

# WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED  
**WESTERN HIGHWAYS BUILDER**

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## IN THIS ISSUE

- Wyoming Uses Absorptive Forms
- Progress on Green Mountain Dam
- Placing Cement Stabilized Base
- Highway Specification Review
- Service Records of Steel Pipe

GREEN MOUNTAIN DAM, a 3,500,000-cu. yd. earthfill structure on the Blue River in Colorado, is one of the major structures of the \$44,000,000 Colorado-Big Thompson project being constructed by the Bureau of Reclamation. Construction operations of the Warner Construction Co., which are reviewed in this issue, will soon enter the third season.



*Opens wide  
Closes tight*



BURY 2-Stage Air Compressors, 180 r.p.m., in Idaho.  
100% lubricated with Texaco Algal Oil since 1929.



THAT'S HOW a hippo's mouth operates . . . and that's how the valves in your air compressors should operate.

In the service of contractors where dependable operation is essential, thousands of compressors are delivering full pressure at minimum cost... and valves keep CLEAN months on end with *Texaco Alcaid, Algol or Ursa Oils*.

These highly stable lubricants resist gumming, sludging and the formation of carbon deposits, assuring more efficient valve action and longer service between inspections.

The outstanding performance that has made Texaco preferred in the contracting field has also made it preferred in fields listed in panel.

Buyers in these fields are enjoying many benefits. You, too, will find important advantages when you use Texaco Lubricants and Fuels.

A Texaco Lubrication Engineer will gladly cooperate in securing more dependable operation of your equipment. Phone the nearest of more than 2300 Texaco distributing plants in the 48 States, or write: The Texas Company, 135 East 42nd Street, New York, N. Y.



FRED ALLEN in a full-hour program every Wednesday night, CBS, 9:00 E.S.T., 8:00 C.S.T., 10:00 M.S.T., 9:00 P.S.T.

METROPOLITAN OPERA every Saturday afternoon, NBC. See local newspaper for time and station.



#### THEY PREFER TEXACO

- ★ More railroad rolling equipment in the U. S. is lubricated with Texaco than with any other brand.
- ★ More tourists use Texaco Fire-Chief Gasoline than any other brand.
- ★ More scheduled airline mileage within the U.S. and to other countries is flown with Texaco than with any other brand.
- ★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.
- ★ More copper is produced in the U. S. by mines using Texaco Products than by all other copper mines combined.
- ★ More stationary Diesel horsepower in the U.S. is lubricated with Texaco than with any other brand.
- ★ More Diesel horsepower on streamlined trains in the U.S. is lubricated with Texaco than with all other brands combined.



**TEXACO Lubricants**  
FOR ALL COMPRESSORS AND AIR TOOLS



**NORTHWEST  
ENGINEERING COMPANY**  
1736 Steger Building  
28 E. Jackson Boulevard  
Chicago, Illinois

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Buy for the  
**TOUGH GOING**  
and the easy jobs  
will take care of  
themselves

# GET OUT IN FRONT with EUCLIDS



WHETHER your contract is large or small, whether it calls for improving a highway, building an airport, or increasing the capacity of an industrial plant— you can do the job better, faster, and more economically with Euclids!

C. J. LANGENFELDER & SON, for example, selected three 13-Yard Bottom-Dump EUCLIDS to haul 60,000 cu. yds. of sandy material for approaches to a bridge near Elkton, Maryland. On a comparatively short but tough haul, the great tractive power, mobility, and quick dumping of these big Euclids enabled them to do the job with the utmost speed and economy.

Contrast this with RALPH E. MILLS contract for enlarging Norfolk & Western's railroad yard at Roanoke, Virginia. On this job twelve of the same size Bottom-Dump EUCLIDS are hauling a million cu. yds. of excavation . . . 40,000 cu. yds. in one week over a mile haul. Yet it's the same Euclid qualities—great capacity . . . speed on the haul road . . . flotation and power on the fill . . . quick dumping . . . economy of operation . . . and the stamina to keep going at a terrific pace—which puts Euclids out in front on jobs like this!

Increase Your Contract Opportunities With Euclids!

THE EUCLID ROAD MACHINERY CO.  
Cleveland, Ohio

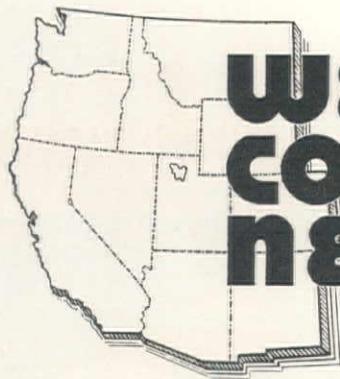
# EUCLID

SELF-POWERED  
EARTH • ROCK • COAL • ORE  
HAULING EQUIPMENT

And—CRAWLER WAGONS • ROTARY SCRAPERS • TAMPING ROLLERS



CONTRACTORS' EQUIPMENT & SUPPLY CO., Albuquerque; INTERMOUNTAIN EQUIPMENT COMPANY, BOISE; HALL-PERRY MACHINERY COMPANY, Butte; F. W. McCOTY COMPANY, Denver; CROOK COMPANY, Los Angeles; THE RIX COMPANY, INC., San Francisco; LOGGERS AND CONTRACTORS MACHINERY CO., Portland, Ore.



# WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED  
WESTERN HIGHWAYS BUILDER

*The National Magazine of the Construction West*



## Editorial Page

Wyoming Uses Absorptive Form Lining . . . . .	73
By R. C. PIKE	
Service Records of Steel Pipe . . . . .	76
By J. D. DeCOSTA	
Construction Progress at Green Mountain Dam . . . . .	78
Review of Changes in California Highway Specifications .	82
Placing Cement Stabilized Base Near Banning . . . . .	85
Welded Concrete Car for Mono Tunnel Lining . . . . .	87
By K. G. WILKES	
How It Was Done . . . . .	90
News of Western Construction . . . . .	93
Unit Bid Summary . . . . .	46
Construction Contracts Awarded During February . .	62
Trade Winds—News of Men Who Sell Equipment . .	84
New Equipment and Manufacturers' Catalogs . . . . .	86

D. F. STEVENS, Editor

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For real Diesel economy and performance, choose the International ID-6, shown here with road grader.

# 5 NEW INTERNATIONAL Industrial WHEEL Tractors

...and the New INTERNATIONAL-A  
HIGHWAY  
MOWER



This ideal outfit for highway maintenance—the new International-A Side-Mounted Mower—cuts a 5-ft. swath at mowing speeds up to 6 m.p.h. Cuts at any angle from 90° above horizontal to 45° below horizontal. Pneumatic power-lift controls angle of cutter bar. Enclosed, heat-treated gears run in oil bath. Electric starting and lighting.

• Here are International Harvester's latest products for the men who use industrial power—five brand-new International Industrial WHEEL Tractors. These "I" Tractors, added to the line of International TracTracTors and Power Units announced in 1940, make standardization on International Industrial Power more profitable than ever.

Three of these new "I" models have carburetor-type engines—two have International quick, easy-starting, full Diesel engines. They are streamlined, efficient, economical—ready to cut costs to the bone on a wide variety of jobs.

Contractors, counties and townships, cities and villages, airports, parks, cemeteries, golf courses, railroads, public utilities, factories, lumber and building supply yards,

etc., will find these new Internationals useful, handy, and economical on a wide variety of construction, maintenance, materials-handling, and transportation work.

All these tractors have Tocco-hardened crankshafts, pressure lubrication, replaceable cylinders, five forward speeds up to 15 m.p.h., gear drive, countershaft brakes that can be individually controlled or interlocked, provision for mounting a variety of allied equipment, and many other features.

See these tractors at first hand. Watch them perform on the job. Ask the nearest International Industrial Power dealer or Company-owned branch for full information.

**INTERNATIONAL HARVESTER COMPANY**  
180 North Michigan Avenue, Chicago, Illinois

# INTERNATIONAL



ID-9

Rugged, husky power and long life go hand in hand in the new International ID-9 Diesel Tractor (above).

## EQUIPMENT THE NEW "I" TRACTORS WILL HANDLE in the Construction Field

The new International WHEEL Tractors are capable of operating a variety of equipment in their power range. This includes maintainers and graders; front-end shovels and loaders; cross-walk, side-walk, and other types of snow plows; road rollers; cranes and hoists; winches; brushes and sweepers; disk harrows and mixers for mixed-in-place roads; scrapers; dump wagons; trailers; tampers; mowers; etc.

## "I" Tractor Facts at a Glance

**I-4**—4-cylinder valve-in-head gasoline engine. Bore and stroke  $3\frac{3}{8} \times 4\frac{1}{4}$  inches. Five forward speeds up to 15 m.p.h. Develops 29.5 engine h.p. at 1,650 r.p.m.

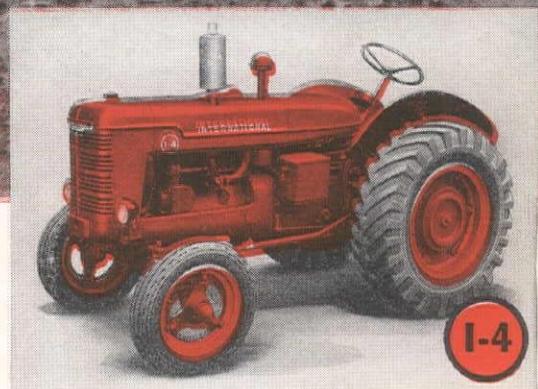
**I-6**—4-cylinder, valve-in-head gasoline engine. Bore and stroke  $3\frac{7}{8} \times 5\frac{1}{4}$  inches. Five forward speeds up to 14 m.p.h. Develops 40.5 engine h.p. at 1,450 r.p.m.

**ID-6 DIESEL**—Quick-starting, 4-cylinder, compression-ignition, 4-cycle Diesel engine. Bore and stroke  $4.4 \times 5.5$  inches. Five forward speeds up to 15 m.p.h. Develops 51.5 engine h.p. at 1,500 r.p.m.

m.p.h. Develops 38.5 engine h.p. at 1,450 r.p.m.

**I-9**—4-cylinder, valve-in-head gasoline engine. Bore and stroke  $4.4 \times 5.5$  inches. Five forward speeds up to 15 m.p.h. Develops 54 engine h.p. at 1,500 r.p.m.

**ID-9 DIESEL**—Quick-starting, 4-cylinder, compression-ignition, 4-cycle Diesel engine. Bore and stroke  $4.4 \times 5.5$  inches. Five forward speeds up to 15 m.p.h. Develops 51.5 engine h.p. at 1,500 r.p.m.



I-4



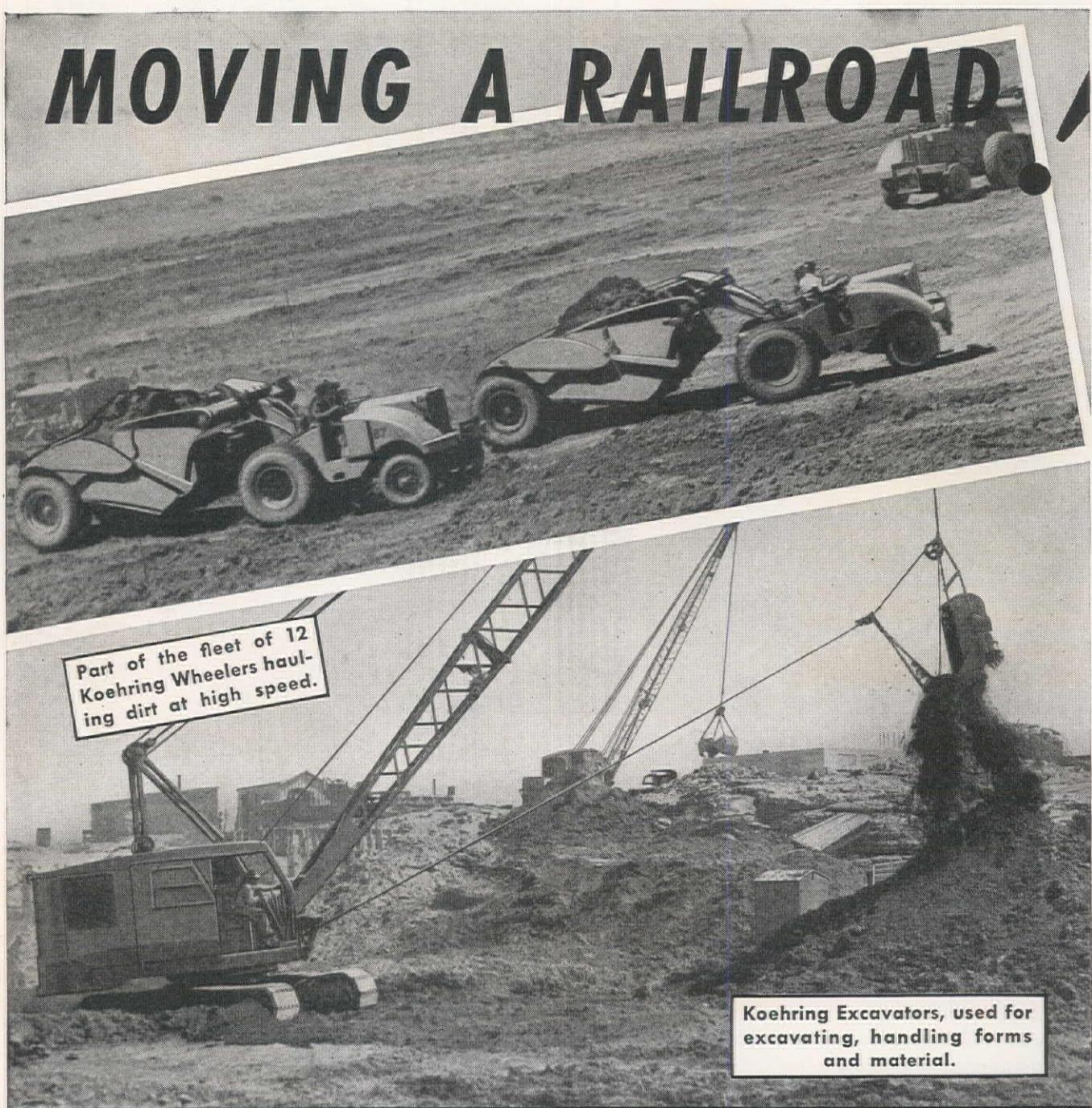
I-6



I-9

**International Industrial Power Dealers:** Smith Booth Usher Co., Los Angeles; O. S. Stapley Co., Phoenix; Howard-Cooper Corp., Portland, Seattle, Spokane, Klamath Falls, Eugene; Intermountain Equipment Co., Boise; J. D. Adams Co., Billings; The Lang Co., Salt Lake City; Motor Equipment Co., Albuquerque; Clark County Wholesale Mercantile, Inc., Las Vegas; H. W. Moore Equipment Co., Denver; Allied Equipment Co., Reno; Wilson Equipment & Supply Co., Cheyenne. **International Harvester Branches** at San Francisco, Los Angeles, Portland, Seattle, Spokane, Salt Lake City, Denver, and Cheyenne

# MOVING A RAILROAD



Twelve Koehring Wheelers on the Santa Fe main line track re-location project — to make way for Caddoa Dam . . . hauled dirt night and day at high speeds over long hauls. Speed was essential to hold the cost down . . . and the Koehring Wheeler Method was the profit answer. • Fast loading, high speed travel, loaded or empty, complete, quick dumping, short turning radius, are the second-saving features that reduce the cost of dirt-moving, when the Koehring Wheeler Method is used. Koehring Excavators handled material, forms and excavation on this 3,500,000 yard project.

**KOEHRING COMPANY • Milwaukee, Wis.**



**HEAVY-DUTY CONSTRUCTION EQUIPMENT**

MARRON, 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.

# TRAXCAVATOR\*

EXCAVATES - LOADS

GRADES - STRIPS

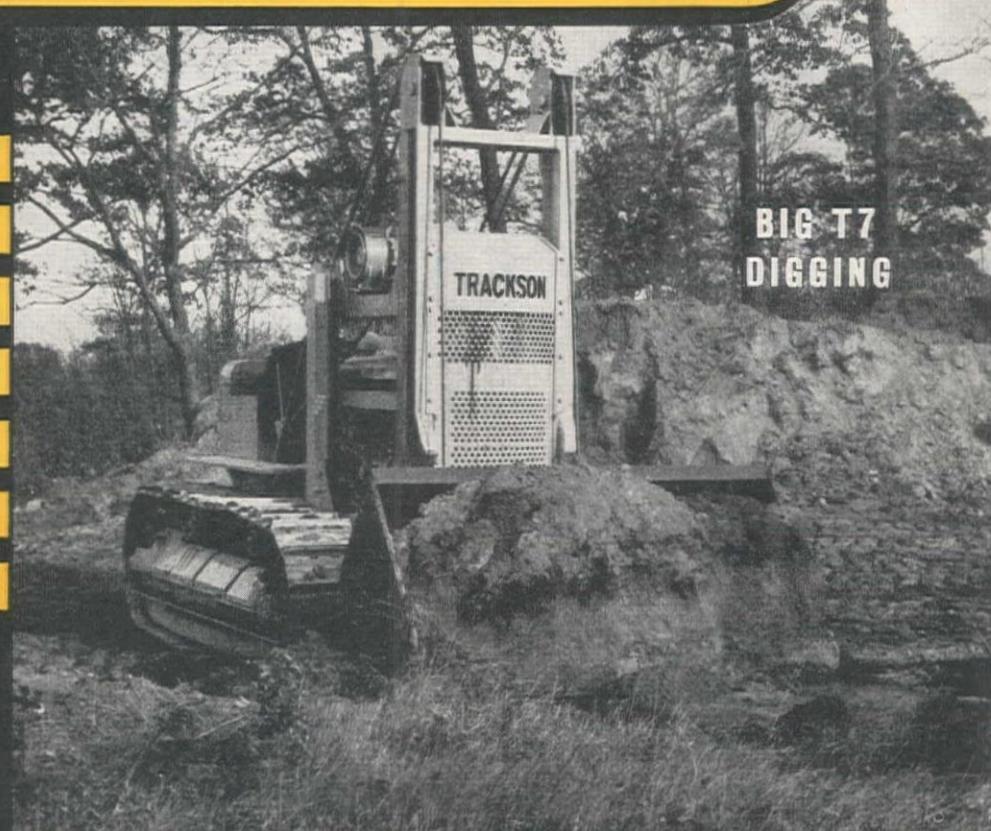
BULLDOZES - LEVELS

CLEAR LAND - PULLS

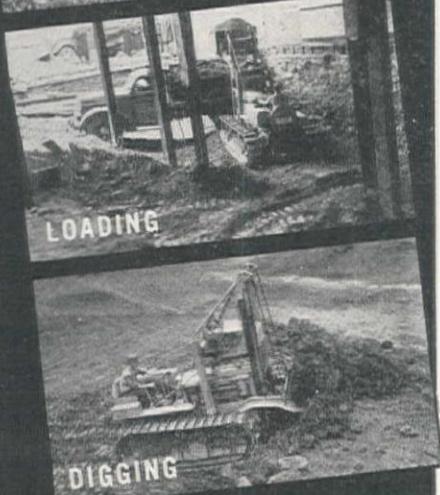
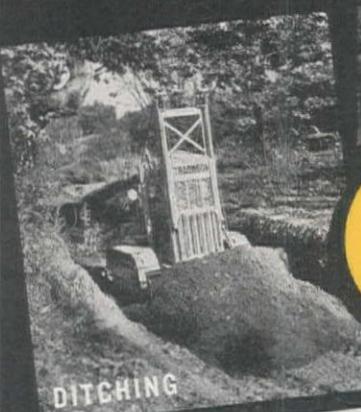
BACKFILLS - CASTS

DIGS - REMOVES SNOW

SPREADS - DITCHES



BIG T7  
DIGGING



## *Master* of ALL JOBS

"TRAXCAVATORS"—the heavy-duty tractor excavators not only dig but load, grade, carry, bulldoze, and spread; in fact, there is no limit to their usefulness on any project. Mounted on "Caterpillar" track-type tractors they have the speed, power and traction to operate in toughest conditions. "TRAXCAVATORS" are furnished in three models with a wide variety of bucket sizes, extra equipment and attachments to make them the MASTER OF ALL JOBS. Sold and serviced by "Caterpillar" dealers everywhere. Further information and completely illustrated catalog upon request. TRACKSON COMPANY, Milwaukee, Wis., U. S. A.

\*REG U. S. PAT. OFF.

## TRAXCAVATORS ARE PROFIT-MAKERS

A 3186-1P-C

# LIMA SUPER PAYMASTER IS PROOF OF LEADERSHIP

The SUPER-PAYMASTER, a  $\frac{3}{4}$  yard combination shovel, dragline, crane and pull shovel recently developed by the Lima Locomotive Works, Incorporated, Shovel and Crane Division, Lima, Ohio, is a major contribution to the efficiency and profitable operation of the earth moving and material handling industry. Its design embodies the same time-tested features that made its predecessor, the PAYMASTER, so unusually popular with its many users. When equipped as a clamshell or dragline, capacity depends upon length of the boom and material to be handled. When equipped as a crane, it is of 13 ton capacity. As a shovel, it is equipped with an 18' boom and a 15' dipper handle. It is exceptionally fast with ample strength to give steady dependable service in all kinds of work. Many new features which are worth consideration are found in its design.

LIMA LOCOMOTIVE WORKS, INC., Shovel and Crane Division, Lima, Ohio. In the West: Seattle: Branch Office, 1932 1st Ave. So. Spokane: General Machinery Co., E. 3500 Block, Riverside. Portland: Fennahatty Machinery Co., 112 S. E. Belmont St. Boise: Fennahatty Machinery Co., 600 Front. San Francisco: Garfield & Co., 1232 Hearst Bldg. Los Angeles: Smith Booth Usher Co., 2001 Santa Fe. Denver: F. W. McColl Company, 956 Cherokee St. Phoenix: Smith Booth Usher. Helena, Mont.: Steffert Equipment Co., Main and Cutter Sts.

## EVERYTHING YOU WANT IN A $\frac{3}{4}$ YD. EXCAVATOR

### PROPER BALANCE

Proper balance is particularly stressed in the SUPER-PAYMASTER. The machinery and power plant is placed to the extreme rear of the rotating frame so that greater capacities can be obtained without affecting the weight of the machine.

### HOOK ROLLERS

Hook rollers relieve center pintle of all digging shocks. They rotate between a double roller path cast integral with the lower frame casting.

### LARGE SWING CLUTCHES

The swing clutches are the internal expanding band type, toggle operated, with housings 17" in diameter by 6" wide. The unusual size of the clutches assure smooth, split-hair control. No time lost in spotting the load—no overheating—no complicated adjustments.

### ANTI-FRICTION BEARINGS

Friction is reduced to a minimum by the use of anti-friction bearings which are used at all the important bearing points, including drums.

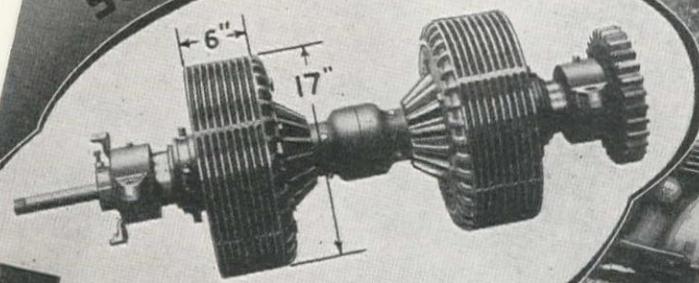
**EASE OF CONTROL**  
The SUPER-PAYMASTER responds instantly to all control levers which are within easy reach and are of short easy throw. One of the chief considerations of Lima Engineers in designing this unit was the operator.

### CLEAR VISION CAB

The cab is equipped with a winter-front which is housed in top of cab when not in use, and it can easily be lowered or raised with one hand.

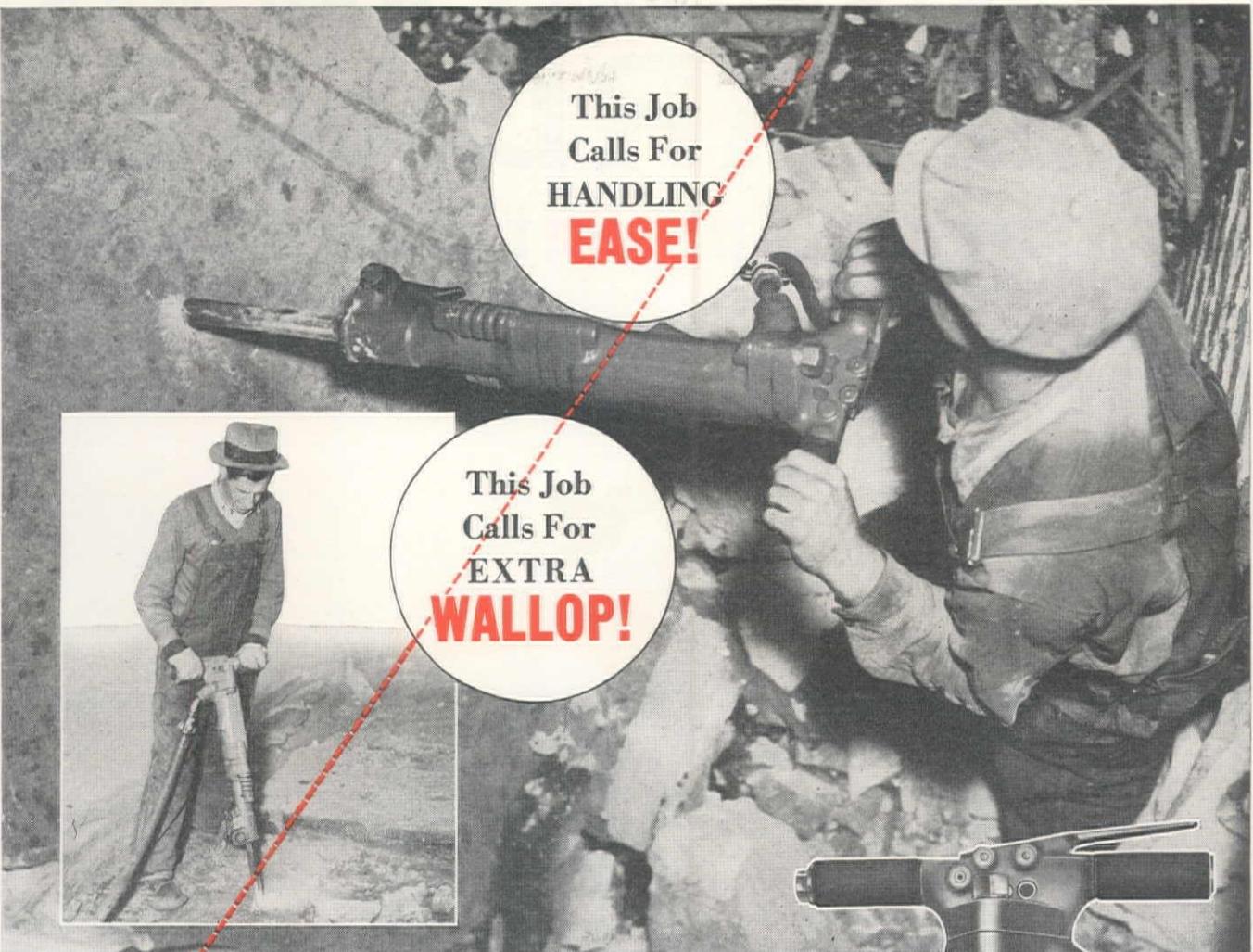
No other cab offers so great a range of vision.

BIG, SMOOTH RUNNING SWING CLUTCHES



**LIMA** **SUPER PAYMASTER**  
3/4 YD.  
SHOVEL • CRANE • DRAGLINE • CLAMSHELL • TRUCK CRANE • PULL-SHOVEL

WESTERN CONSTRUCTION NEWS—March, 1941



This Job  
Calls For  
**HANDLING  
EASE!**

This Job  
Calls For  
**EXTRA  
WALLOP!**

## *Thor* No. 23 Paving Breaker handles BOTH!

**Handles Like a Lightweight . . . Wallops Like a Heavy!**

That's why Thor's new No. 23 Paving Breaker can perform with equal ease a pavement job that demands sustained power *and* a wall opening that requires fast, continuous movement. Weighing but 59 pounds, this new Thor machine gets its *extra wallop* from a block type piston hammer whose new design greatly increases the foot pound blows. It gets its *handling ease* through trim, stripped-for-action design that eliminates every ounce of excess weight. These and other Thor structural features like the quick-change Latch Type Retainer . . . the cool, rubber-grip handle . . . and a new cylinder that gives full effect to every hammer blow . . . make the new No. 23 the "Breaker with the Extras". Extra Power! Extra Output! And Extra Profits for you on every job!

**INDEPENDENT PNEUMATIC TOOL CO.**  
600 WEST JACKSON BLVD., CHICAGO, ILLINOIS

Birmingham, Ala.      Boston, Mass.      Buffalo, N.Y.  
Cleveland, Ohio      Detroit, Mich.      Los Angeles, Calif.  
Milwaukee, Wisc.      New York, N.Y.      Philadelphia, Pa.  
Pittsburgh, Pa.      St. Louis, Mo.      San Francisco, Calif.  
Toronto, Ont.      London, England



*Thor*

Rock Drills  
Paving Breakers  
Clay Diggers  
Sump Pumps  
Associated  
Air Tools

MAIL COUPON FOR NEW THOR CATALOG—1941 EDITION

INDEPENDENT PNEUMATIC TOOL CO.  
600 West Jackson Blvd., Chicago, Ill.

Please send me the new Thor Catalog No. 42 containing complete information on rock drills, paving breakers, clay diggers, sump pumps, and associated air tools.

Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_



# FOR EARTHOVERS WHO WANT BIG YARDAGES with Low Equipment Cost...



LeTourneau LP Carryalls  
(15 Heaped Yards) and  
"Caterpillar" D7 Tractors  
(80 H. P.)

THE LP Carryall is built for earthmovers who want to move big yardages but don't want to invest in extra big tractors. It has a heaped capacity of 15 yards and is designed for use with the 80 H. P. "Caterpillar" D7 tractor. Very profitable for fleet operation with D7 pusher.

## Easy Loading, Narrow Cutting Edge

The LP Carryall has an 8'6" cutting edge, enables you to apply greater drawbar pull per lineal foot of blade. D7 tractor weight

and Carryall's narrow overall width greatly facilitate shipping . . . narrow width makes for easier operation in tight places and nar-

row cuts. High bowl sides and big apron increase bowl capacity and prevent spilling. New arched "A" frame strengthens construction, same time makes for easier unloading. All sheaves and cables operate up out of the dirt, thus give you longer cable life.

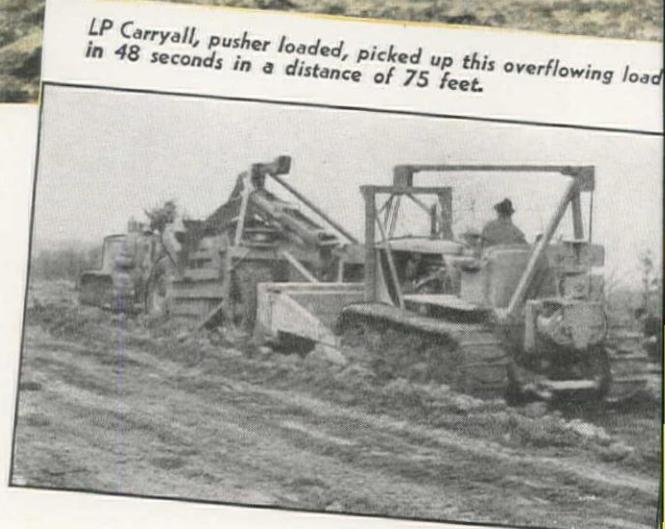
See for yourself . . . on your own job . . . how a fleet of job-proved LP Carryalls and D7 tractors can give you big yardages with low equipment investment and low operating costs. Ask your LeTourneau-"Caterpillar" dealer for complete details NOW.

**These Profit-Making Yardages  
Can Be YOURS with LP and D7**

Loading on the level with a D7 pusher and hauling over favorable surfaces, you can expect the following results from LP Carryalls and D7 Tractors:

Haul— one way (feet)	Cycle Time (min.)	Trips per hour	Pay Yards per 50-min. hour
1000	6.5—7.7	7.7—6.5	92—78
700	5.3—6.1	9.5—8.2	114—99

Variations shown in cycle time, trips per hour and yardage are result of the varying speeds available in D7 tractors. Under same conditions pay yards obtained without a pusher will run approximately 25% less.



# LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

CARRYALL\* SCRAPERS, ANGLEDODZERS\*, BULLDOZERS, ROOTERS\*,  
POWER CONTROL UNITS, DRAG SCRAPERS, CRANES, SHEEP'S FOOT  
ROLLERS, PUSHDOZERS, TOURNAPULLS\*, TOURNATRAILERS\*

Name Reg. U. S. Pat. Off.



## I'm no hot shot, *honest...*

Every once in a while I'm dubbed "a lubrication hot shot," and I'm not one, honest. Now if they'd call me "a good salesman for Safety Factors," that would be more like it. For instance:

The other day, I fixed up a traveling kiln that had been freezin' bearings pretty bad. Yet all I did was suggest a bearing lubricant nobody else had been able to supply those folks.

So what? So I get the credit, when actually it's one of the Shell Safety Factors that did it. Shell has a whole bagful of these money-saving Safety Factors that I'd like to talk to you about. Just say when . . .

*Your Shell Salesman*

# Two BIG features



Side plates are extended well ahead of the cutting edge to eliminate side spilling of dirt while spreading or loading.



Load can be dumped and spread on side slopes because of accurate control, wide wheel spread, and low center of gravity.



The dirt rolls easily out of the bowl and underneath the scraper; no power wasted bulldozing it under.



P-70  
Part of a load can be dumped in one place and the rest of it dumped in another; tilting bowl is easily controlled.

## 1 - Controlled Depth of Spread . . . . .

You get exactly the depth of spread you want with the new Bucyrus-Erie 4-Wheel Scrapers. As dirt is rolled out of the bowl it is leveled off by the cutting edge. Since this cutting edge is fixed in the frame and controlled by a separate line of cable, independently of the tilting of the bowl, it maintains the depth of spread you want at all times.

## 2 - Positive Rolling Ejection . . . . .

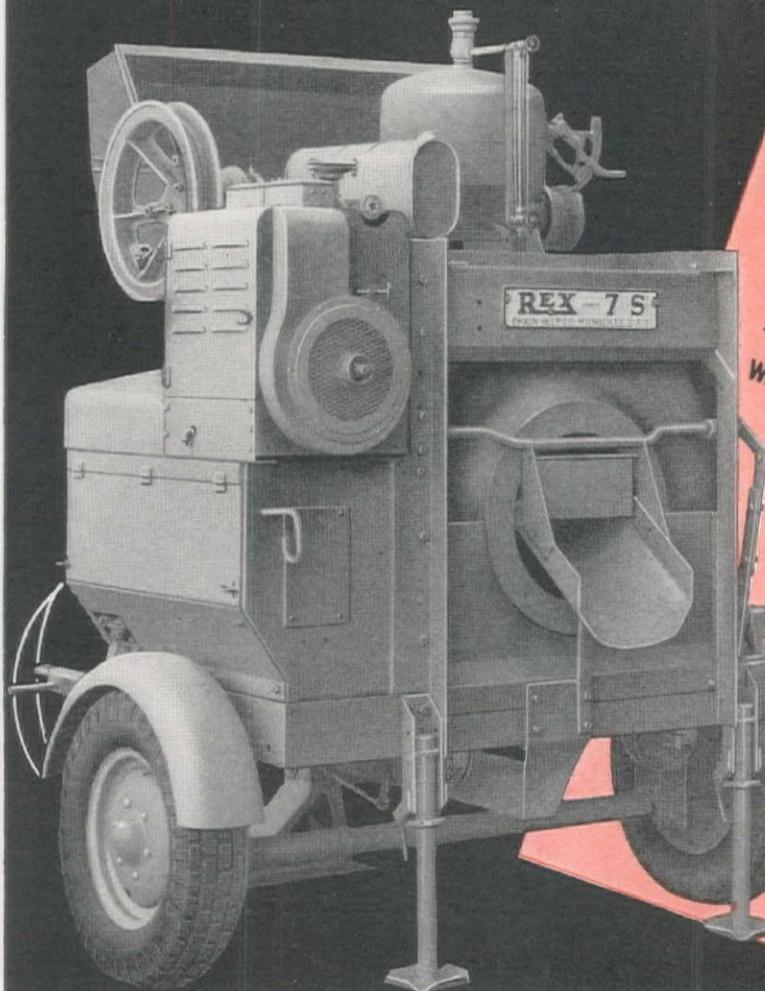
You also get positive rolling ejection, by means of the tilting bowl. Controlled by an independent line of cable, this bowl ejects the dirt in a rolling motion when tilted upward. It can be tilted to a nearly vertical position, and this sharp angle of tilt plus the shearing action along the side plates of the frame assures you clean dumping of any kind of material.

Of course the new Bucyrus-Erie scrapers have all the other features. There is a complete range of sizes matched to the new line of International TracTracTors. Find out all about them from your nearest International TracTracTor Dealer.

**Bucyrus-Erie**  
SOUTH MILWAUKEE, WISCONSIN

ON YOUR JOBS...  
GET SET TO

**GO!**



WITH THE GREATEST  
LINE OF MIXERS  
REX HAS EVER BUILT!

UP TO 50% FASTER CHARGING  
—with "Multi-Shake" shimmy skip  
SIMPLER—FASTER DISCHARGE  
with the Rex Swing-Chute

DIE-FORMED, PRESSED STEEL  
drumheads, tracks and roller—no flat spots!  
ENGINES ON "HIGH" SIDE OF ROAD  
—sway-free towing!

WATER CONTROL 100% ACCURATE!  
IMPROVED CHAIN BELT DRIVE

—by men with over 50 years of  
power transmission experience!

OPTIONAL  
POWER

New air-cooled  
engines, or radia-  
tor-cooled engines  
available on 7S,  
10S and 14S sizes.  
Take your choice!

FENDERS—  
for smooth  
appearance

**Be Right  
-Buy**

**5S • 7S • 10S • 14S • SEE THEM ALL!**

Drop in to see the great line of mixers your Rex dealer has on the floor this year! Find out about the sensational, new operating features that Rex alone offers! You'll say, "Rex has something there—something I've been wanting for a long time!" And you'll be right! Rex Mixers now bring you cost-reducing advantages not approached by any others—plus many improvements that will help you in obtaining the faster and better mixing so necessary in "high-pressure" times like these. So do yourself a favor and see your Rex distributor without delay!

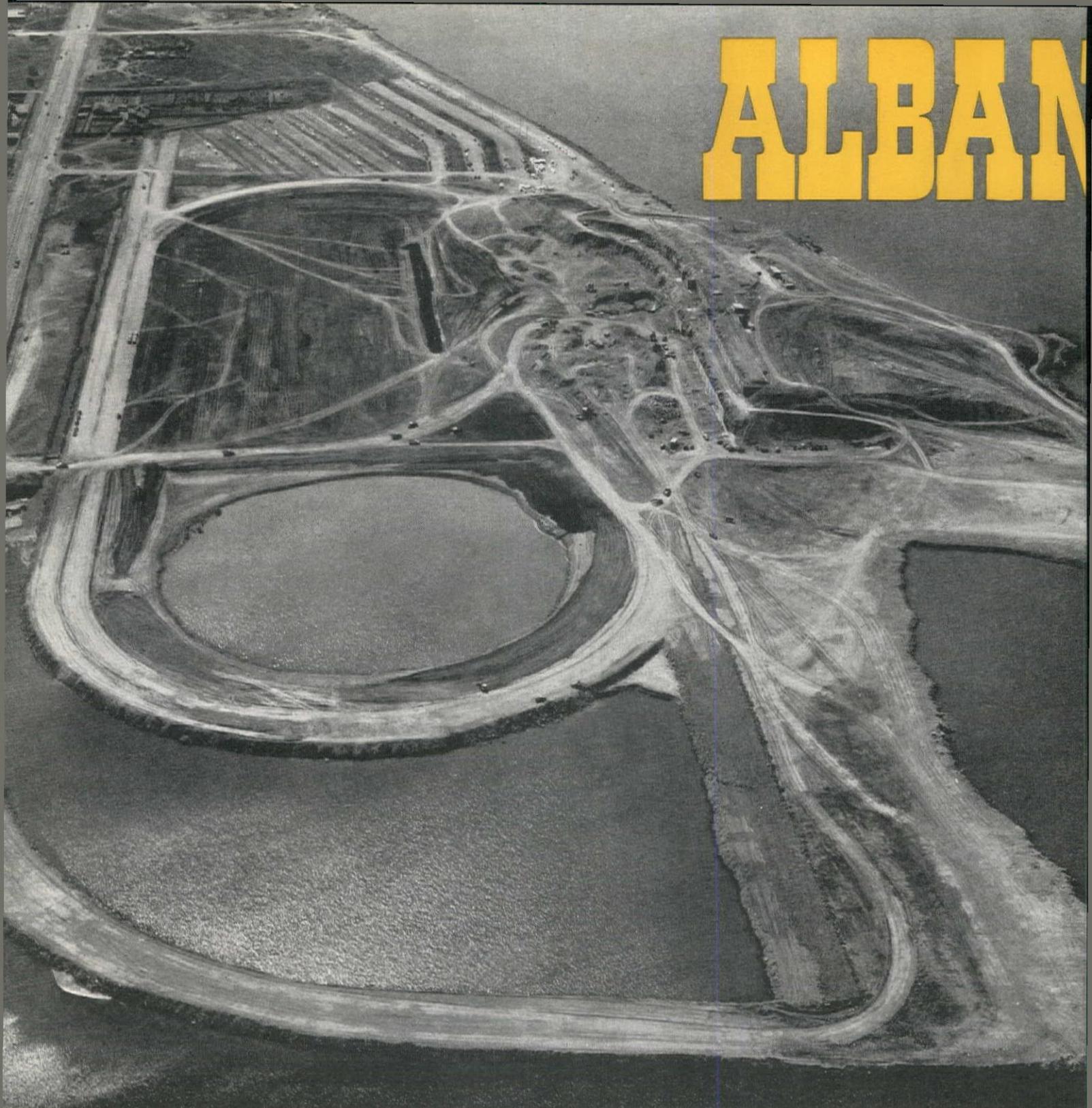
SEE YOUR  
**REX**  
DISTRIBUTOR  
ABOUT

**REX MIXERS**

CHAIN BELT COMPANY OF MILWAUKEE

50<sup>th</sup> ANNIVERSARY  
**REX**  
1891 1941  
CHAIN BELT COMPANY

# ALBANY



**"America's  
finest tractor  
built America's  
finest Race Track"**

*says: Jack Casson, General Contractor  
Hayward, California*

**"The mountain of rock and clay that lay in the middle of our Albany Race Track site seemed an insurmountable barrier to my associates. We had to move it out of the way of the grandstand and we needed dirt to fill in the low spots. But, I felt sure we could solve the problem and handle the 1,500,000 yards of excavation — mostly rock — in time for our planned opening date, and at a cost well within our estimates.**

**"I had good reasons for my confidence because I knew from my many years' experience as a road-building contractor what 'Caterpillar' Diesel Tractors would do. I immediately moved in a fleet of these machines and put them to work with the biggest scrapers and bulldozers we could get. I don't have to tell anyone who saw the site of our track before these tractors went to work that they have more than justified my confidence."**

# Y TRACK



COMPLETED ON  
SCHEDULE!



At the halfway stage the site of the track looked like a busy ant hill from the air. The grandstand rests in the center cut and the fill at the right was completed to form the car-parking area.

Golden Gate Turf Club Today—magnificently landscaped and beautifully appointed. Proclaimed by many turf followers America's finest racing plant!

Even as the clubhouse goes up one of Jack Casson's "Caterpillar" D8 Tractors and LeTourneau Carryalls digs away at the remains of the 1,500,000-yard mountain.

## JACK CASSON MOVES 1½ MILLION YARDS IN EIGHTEEN MONTHS

Though the Weatherman intervened and delayed for a month the opening of the Albany Race Track scheduled for New Year's Day, Jack Casson made good on his promise to the Directors of the \$2,000,000 Golden Gate Turf Club. A little more than 18 months earlier, he had surveyed the site, tested the material in the million-and-a-half-yard mountain which stood in the way of the proposed clubhouse and grandstand and had assured his associates he could have the plant ready to go.

Jack Casson himself tells how it was done in the interesting story on the opposite page. Read it and you'll see why he was willing to stake his reputation and his investment on the dependability of "Caterpillar" Diesel Tractors — you'll understand why it will pay you to call in your "Caterpillar" Dealer when you figure your next job.

Your Dealer will help you select the equipment combination to do the job at the lowest possible cost and he'll arrange to give you the kind of "job-through" service that will keep your equipment working and earning with less delay and expense.

CATERPILLAR TRACTOR CO.  
SAN LEANDRO, CALIF. PEORIA, ILL.



# CATERPILLAR

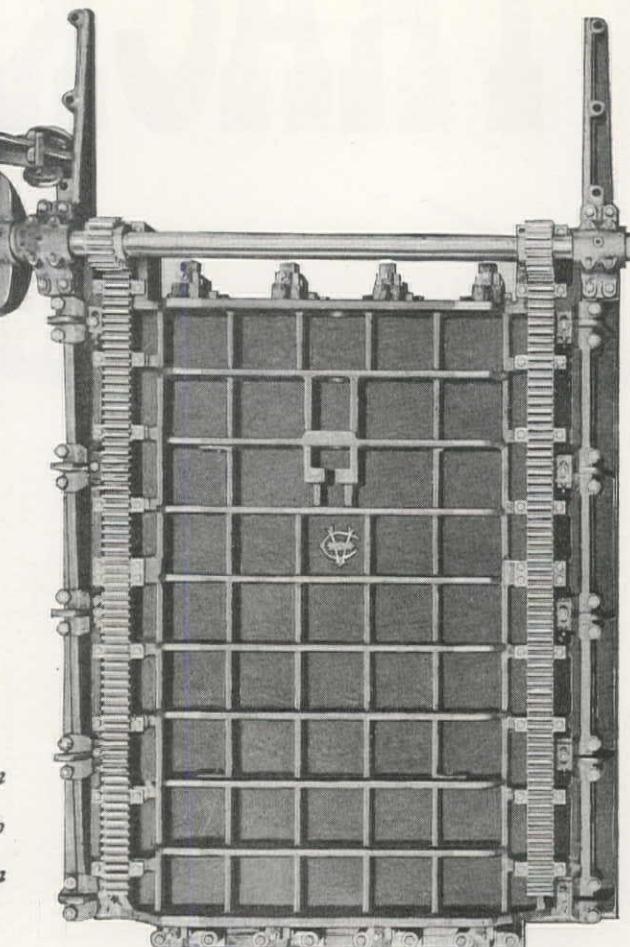
REG. U. S. PAT. OFF.

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

*For*

**WATERWORKS  
SEWAGE DISPOSAL  
FLOOD CONTROL**

*84" x 108" Special Chapman  
Sluice Gate. Equipped for both  
Hydraulic and Hand Operation*



# **Chapman SLUICE GATES AND FLOORSTANDS**

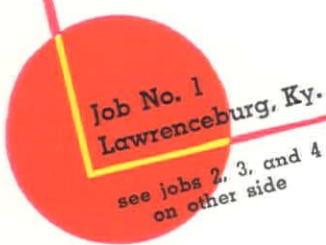
Long successful experience is a sound basis for leadership in any field. Chapman has seventy-five years to its credit in the manufacture of sluice gates and operating accessories. Thousands of installations, including outstanding projects in every field, provide concrete evidence of the high quality of service rendered. Chapman sluice gates have been standardized in a range of types and sizes to meet the majority of conditions, at substantial savings in cost and time of delivery. Where standard material won't meet some special requirement, we will be glad to assist in a study of the problem and make recommendations.

**THE CHAPMAN VALVE**  
MANUFACTURING COMPANY  
INDIAN ORCHARD, MASS.



Four

## Significant Jobs



OVER 150 Barber-Greene Bituminous Mixers operated on hundreds of jobs throughout the country in 1940.

Out of these hundreds of jobs, four were outstandingly significant. These four continuous mixers were equipped with Barber-Greene Gradation Control Units, and the plants applied to the "high type hot mixes" on four widely separated locations. We engaged a competent private laboratory to follow each job thoroughly, and invited Federal, State, and City Engineers to witness each job in operation, take samples, and make analyses in their own laboratories.

The results are startling. See other side.

**BARBER** STANDARDIZED MATERIAL HANDLING MACHINES **GREENE**  
AURORA ILLINOIS

# 4 Significant Jobs

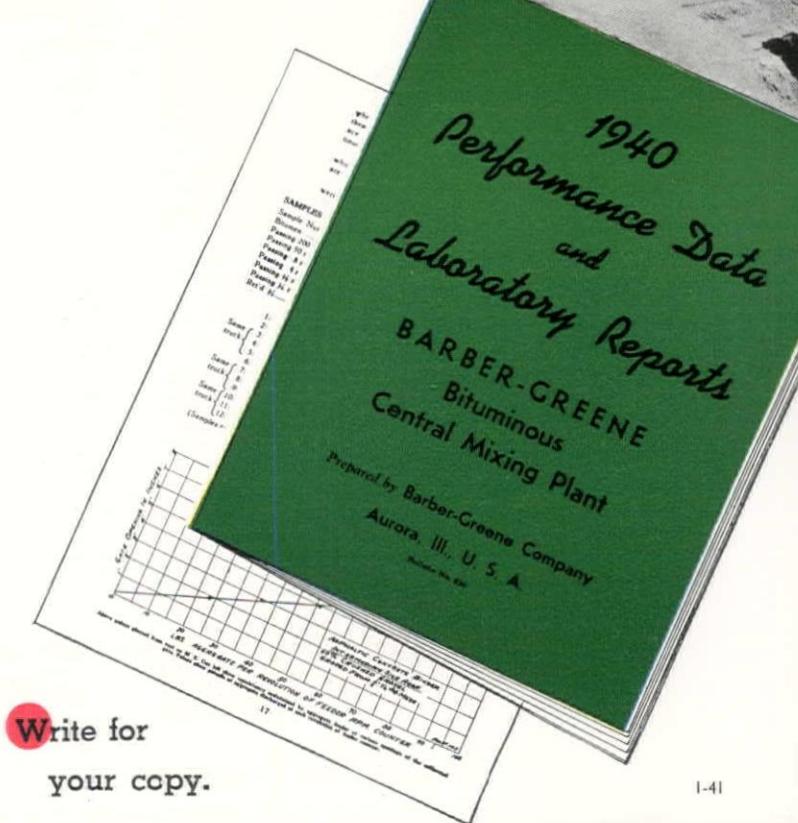


**I**N 1940 Barber-Greene Mixers were set up for the "high type hot mixes" on four widely separated locations. They herald a new era in bituminous construction. The performance data and laboratory reports have been assembled into a booklet, available on request. Not a picture book, it gives the results of applying the modern production principle of continuous flow to the "high type hot mixes". It will answer the questions of those who are sincerely skeptical.

The B-G Central Plant includes the Dryer, Gradiation Control Unit (Screen, Bins, Apron Feeder, and Calibrated Gates), and Mixer. It gives the finest means of preparing the "high type hot mixes". By "finest" we mean from every angle, including accuracy, consistency, ease of inspection, high capacity, portability, versatility, and economy.

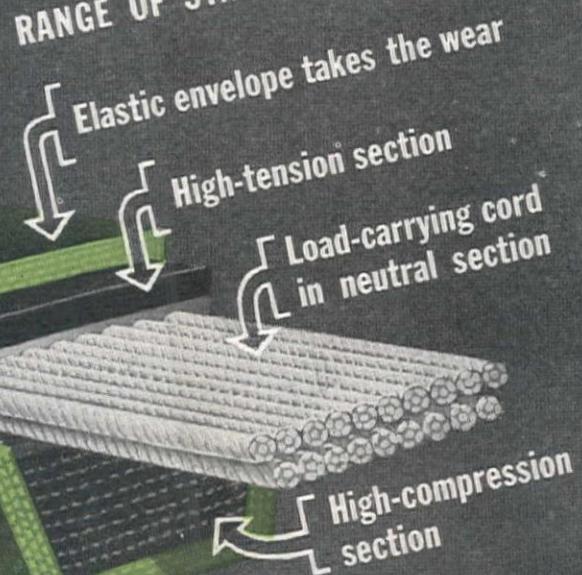
The units can be used in any desired combination, including Single Aggregate Central Set-ups, and Travel Plant work.

It will not be surprising if the introduction of the continuous plant on "all type" mixes is opposed — by some wanting only complete proof and demonstration — by others who have financial or other interests in less portable, less versatile, or less modern equipment. We conscientiously believe that these groups will serve their own interests by studying the booklet. Already some producers have expressed interest in supplementing their present permanent equipment with a portable continuous plant, in order to more economically supply the more distant areas of their present markets.



**BARBER** **GREENE**  
AURORA ILLINOIS

MADE IN FIVE STANDARD CROSS SECTIONS AND  
A COMPLETE RANGE OF STANDARD LENGTHS



## Six Years Old

... AND EACH BELT STILL  
PULLS ITS SHARE OF THE LOAD

THE Wenzel-Henoch Company of Milwaukee, Wisconsin, has a Multi-V Belt drive which powers a 125-hp. air compressor used in tunneling, sewers and other underground work. Operating conditions are severe enough to give any belt a battle: dust, surface wear, overloads, round-the-clock activity for days at a time.

Subjected to this sort of pressure, belts were constantly breaking down, or requiring adjustments which consumed time and money.

Eventually, the advice of the G. T. M. — Goodyear Technical Man — was sought. On his specification they installed a matched set of nine E-C Cord V Belts (D-240).

This change occurred nearly six years ago. Today, the management can tell you it was a happy one. The drive has known none

of the old troubles. During all this period these same nine belts have performed their task so efficiently — there hasn't been a single shutdown for adjustment. And all nine are still uniform in length, still pulling evenly.

If you have a similar belt problem, the G. T. M. will be glad to demonstrate the advantages of uniform, longer-wearing E-C Cord V Belts for your Multi-V drives. A note will bring him to your office.

Write: Goodyear, Akron, Ohio, or Los Angeles, California — or phone the nearest Goodyear Mechanical Rubber Goods Distributor.

E-C Cord — T. M. The Goodyear Tire & Rubber Company

THE GREATEST NAME IN RUBBER  
**GOOD**  **YEAR**



MULTI-V  
E-C  
CORD  
BELTS

# Extra

## EARTH-MOVING CAPACITY...



### *Capacity* TO CUT AND ROLL DIRT FASTER, EASIER, CHEAPER

Here is a **NEW** motor grader—built the way you want it—with more time-saving, money-saving, profit producing features than you ever thought possible. It's more powerful, more versatile, stronger, faster . . . easiest handling machine you've ever seen!

**EXTRA AXLE CLEARANCE**—A full six inches of extra clearance under the front axle enables you to handle windrows twice as large as ever before—to straddle heaping windrows without hanging up . . . without wasting power . . . without wasting fuel . . . without decreasing travel speeds.

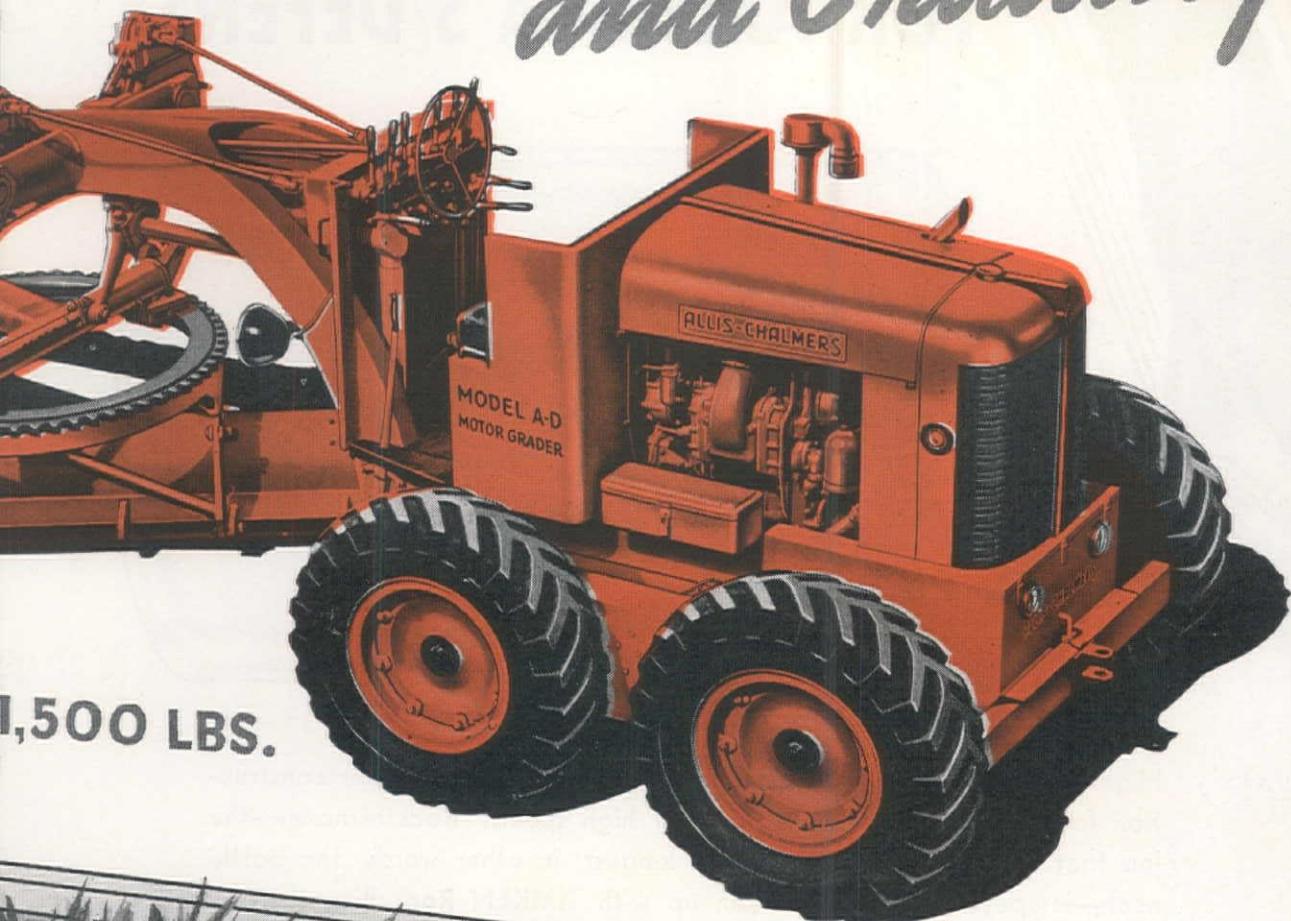
**EXTRA THROAT CLEARANCE**—Plenty of clearance

between blade and circle adds extra earth moving capacity. Heaping loads roll off blade freely without jamming up the circle—no bulldozing action . . . no power loss . . . frequent blade adjustments.

**EXTRA POWER**—Powered by a smooth 75 h.p. 2-cyl. Diesel with a world of power to handle your jobs faster than ever before. It's *smooth* power that cuts your fuel bill—that eliminates costly vibration—that digs in and hangs on when the blade bites deep. It's the kind of power you've always wanted—simple, sturdy, smooth and thrifty.

**FULL BLADE RANGE**—Put it on your toughest jobs. Handles high bank cuts . . . hard ditch cuts . . . heavy oil mix-

# FOR HEAVY CONSTRUCTION and Grading



1,500 LBS.

## REEDOM FROM WINDROW HANG-UPS

—all with equal ease. Operates forward or reverse. Blade positions and adjustments made quickly, easily, accurately.

**IDE SPEED RANGE**—Operate at the exact speed desired for construction, maintaining, snow removal or gravel. In addition to transmission speed changes, throttle engine control gives you a still greater selection of practical working speeds from 1.5 to 16.6 m.p.h. Get your jobs done in time and at a profit.

Before you buy any motor grader get the facts on this remarkable new machine. Find out how it will cut your costs—why you cannot afford to operate without one. See your Allis-Chalmers dealer...NOW!

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

**IT DOESN'T COST... it Pays!**

# A BOTTLE NECK BREAKER FOR AMERICA'S DEFENSE



Highway, dam, bridge and tunnel contracts being let or under construction for America's defense all call for high speed. Rock removal—the job that often seems to "hang-on" longest; in other words, the bottle neck—is speeded up and broken up with TIMKEN Rock Bits, thereby helping you beat the deadline to the draw.

## *Here are a few reasons why:*

1. TIMKEN Bits sink more hole because TIMKEN Steel (All TIMKEN Bits are made of this material) will stay sharp longer, retain gauge longer.
2. Their streamlined design incorporating a flush union on steel and bit results in less stuck steel and reduces steel fracture.
3. Their shoulder construction, whereby the shoulder takes the shock, assures easy removability.
4. Less steel is needed at the drilling site as compared with forged bits, thereby eliminating congestion—especially advantageous in tunneling.

**TIMKEN**  
ROCK BITS

All these advantages result in faster drilling—always important in the construction game and today still more important because of our defense emergency. Try TIMKEN Bits, you will be convinced—and pleased. Write for further information.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

# "VIC" THE WELDER SAYS -



**LISTEN—THEY CAN TELL  
YOU ANYTHING THEY  
LIKE. WHEN IT COMES  
TO WELDING TORCHES,  
I SAY, "VICTOR"**

Ask any good welder — don't take my word for it. VICTOR is the best darn welding and cutting apparatus any man's money can buy — and that's no fooling.

Out on the construction job a torch gotta have more than just looks — we can't lug along half a dozen torches to be prepared for all of the kinds of jobs we run into. Take my VICTOR torch, for instance. Gosh, if I want to bend a piece of metal or straighten it, I attach a multiple flame heating nozzle and the job's done in a jiffy. If I have to weld in one of those cockeyed spots that are hard to reach, I get myself the right size straight or short bent nozzle.

My old cutting attachment can whack off a piece of steel shafting even if it is 10 inches thick — and that isn't just bragging.

If the regulator goes batty on me — and you know they all do — I can put a new seat in without hunting around for special tools or a fancy instruction book. Sure — I use the arc on a lot of jobs, but when it comes to an emergency — give me a good old VICTOR torch. I'll bet half of you fellows don't even know how many helpful attachments you can get for your VICTOR torch.

To reader

**JACK REILLY . . .**

Jack — how can I answer your swell letter when you forgot to give your address? It's great to get letters from so many of you fellows!

VIC

Tell you what — just drop me a note and say — "Let me have a copy of that new 48-page VICTOR catalog. Really — you ought to know more about that torch of yours. And if you do your own welding apparatus repairs why not let me send you the VICTOR Apparatus Repair Instruction Book — it's on the house."

# VICTOR

**VICTOR EQUIPMENT COMPANY**

844 Folsom Street  
SAN FRANCISCO

3821 Santa Fe Avenue  
LOS ANGELES

OVER A MILLION

ATLAS ACCORDION FOLD  
ELECTRIC DETONATORS  
*used on the*  
DELAWARE AQUEDUCT  
NEW YORK

**PROOF APLENTY**  
*of Simple Yet Effective Performance*

On the Delaware Aqueduct—recognized for high standards in safety and efficiency—more than 1,000,000 Atlas Accordion Fold\* Electric Detonators already have been used in driving shafts and tunnels. Here's ample evidence of effective performance.

**Greater Safety...Easier to Use**

These two advantages make safety precautions not less important—but more effective. The cap is in the center of 48 folds of wire to protect the detonator. And it's easy to open without kink or snarl. For the easiest, simplest, safest method of handling electric blasting, ask your Atlas representative about Atlas Accordion Fold Electric Detonators.

\*Reg. U.S. Pat. Off.

**ATLAS** EXPLOSIVES  
*"Everything for Blasting"*



Atlas Powder Co., San Francisco, Calif.

THE  DIVISION

Offices in Principal Cities

# UNDERGROUND LEAKAGE...

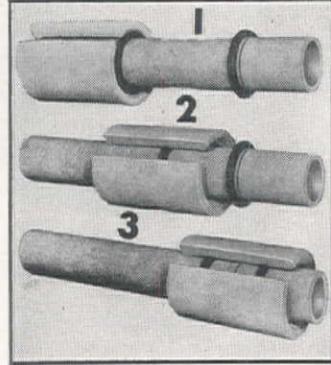
## and how it can be minimized with this simple, "packaged" joint

NUMEROUS surveys have shown that leaky joints are responsible for a considerable portion of total water losses from underground mains. Generally recognized by waterworks men as a serious problem, joint leakage not only results in a direct waste of water but, by washing away supporting soil, frequently causes pipe to fracture under traffic and earth loads.

Much of this trouble is caused by the fact that the ordinary rigid joint, even though perfectly made by skilled workmen, may open up when subjected to vibration or settlement after the line is in service.

### One Solution . . .

Such potential dangers are minimized with a *flexible* joint. And that is the principle upon which the Simplex Coupling, employed in assembling Transite Pipe, was designed. Consisting of a Transite sleeve and two rubber rings, it forms a tight joint that stays tight in service. Its flexibility compensates for vibration and for vertical, longitudinal and lateral movements to which the pipe may be subjected underground. Depending upon the size of the pipe, a deflection of 5° or more is possible at each joint.



Simplex Coupling Assembly  
(1) At start of operation  
(2) Sleeve pulled over one ring  
(3) Final position, sleeve centered over joint

### Simplicity—the best insurance against defective joints

From a practical standpoint, the less skill required in assembly, the less the danger of defective joints in the field. The dependability of the Simplex Coupling is due primarily to these distinctive features:

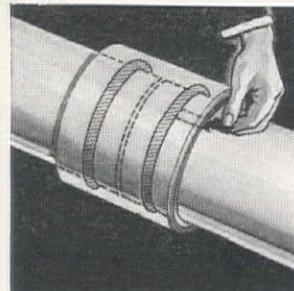
1. It is actually a pre-fabricated, "packaged" joint. The ends of the pipe and the inside of the coupling are machined to exact dimensions. The rubber rings are precision-made and subjected to rigid inspection before shipment. Joints are assembled cold—no pouring, caulking or heating equipment is needed. A simple hydraulic

coupling puller, loaned by Johns-Manville without charge, is the only tool required for assembly.

2. The effectiveness of the joint does not depend on the individual skill or training of the workmen. So simple is the operation that perfect Simplex joints can be made quickly and economically even by completely unskilled crews.

### Made of Permanent Materials

The Transite sleeve, like the pipe itself, is made of asbestos and cement and has the same high degree of resistance to all forms of corrosion. The rings, made of the highest quality rubber, are carefully cured and specially compounded with anti-oxidants and properly graded non-hygroscopic fillers to assure permanence in water service.



With Simplex Couplings, tightness of the joint can be determined from the outside as soon as the pipe is laid. A thin steel blade, slipped under the lip of the sleeve, checks the position of the rubber ring. If the position is right, the joint is tight.

the toll they exact in excessive operating and maintenance costs, to mention but a few. Full details on Transite Pipe and Simplex Couplings are in Catalog TR-11A. We'll be glad to send you a copy. Johns-Manville, Los Angeles, San Francisco or Seattle.

**NOTE TO ENGINEERS:** The "J-M Pipe Installation Manual," a 76-page book that outlines in detail effective methods of installing water lines, contains much more data on the Simplex Coupling than was possible to include above. A copy will be sent you on request.



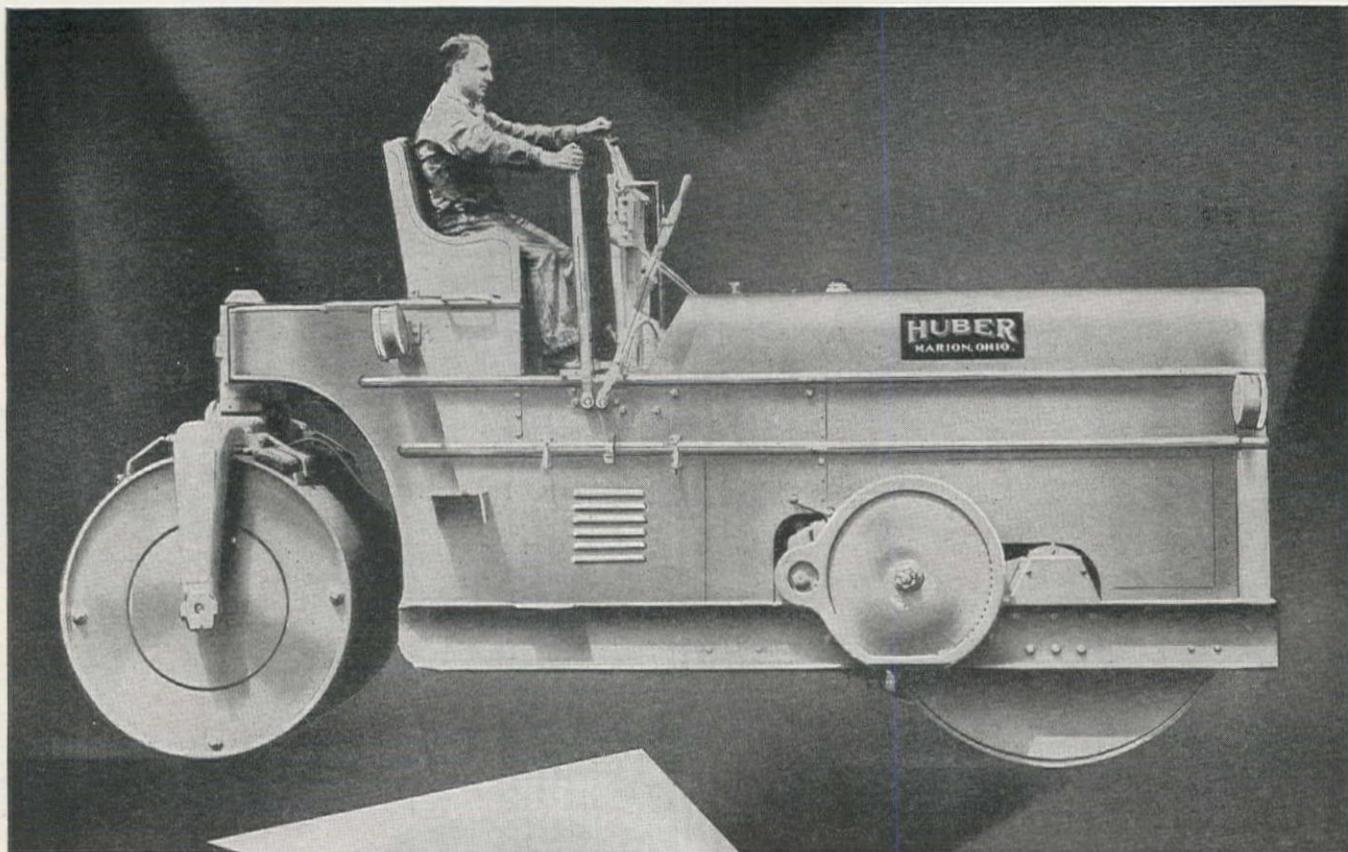
The Simplex Coupling is assembled with a hydraulic puller. The collar engages the edge of the Transite sleeve; the jack fits over the open end of the pipe.

### ... and a word about Transite Pipe

Simplex Couplings, designed specifically for use with Transite Pipe, have solved the joint-leakage problem for many American municipalities. And Transite Pipe has helped bring other waterworks problems under control—tuberculation, soil corrosion and electrolysis, and

**Johns-Manville TRANSITE PIPE**

For efficient, economical water and sewer lines



**It's NEW!  
It's MODERN!  
It's POWERFUL  
It's SMOOTH!  
It's FAST!  
It's the New  
**HUBER**  
VARIABLE WEIGHT  
AUTOMOTIVE TYPE  
**TANDEM**  
**ROLLER****



★ If you want a road roller with plenty of speed, power and stamina . . . and what road man doesn't . . . then by all means find out what this new HUBER TANDEM ROLLER can do to reduce the time element and operating costs on your road building and maintenance jobs. Every contractor and highway engineer who has seen it says "It is 'streamlined' in features, in performance, as well as in looks." Let us send you the facts about this modern time and money saver.

**THE HUBER MANUFACTURING CO.  
MARION, OHIO, U.S.A.**

# For Working IN CLOSE QUARTERS

→ You cannot always depend on plenty of "elbow room" in which your crane can move around easily and quickly. So why not anticipate this in the beginning by buying a MARION Type 352 Crane? Here is a machine that is designed to do just as an efficient job in close quarters as it does where high lifts and long reaches are involved. A bulletin will bring you full details about MARION'S close-quarter features as well as many other important reasons why you should buy this MARION crane. Why not write for it today?

THE MARION STEAM SHOVEL COMPANY • Marion, Ohio, U. S. A.

## MARION CRANES

SHOVELS • DRAGLINES • CLAMHELLS • PULL-SHOVELS  
WALKERS • from  $\frac{3}{4}$  Cu. Yd. to 35 Cu. Yds. GASOLINE - DIESEL - ELECTRIC

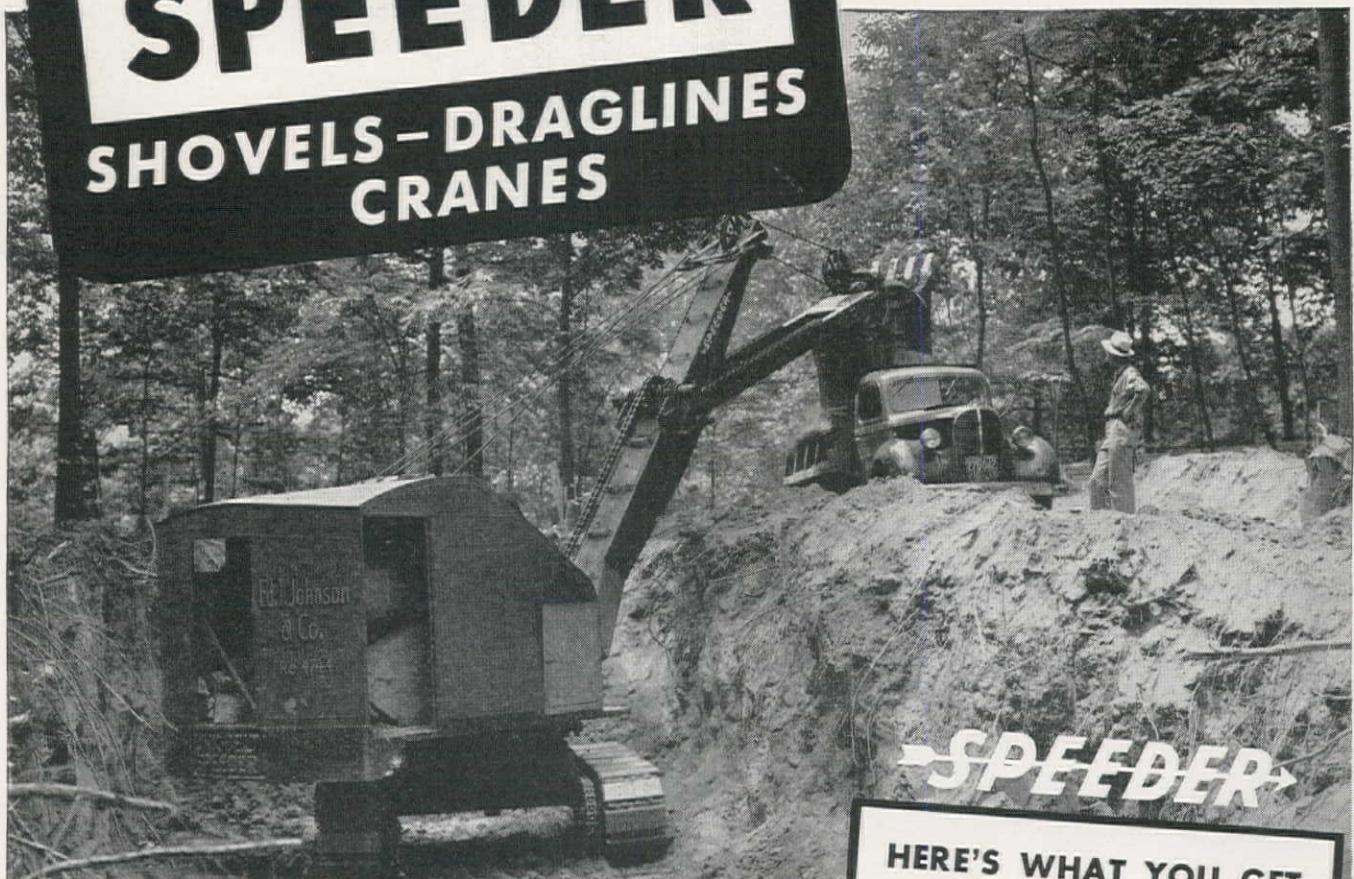
MODERNIZE  
with MARION

SILAS MASON COMPANY, INC.  
ENGINEERS & CONTRACTORS.

MODEL LS-85 . 3/4 YARD

# LINK-BELT SPEEDER

SHOVELS - DRAGLINES  
CRANES



## TRULY A PLUS-VALUE MACHINE

Your equipment dollars buy more when you invest in a Link-Belt Speeder LS-85—with its extra power, speed, stamina and mobility for outstanding performance on the job. Link-Belt Speeder machines range in size from  $\frac{3}{8}$  to 3 yard . . . crawler, truck and tractor mounted. Get the complete story of how advanced design, welded construction and scientific distribution of weight give you matchless performance in Link-Belt Speeder machines. Write for Book No. 1812 today.

8455

More  
FOR YOUR  
MONEY

SPEEDER

### HERE'S WHAT YOU GET

- 1 Greater Power  
(Heavy-Duty 80 H. P. Engine)
- 2 More Weight for Greater Stability  
(44,200 pounds — Diesel)
- 3 Greater Crane Capacity  
(20,500 pounds)
- 4 Removable Crawler Side Frames
- 5 Two Travel Speeds
- 6 Positive, Independent Chain  
Crown (Self-adjusting to all boom  
angles)
- 7 Power Dipper Trip
- 8 Starter and Electric Lights  
(With Gasoline Engine)

## LINK-BELT SPEEDER CORPORATION

*Builders of the Most Complete Line of Shovels and Cranes*

301 WEST PERSHING ROAD

CHICAGO, ILLINOIS

# ENGINE LIFE DOUBLED...

# ENGINE OVERHAULS CUT $\frac{1}{2}$

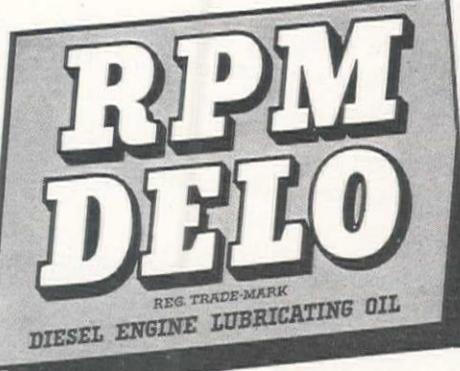
Here's the story straight from Mr. George Langenfelder of C. J. Langenfelder and Son, prominent Baltimore Contractors:

"Prior to the use of RPM DELO we overhauled all our Diesel engines after 2500 to 3000 hours of service... Since using your RPM DELO our engine life expectancy is over 6000 hours! To us this means 100% longer engine life and reduction by one-half of our engine overhauls. By experience, by cold facts, we attribute our results to RPM DELO.

"We recently completed a job on the Pennsylvania Turnpike involving the moving of nearly 2,000,000 yards of rock, shale and dirt. Our contract called for completion in 270 calendar days; if we ran over, heavy penalties were imposed. Our

insurance against time loss was 100% use of RPM DELO, so we finished ahead of schedule.

"We own and operate 28 Caterpillar Diesels... 3 Waukesha-Hesselman engines... 4 Mack-Lanova Diesels... 9 Cummins Diesels... 44 units, which to us represent 44 reasons why we use RPM DELO exclusively!"



And—  
get top power—top  
engine protection with  
**STANDARD  
DIESEL FUEL**

No matter how long or hard you work your engine, Standard Diesel Fuel delivers smooth, uniform FULL POWER hour after hour. And it's the safest power you can buy. Completely distilled—100% clean—Standard Diesel Fuel protects fuel pumps and injectors perfectly. It's the buy for your Diesels!

## STANDARD OIL COMPANY OF CALIFORNIA



## BACKED BY A RECORD

*You can  
get your teeth into!*

Ever stop to think—"Why so many Ford Trucks?" Ever look into the record of these powerful, trustworthy units? Here it is—a record that clearly demonstrates Ford performance, economy, reliability!

**THE RECORD:** More Ford Trucks have been built, and more are in use this minute than any other kind.

**THE RECORD:** Ford Trucks give amazing economy—shown in actual cost records of truck operators throughout America.

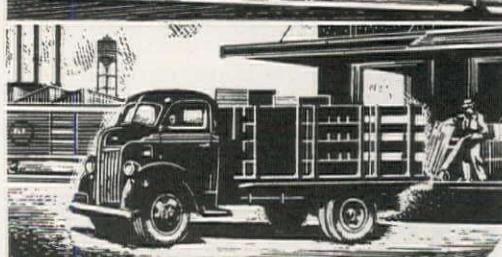
**THE RECORD:** Ford Trucks have extra big and extra sturdy brakes, axles, clutches, frames—there's a host of Ford Truck features that challenge comparison!

When you choose a Ford unit you get the just-right unit for your job! 42 body types. 6 wheelbases. Power choice of 30, 85 or 95 hp engines.

Ask your Ford Dealer to prove Ford low cost and high efficiency on your job with your driver! Make this test and check the record.



# FORD TRUCKS AND COMMERCIAL CARS



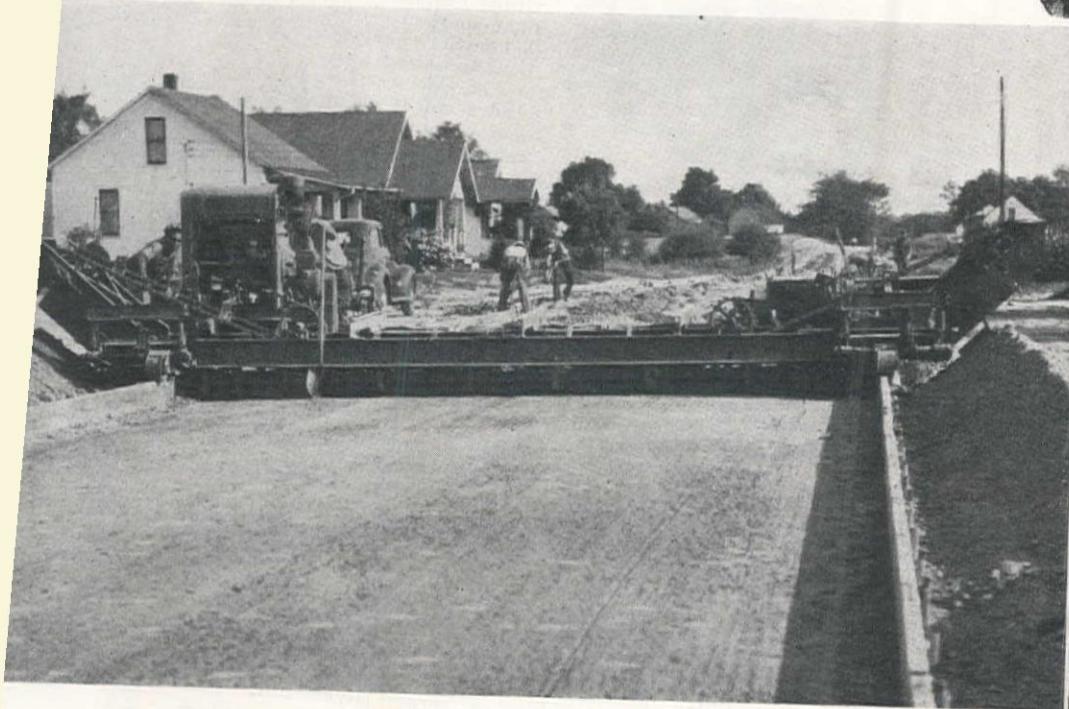
# ARE YOU MAKING a Donation AGAIN THIS YEAR?

HOW much money are you going to sink into excess aggregate through loss of yield on poorly prepared subgrade this year? It costs you plenty if you make the slab too thick and in most states you pay if the slab's too thin — you're between the devil and the deep and *you lose either way!*

But Buckeye R-B Power Finegrader owners don't suffer these losses — and they use less labor and never hold up the paving crew because their Finegraders move out fast and cut the grade *right on the payline!* Smooth, accurate and true. No low or high spots that spell trouble and money!

Stop the "Donations" and make bigger profits this year on concrete or macadam jobs with a Buckeye R-B Power Finegrader. A size for every job — 8' to 24'. WRITE FOR 8 PAGE BULLETIN NOW!

**BUCKEYE TRACTION DITCHER COMPANY**  
Findlay, Ohio



## READ What These STATE HIGHWAY ENGINEERS Have to Say!

"... loss of yield would probably range from five to ten percent, and this is largely attributable to extra slab thickness." — Engineer of Construction.

"... we do know that contractors have lost considerable in yield because of not having subgrade properly prepared." — Chief Engineer.

"Overruns vary from an average of 1½% to as high as 8%. Where overruns occur they are generally the result of low subgrade and excessive thickness of pavement." — Engineer of Materials and Tests.

"Smoothness and trueness of subgrade are necessary, desirable and required, . . . the method chosen is that which works out to the best advantage of the party contracting to do this work." — Construction Engineer.

## Built by Buckeye ✓

Convertible Shovels



Trenchers



Tractor Equipment



R-B Finegraders



Road Wideners

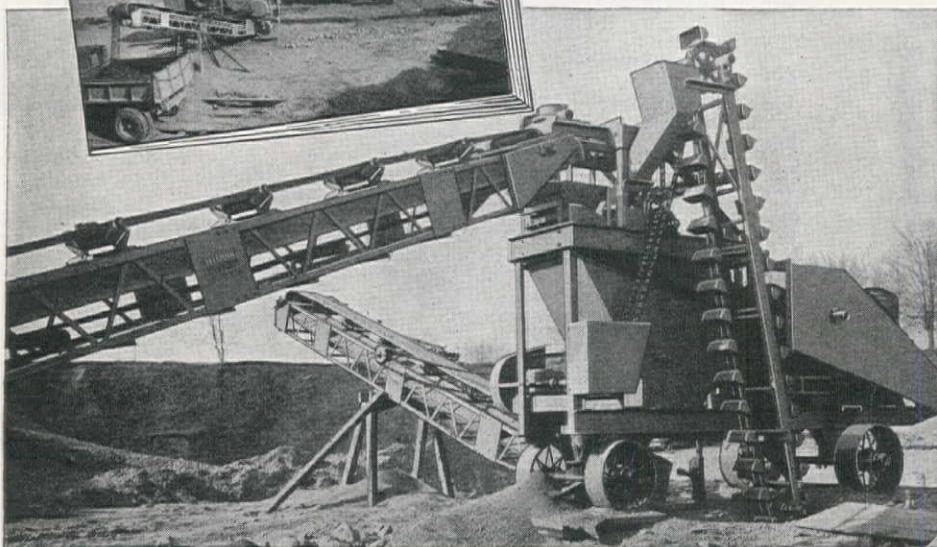
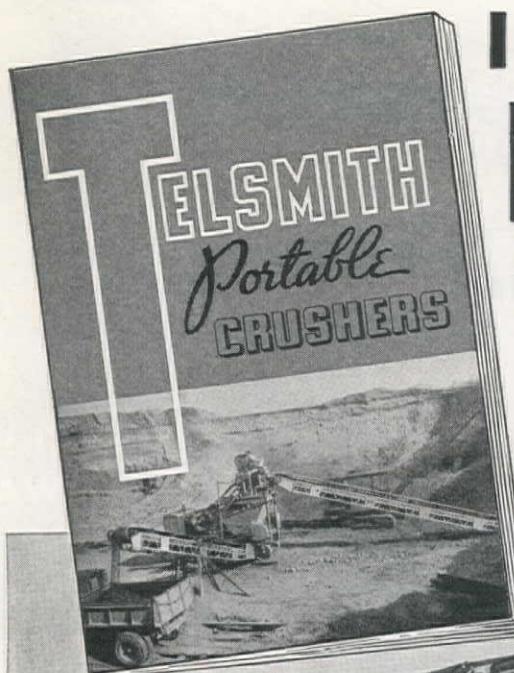


Spreaders



# It's New! It's Free!

# PORTABLE CRUSHING PLANT GUIDE



• If you want to know "what's the latest" in portable crushing plants . . . if you want practical ideas on how to get bigger output and finer sizing from a portable and which type plant will give it to you, whether you're crushing quarry rock, or preparing bank gravel — ask for free Guide P-30.

Telsmith General Utility Portable Outfit, equipped with Telsmith-Wheeling Jaw Crusher and bucket elevator. Includes worm-wheel device for raising elevator.



### General Utility Crushing Plant

Ideal for the contractor or state or county highway department wanting a mounted crusher with a bucket elevator to deliver crushed product to bin or screen over bin. Furnished with either jaw or gyratory crusher, and with or without power unit. A low first cost, low upkeep outfit, but exceptionally well built.

### TELSMITH Standard Portable Crushing, Screening and Loading Plants—

A single crusher in closed circuit with a bucket elevator and vibrating screen. The crusher may be a jaw or gyratory (for coarse or medium sizing), or a secondary crusher for fine reduction. The jaw crusher furnished is a high-speed Telsmith-Wheeling with cylindrical roller bearings. It turns out a uniform cubical product unusually free from slabs or dust. Recommended for production of 1"-1½" rock. In all cases, crusher is in closed circuit with the screen. No oversize can get into product.

**TELSMITH Coarse Crushing Portables**—Mounted jaw or gyratory crusher, not in closed circuit. A rugged, big capacity outfit for quantity production on big road jobs.

**TELSMITH Tandem Crushing Plants**—A super-crushing portable for quarry use. A tandem combination—coarse crushing unit . . . followed by large capacity, fine crushing, screening-loading plant operating in closed circuit.

**TELSMITH Dual Crushing and Screening Portable**—Exceedingly mobile. Combines jaw breaker and roll crusher with more ample screening and conveying capacity.

• For complete details, get the new free 20-page Guide P-30.

P-1-41

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# TELSMITH

Smith-Booth-Usher Co.  
Los Angeles, Calif.

Mines Eng. & Equip. Co.  
San Francisco, Calif.

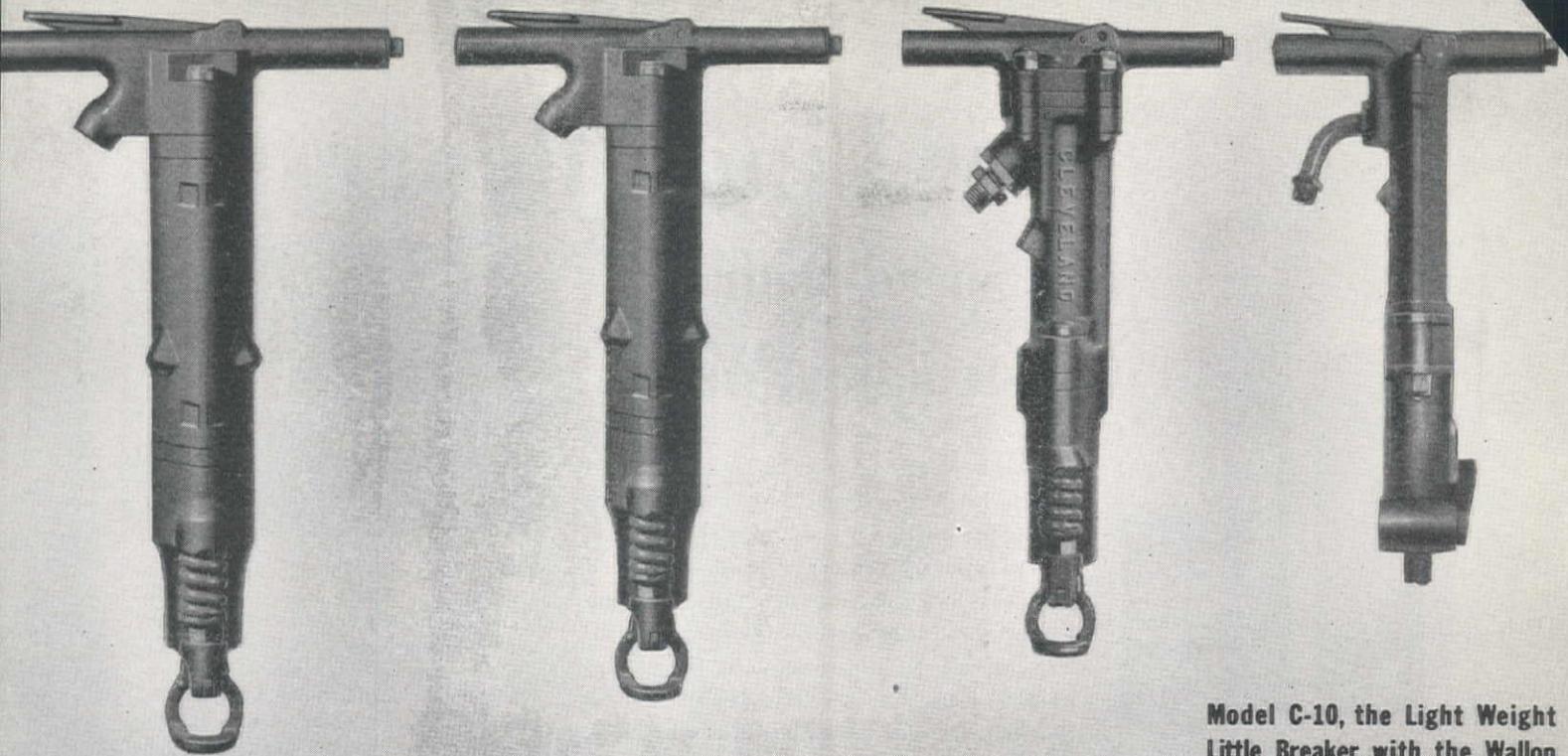
Clyde Equipment Co.  
Seattle, Wash.

Clyde Equipment Co.  
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General Machinery Co.  
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Gordon Russell, Ltd., Vancouver, B. C.



Model C-9 for the Tough Job—  
the Hard, Well-Seasoned, Re-enforced Concrete, and for  
General Paving Breaking.

Model C-7, the All-around  
Machine for Paving Breaking,  
Cleaning Slag Pits, for Ice  
and Frozen Ground, etc.

Model C-11, the Medium  
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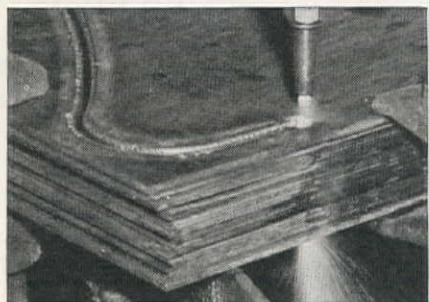
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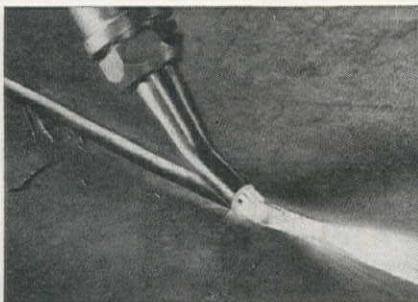
# How Linde Processes can speed your Construction Work



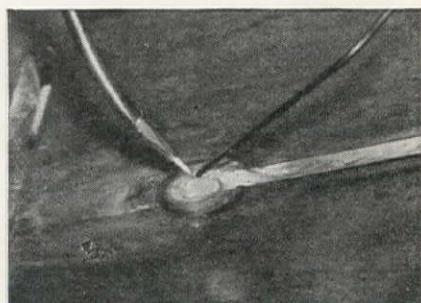
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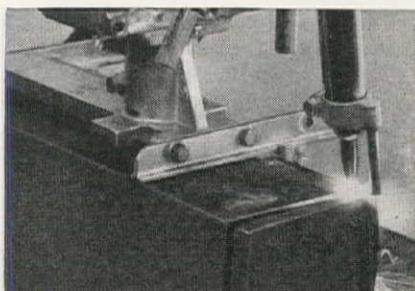
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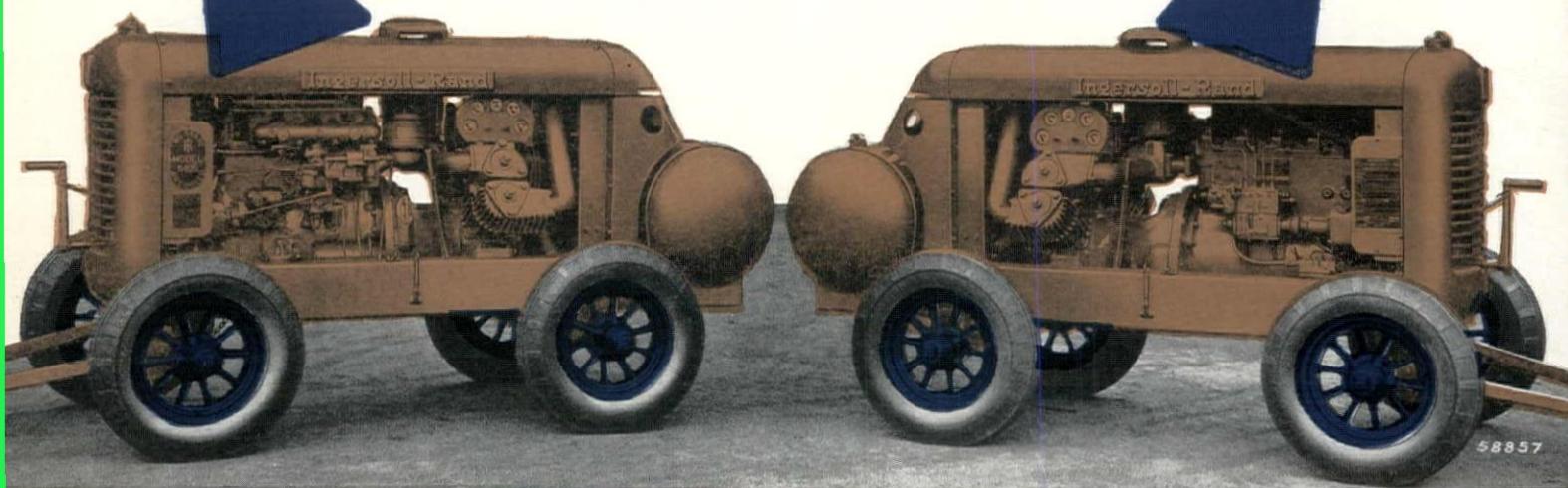
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34-E on city street job in  
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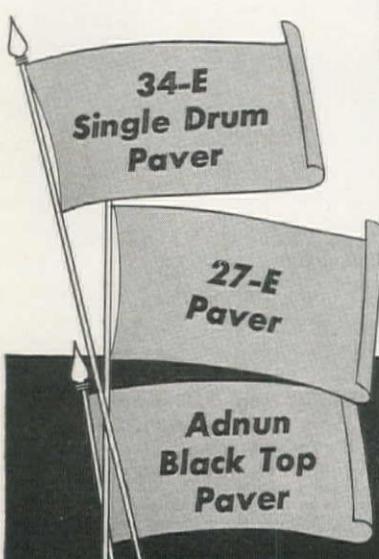
THAT'S what you get with a MultiFoote SINGLE DRUM 34-E Paver! Figure it out for yourself: on level ground you have an allowable 37.4 cu. ft. mix with this machine against 29.7 cu. ft. under the same conditions with a 27-E paver. And with today's grading and finishing equipment the 34-E SINGLE DRUM MultiFoote doesn't require any more men or machines than a 27-E!

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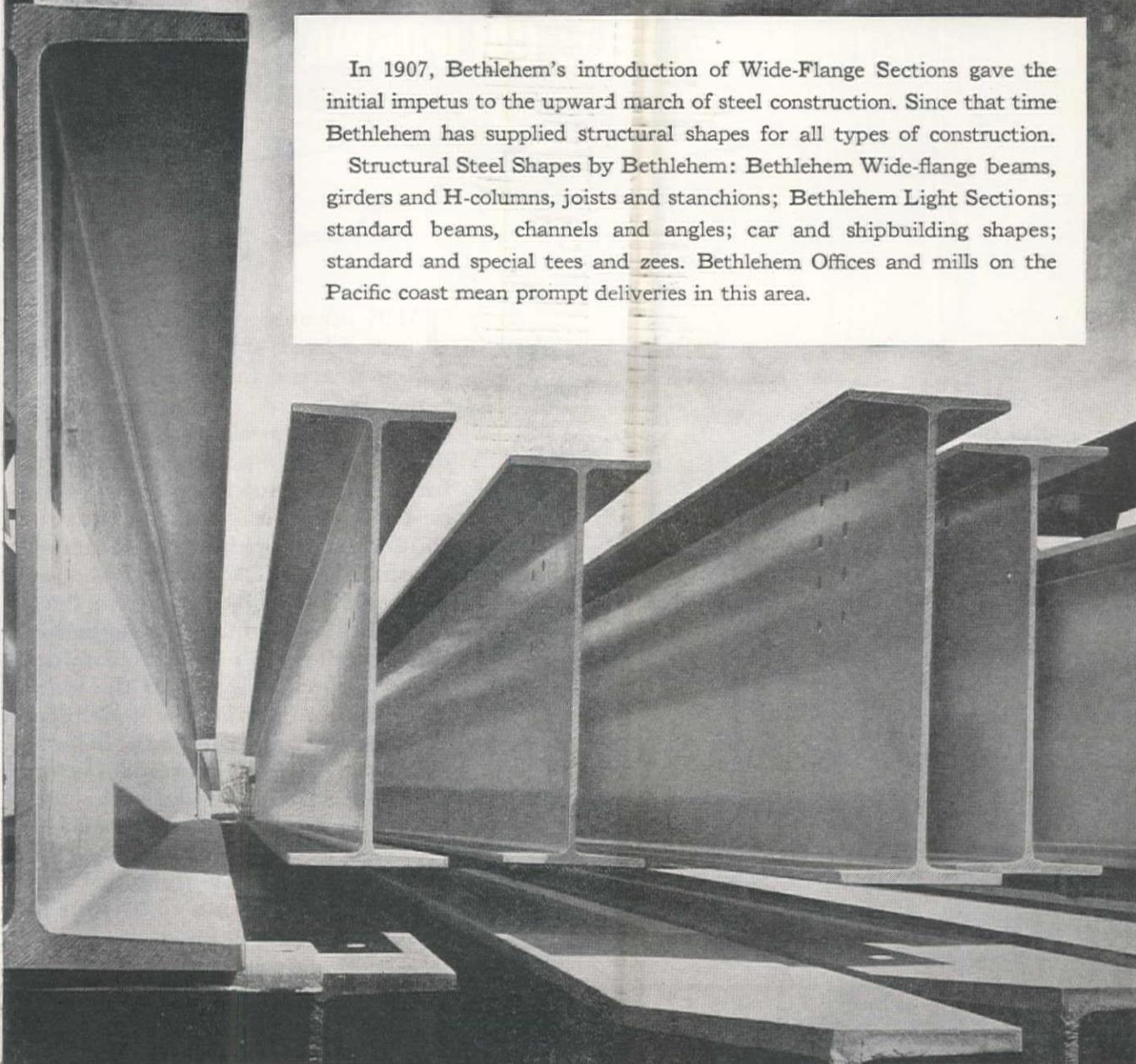
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March, 1941

Vol. 16, No. 3

D. F. STEVENS . . . . . Editor

A. H. GRAHAM . . . . . Field Editor

R. J. KAMLADE . Construction News Editor

## WPA Labor Finds Private Payrolls

**I**N SOUTHERN CALIFORNIA the Associated General Contractors, the Los Angeles Building Trades Council and Works Projects Administration officials have co-operated in a plan which in three months has permitted over 2,500 construction workers to leave the WPA ranks and join the payrolls of private employers. Members of all three organizations which aided in the operation of the plan are to be congratulated for the spirit of co-operation which is so necessary to the success of such an undertaking.

When private industry is unable to employ all of the available workers of the country, then it is necessary that government step in to prevent privation. If a man be required to earn his pay, whether on relief or not (and this must be the only successful policy), then the government will inevitably come into competition with private enterprise when providing employment for those on relief rolls. During the past six or seven years this competition became a reality.

Unfortunately, the construction industry was most affected, since the chief requirements of governmental bodies, outside their routine duties, are improvements to public plant provided principally by construction. During recent years much of the public construction work, which fifteen years ago would have been performed under contract, has been done under WPA auspices and often at costs greater than might have been expected using the contract system.

The efforts undertaken by the Southern California Chapter of the Associated General Contractors to return WPA labor to private payrolls is to be commended as a definite step to improve the position of the construction industry.

## Distribution of Defense Highway Funds

**R**ECOMMENDATIONS for appropriation of funds totaling \$287,000,000 for the construction of access and strategic military highways have been submitted to the President by the Public Roads Administration. In view of the estimates, recently released by several of the eleven western states, this sum would seem to be but a small beginning if all of the highways designated by the military forces are to be brought up to the required standards. However, an additional recommendation is a continuing program to be financed by an annual appropriation of \$458,000,000. Although this will not immediately provide the nation with a network of adequate strategic roads, it can be expected to do so eventually, if faithfully carried out.

The report recommends that an appropriation of \$100,000,000 should be made available to the states, distributed on a somewhat higher basis of Federal participation than that existing at present, but otherwise expended under present provisions of the Federal highway legislation. This fund would provide for the replacement of substandard bridges and other critical deficiencies of the strategic network. For the making of surveys and plans for the development of the

network, another fund of \$12,000,000 would be made available to the states on the present basis of distributing Federal highway funds.

There seems to be some justification in questioning the equity of using the present Federal aid distribution basis in allotting funds for the construction of highways which are vital to national defense. It seems to be obvious that many of the interior states of the nation will have within their borders fewer miles of the strategic network than will the exterior states. Those states which are on the Nation's border have within their own borders the majority of the military and naval centers, and it is between these centers that most of the military traffic will develop, whether in actual defense of the Nation or in training for defense.

A more equitable distribution of Federal aid highway funds for strategic roads would be one based on the mileage within each state, or if it could be calculated, a distribution based on the strategic highway mileage and the amount of military traffic which that mileage is expected to accommodate.

## Engineers Wanted

**W**HEN it comes to employment, the engineer usually finds himself in either a feast or a famine. During the past twelve years there has been precious little feast and a good deal of famine. Today, for the first time since 1929, the demand is exceeding the supply. Today the college graduate, soon to be, is receiving offers of greater compensation than men of five or more years' experience had dared to ask a year or two ago. Experienced men are unobtainable and the cry goes up that more trained men are needed.

The feast will not last forever, and when it ends the famine will be worse than ever for there will be available more trained and experienced engineers than before the feast started. Compensation will drop swiftly with the increase in supply and soon the engineer on a construction job will again be receiving less than the equipment operator.

There must be an answer to the problem, a way to level out the demand for engineers to more equally meet the supply. We admit that we don't know what that solution is, but we do say that the engineering profession had better give the problem some serious consideration before the feast ends and the famine begins.

## Absorptive Form Lining

**I**T WILL be interesting to watch the development in the use of absorptive lining for concrete forms. The Bureau of Reclamation has proved conclusively in the laboratory that the use of absorptive lining has certain definite advantages in specified cases. Other engineering and construction agencies are beginning to use it in an effort to further develop its usefulness. In this issue a few of the first problems which have developed with its use by the Wyoming Highway Department are discussed.

It has been apparent from the first that unusual care will be required in handling the lining material. Further improvements are expected of the manufacturers as use of the material develops. Several years will be required to prove its actual value for each type of concrete work for which it is adopted. Some time will be required to prove whether the extra care needed is repaid in better concrete, or whether easier methods of handling can be developed with more extensive use.

**HERE'S WHY**  
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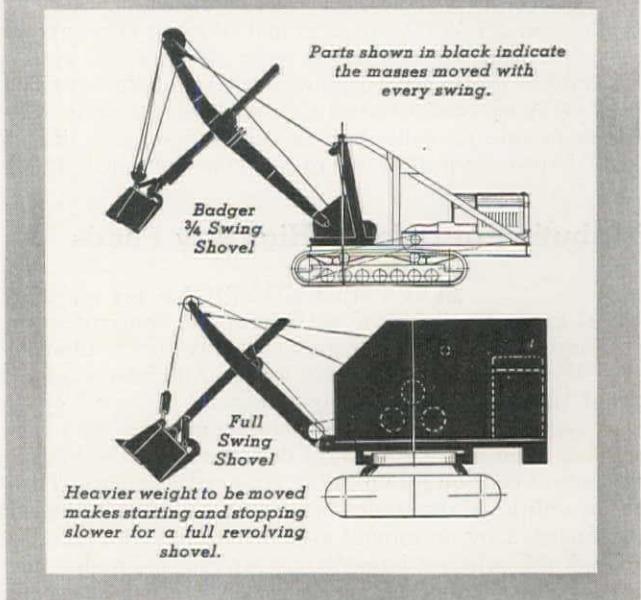
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Ask for engineering specifications, low first cost . . . and PROOF that you can get more done quicker, and at less cost, with a BADGER. THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois.



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MARCH • 1941

## Wyoming Uses

# Absorptive Form Lining

**Absorptive materials were specified for four grade separation structures by the Wyoming State Highway Department in an effort to reduce crazing in concrete surfaces and present a pleasing finished texture—Problems encountered in the use of absorptive materials and construction kinks developed to overcome difficulties**



Public Roads Administration Photograph

THE USE of concrete not only as a structural material, but also its steadily growing use as a means of modern architectural expression has created a demand for greater surface stability with respect to weathering, resistance to abrasive action, and for more pleasing appearance. Hard, dense concrete, free from pits and voids, is an important factor in the construction of such concrete structures.

With this in mind, the U. S. Bureau of Reclamation in May, 1938, undertook an intensive program of investigation and development of a material to be used as a liner for concrete forms that would produce these results.

The February, 1940, issue of *Western Construction News* included an article, "Case Hardening" Concrete with Absorptive Form Lining. This fully covered the development of absorptive form lining by the Bureau of Reclamation. The Bureau of Reclamation is still carrying on experiments and investigations to improve the use of this material.

### Wyoming interest develops

Starting with the presentation of a paper on the subject of "Absorptive Lining for Concrete Forms," by C. O. Crane, assistant engineer of the Bureau of Reclamation, Denver, before the Colorado Highway Conference at Boulder, in January, 1940, the attention of the Wyoming State Highway Department has been directed toward benefiting from the extensive experiments made on this

By R. C. PIKE  
Project Engineer, Wyoming State Highway Dept.,  
Rock Springs, Wyoming

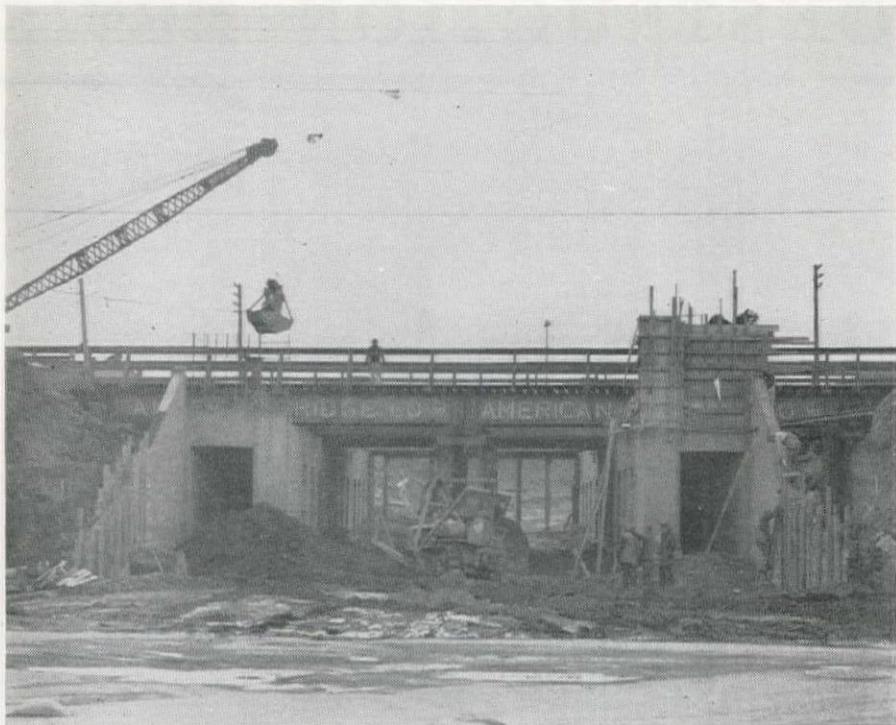
THE USE of an absorptive lining on forms for concrete structures was first considered by the Bureau of Reclamation several years ago, and extensive laboratory tests were carried out to determine the usefulness and feasibility of this procedure. Immediately following the announcement of these tests and the Bureau of Reclamation engineers' intention to carry the development into the field on major structures, the Wyoming State Highway Department determined to adopt absorptive form lining for a thorough trial, and has been the only state to do so at the present time. As a pioneer in the application of absorptive linings to concrete forms, R. C. Pike, project engineer for the Wyoming State Highway Department, here relates some of the experiences which were gained during the construction of three grade separation structures at Rock Springs.

—EDITOR.

material by the Bureau of Reclamation by making practical use of the material.

The Wyoming Highway Department's practice in the past has been to give a carborundum stone rubbed finish to all exposed concrete surfaces. Although this generally resulted in giving a pleasing concrete appearance, after these surfaces were exposed to the weather for a year or two, crazing and checking sometimes developed; nor had the results always been satisfactory in giving a uniform appearance to the finished work. It was largely in the hope of securing concrete surfaces of more uniform and pleasing appearance that the department decided to give absorptive lining a thorough trial, aside from the established merits of the material in producing a more dense and weather-resistant concrete surface.

The Wyoming Highway Department in the spring and summer of 1940 awarded three contracts for structures in which absorptive form lining was specified for forming all exposed concrete surfaces. In letting these contracts, it can be said that among the various State highway departments at least, the Wyoming department was the pioneer in the use of this material. At the time of letting these contracts, although the Bureau of Reclamation had conducted extensive experiments with this material on large test panels at the Grand Coulee



Public Roads Administration Photograph

**M STREET SUBWAY** in Rock Springs is a reinforced concrete and steel structure 190 ft. long with forty-four 33-in. I-beams supporting ten railroad tracks. The cost of furnishing and installing absorptive form lining was included in the contractor's unit bid price per cubic yard for concrete.

Dam, none had been used on any large scale, nor on structures of our type.

#### Description of structures

One of the contracts awarded was for the construction of the C. B. and Q. Railroad underpass at Casper, and the two remaining contracts were for three grade separation structures over or under the Union Pacific Railroad tracks at Rock Springs.

The structures at Rock Springs consist of a concrete and steel vehicular overpass at A Street, a reinforced concrete pedestrian subway at C Street, and a reinforced concrete and steel vehicular subway at M Street. The A Street overpass was made up of a reinforced concrete deck slab 30 ft. wide for vehicular traffic and a 4-ft. pedestrian sidewalk. The deck slab was carried on twelve I-beam spans varying in length from 20 to 49 ft., and one deck girder span 94 ft. long over seven railroad tracks, all supported on steel bents. The entire length of the structure is 943 ft. including concrete paved approaches. The roadway on the north approach was built on earth fill placed between concrete retaining walls 190 ft. long.

The C Street pedestrian subway consists of a simple concrete box or tunnel, 8 ft. square and 110 ft. long, with ramp approaches at either end to street levels.

The M Street subway is a reinforced concrete structure 190 ft. long with forty-four 33-in. I-beams supporting ten railroad tracks. This structure provides a 30-ft. paved roadway and two 5-ft. pedestrian sidewalks. The entire length of this structure including paved approaches is 596 ft.

The A Street overpass and the C Street

pedestrian subway were let as one contract, and the M Street subway as a separate contract. The total cost of all structures is approximately \$400,000 including street widening, right-of-way, etc. Some 22,000 sq. ft. of the absorptive form lining was specified for the Rock Spring structures. The writer was assigned as project engineer on all structures at Rock Springs.

On the Rock Springs projects, the contractor furnished and installed all absorptive lining at his unit bid price per cubic yard for concrete. The contract specifications for absorptive lining were identical with those of the Bureau of Reclamation who furnished them for our use. The Bureau has at all times fully cooperated with the Department, in making it possible for us to initiate the use of absorptive lining on our highway structures.

This article will discuss absorptive lining from the field angle, outlining our experience gained in using this material, troubles encountered, construction kinks involved, and solutions used in overcoming certain troublesome features.

#### Form construction

The absorptive lining was delivered to the job in sheets  $\frac{1}{2}$  in. thick, 8 ft. long, and 4 ft. wide. It was placed in the forms in much the same manner as regular plywood lining is placed, except that special care had to be used in nailing the material to forms and to forming abutting joints between sheets of the material. The material must be installed on a solid backing of either plywood, smooth tongue-and-groove lumber, or smooth lumber with tight joints. Very rough or

discontinuous lumber will show irregularities through the form liner. No. 3 common shiplap was used for backing on these projects.

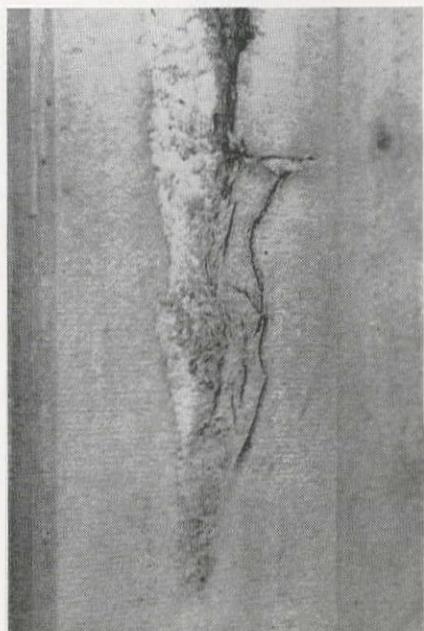
At the start of the construction four-penny galvanized common nails were first used in nailing the lining to the forms. On stripping the forms after concrete had been placed, it was found that the absorptive lining swelled around the nail heads, due to absorbed water from the concrete. As a result, at each nail head, where the material could not swell, the concrete surface was slightly raised above the general surface just as if the nail head had originally been countersunk in the absorptive lining. To overcome this, four-penny common finishing nails (without heads) were used on the remainder of the form work. Nails should be driven just flush with the surface of the liner, and in number only sufficient to properly hold the liner in place. A 12-in. spacing between nails, both ways, was used on the Rock Springs jobs.

Where cutting of the absorptive lining sheets was necessary, a fine tooth finish saw was used, care being taken to obtain sharp, square edges.

#### Joints

Experience proved that an open space of 1/16-in., or about the thickness of an ordinary saw blade should be left between the abutting edges of absorptive lining sheets, as placed, due to its swelling in contact with water as above mentioned. With 1/16-in. cracks left between sheets, the material will swell enough to close these cracks, and a smooth surface will result, with only a thin fin of concrete showing along the joint line, which can readily be removed by light bricking. If more than a 1/16-in. gap is left between sheets the joints will not swell entirely shut, and quite a fin is formed

**ABSORPTIVE LINING** struck with a vibrator head during the placing operation leaves knots or bumps like this in the finished surface. Vibrators should be kept at least 3 or 4 in. from the forms. *Public Roads Administration Photograph*



which will show even after careful bricking or rubbing.

After the forms are lined with the material and just prior to placing concrete, all joints, roughed-up places, tie rod holes, etc., should be sandpapered or otherwise smoothed up to insure final concrete surfaces having a good appearance.

#### Protection of forms

It was learned through sad experience that after the material is placed in the forms it must be protected from rain or wetting until concrete placing has begun. The absorptive lining readily absorbs moisture and once thoroughly saturated its usefulness as a liner is destroyed. If the material becomes wet before the concrete is placed it will swell, buckle, pull away from the form backing and get out of line, which necessitates removing the damaged portion and relining the forms. If the material has received only a moderate amount of moisture results are not so bad, as it will generally dry out enough to regain its shape and alignment and be as good as before. However, if it has once become heavily saturated, its usefulness has gone and relining of the forms is necessary. Also the material after it has once been used, has no re-use or salvage value whatever.

It must be remembered, however, that the use of this material is still in its infancy. It may be that a material may be developed later which will not warp so badly due to premature wetting, and which may be used for concrete form lining several times.

#### Concrete placing

Greater care must be exercised in all phases of concrete placing operations when this material is used as a form liner than when ordinary forms are used. The absorptive lining is a fibrous material, and anything but smooth as compared with a planed wood surface. This characteristic, together with its affinity for water, largely account for the extra care required, as further explained below.

A properly designed concrete mix is essential to good results. A 3-inch slump is about right, and the mix must contain enough mortar to thoroughly cover all surfaces. It is the writer's observation that it must contain more mortar than if ordinary forms were used. At the start of our concrete operations a 1-in. slump had tentatively been set up in conformance with past practice using vibrated concrete and plywood forms, but after our first pour had been made, forms stripped and surfaces exposed, it was quickly learned that a higher concrete slump was necessary.

It is the writer's belief based on observation and experience that low concrete slumps which give good results with ordinary forms, cannot be used where absorptive lining is used, as this material seems somewhat conducive to honeycomb. To explain this briefly, if a rock pocket should develop next to the absorptive lining, it must be very carefully spaded away from the lining surface, whereas with ordinary forms used, such a pocket can easily be vibrated or

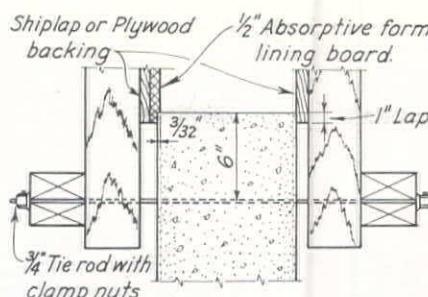


Figure 2

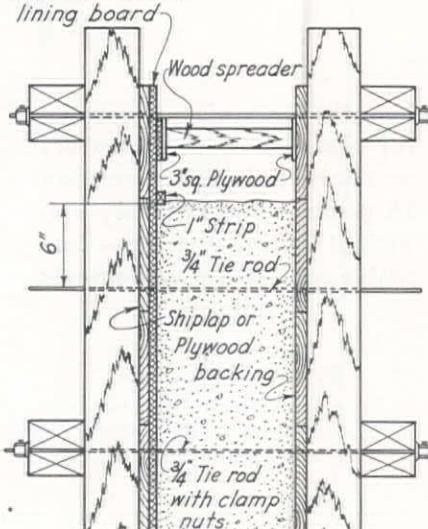


Figure 1

**IN MAKING** construction joints a 1-in. wooden strip was nailed to the outside form at the surface of the concrete and concrete poured slightly above the bottom of the strip. After settling it was struck off to the bottom of the strip and the strip removed after the concrete had set up. A 3/4-in. tie rod, which had previously been placed about 6 in. below the joint was not removed with the forms, but left in place to hold the next lift forms tight against the hardened concrete. Figure 1 illustrates the first step. When the 1-in. strip has been removed the tie rod bolts are tightened to produce a 1/32-in. shoulder on the absorptive lining material which counteracts the pressure of the fresh concrete and prevents leakage of new concrete past the joint. This is illustrated in Figure 2.

tamped out. The mortar will travel through the rocky area to the form face and then slide down the face through the rock pocket, but with absorptive lining it will move to the liner surface, the moisture is immediately absorbed by the material, and the mortar stops and will not slide down the lining. That is why it is essential to use a well sanded concrete mix, with a concrete slump of around 3 inches.

#### Placing and vibrating

More than ordinary care must be used in vibrating concrete as it is placed in the forms. The absorptive lining material is easily damaged and torn by careless vibrating. Tamping bars cannot be used as the bars will tear the material. The vibrator head must be kept away from the forms at least 3 to 4 in. In thin walls, the vibrator head must be kept behind the reinforcing steel. If the head

comes in contact with the lining it will be marred and damaged, and a bump about the size of your fist or even larger will result, and show very plainly when the forms are removed. This projection can of course be removed by bush-hammering, but the area will have a decidedly different texture from that imparted by the undamaged absorptive liner to the rest of the surface.

#### Construction joints

Wherever a horizontal construction joint occurred, a 1-in. timber strip, square-edged, was set level and nailed to the forms at the outside surface of the concrete. The concrete was then poured slightly above the bottom of the strip. After the concrete had settled, it was struck off to the bottom of the strip, and the strip removed. Before the next pour was placed on the hardened concrete, the joint was broomed and cleaned of laitance.

Wherever horizontal construction joints were used, 3/4-in. tie rods were installed about 6 in. below the joint at regular spacing. These rods were not removed when the forms were taken off, but were left in place to facilitate erection of forms for the next lift of concrete.

Forms for the next lift were tightened so as to bring the inside surface of the form liner bottom about 3/32 in. inside the finished wall line. This compensated for the compression of the form lining board under pressure of the fresh concrete and movement of the forms, and reduced to a minimum offsets in the finished surface.

Form spreaders should be used as sparingly as possible to avoid damaging the absorptive lining. End of spreaders next to the lining should first be covered with a 3 or 4 in. square piece of plywood, and a small piece of the absorptive lining placed between this plywood block and the absorptive lining on the forms, so that absorptive lining contacts absorptive lining.

#### Form removal, finishing, and curing

Manufacturers of the brand of lining used on these projects claimed that the ideal time to remove forms to prevent sticking of the material to the concrete was about 72 hours, and that if forms were left longer or removed earlier sticking was apt to result.

The time of removal for forms was made the matter of some experiment on this job—some forms were removed as early as 24 hours, and some were left on as long as 120 hours. Sticking was about the same. In all cases the lining came off with surprisingly little sticking. While some fiber occasionally will adhere to the concrete, subsequent weathering and rain will in time remove this, and any excessive fiber can always be removed with a wire brush, if a sufficient time is allowed for the concrete to set up—say 30 days or more, so as not to damage the case-hardened surface with the brush.

The usual routine of finishing concrete, except rubbing, was carried on after the forms were removed, such as patching of honeycomb and filling rod holes. By the Wyoming Highway Department's specifications concrete may

be cured by the standard practice of water curing, or as on the Rock Springs jobs by spraying the exposed surfaces with a transparent impermeable coating.

Honeycomb has always been the bane of concrete men, but honeycomb with the use of this material is a decided headache. No matter how carefully a honeycomb spot is patched, it will always loom up accusingly. No amount of rubbing or finishing the patched area will give it the same texture as the absorptive lining will give. Trials were made to impart the same texture to a honeycombed area by tightly pressing a piece of absorptive lining against the new concrete "patch," but this did not work out satisfactorily. Honeycomb on ordinary surfaces can be patched, and then rubbed to blend with the other rubbed surfaces. But not with this material, judged by our experience.

#### Cost

There is very little difference in the cost of the absorptive lining material as compared with plywood lining for forms. The cost of building forms with this material was about the same as that for ordinary plywood forms. The final cost using absorptive form lining is somewhat greater however, due to the fact that absorptive lining can only be used once, while plywood can be used several times if reasonable care is used in handling.

#### Conclusions

Absorptive form lining has definite merit. If the material is properly and carefully used it will produce a dense, even-textured concrete, free from pits, voids, air bubbles, which is remarkably resistant to weathering, abrasion and wear. These are the primary purposes behind its development. Concrete on which absorptive lining has been used has the further merit of not requiring rubbing.

Absorptive form lining in its present stage is a material easily damaged. Users should realize that it must be handled with more than ordinary care if they are to get satisfactory results. However, it is believed that most of the difficulties encountered with this material can be eliminated by using some care in handling and placing it, as well as in the subsequent placing of concrete.

While the sticking of the material to the concrete has been more or less an objectionable feature in the past, the manufacturers are rapidly improving their product to overcome this defect.

Only time will show whether or not the use of this material will eliminate the usual crazing and checking of concrete surfaces, but if it does, we believe the material is well worth while for this purpose alone. The manufacturers are keenly alive to present deficiencies of the material, and it would seem that we can look forward to a greatly improved product in time, and as a logical result, a very extensive use of the material.

#### Direction

The Rock Springs projects are being built under the direction of the Wyoming State Highway Department, with Frank Kelso, superintendent, C. F. Seifried, chief engineer, and W. H. Fisher,

bridge engineer. Design plans were prepared by the Union Pacific Railroad Co. in co-operation with the Department and the U. S. Public Roads Administration, the latter represented by District Engineer B. W. Matteson, Denver office.

The writer, as project engineer, has direct charge of construction for the highway department.

The contractor on all three structures on the two contracts is Frank M. Kennedy, Denver.

# Service Records Of Steel Pipe

**Length of service tabulated  
for pipes of 12-in. diameters  
and greater in use more than  
15 years in the East Bay Mu-  
nicipal Utility District—Cor-  
rosive soils caused some early  
failures**

By J. D. DE COSTA  
Engineer in Charge of Distribution  
East Bay Municipal Utility District  
Oakland, Calif.

**M**ORE than 176,000 ft. of steel pipe have served the East Bay Municipal Utility District at Oakland, Calif., for over 40 years, according to this survey made of all steel pipe 11 in. in diameter and greater, which has been in service more than 15 years. Service records of nearly 102 mi. of pipe show that 33 mi. served more than 40 years and nearly half of this length is still in use. With great quantities of water supply lines required for the military and naval establishments and industrial plants under the National Defense Program, *Western Construction News* presents this brief record for whatever service it may be to those who are purchasing pipe.—EDITOR.

**T**HE East Bay Municipal Utility District serves water to the East Bay communities lying in Alameda and Contra Costa Counties, the principal cities being Oakland, Berkeley, Alameda, Piedmont, Richmond, El Cerrito, Albany, Emeryville and San Leandro. The District also serves considerable unincorporated territory in the two counties.

The District was organized in 1923 for the purpose of bringing in an adequate water supply for the above communities from the Mokelumne River in the Sierra Nevada Mountains. On Dec. 8, 1928, the District acquired the properties of the East Bay Water Co., a corporation serving water to the communities lying within the district. The East Bay Water Co., incorporated in 1916, represented the consolidation of fifteen smaller water companies, the oldest of which was incorporated in 1865.

At the time of the acquisition by the

District of the East Bay Water Co., there existed in the system a great mileage of steel and wrought iron pipe, much of which had been in service for many years. Much of this pipe, particularly in the larger diameters, was of light wall with riveted joints. The wall thickness of these pipes varied from 1/16 in. for the smaller sizes to 5/16 in. for the larger sizes. When installed, these pipes had been given a protective coating consisting in most cases of an asphaltic dip, although in some cases a coal tar dip had been used.

Since the taking over by the District of the East Bay Water Co. system, many of these old pipes have been replaced. Replacements have been made to increase capacity (by installing larger diameter pipes), and to reduce maintenance costs, where existing lines were developing leaks. In some instances the replaced lines when in good condition were removed and after being cleaned and repaired and given a new protective coating, inside and out, were reinstalled in new locations. In other locations, lines have been uncovered, repaired and re-coated externally and replaced in service without removal from the trench. No pipes have ever failed due to interior corrosion, always due to external causes. In many instances, removed pipes which had been found inadequate for high-pressure service have been salvaged and sold for low-pressure work, such as in irrigation systems.

#### Varying soil conditions

Soil conditions vary greatly within the area served by the District. In some areas the soil is extremely corrosive and has caused early failure of all types of ferrous metal pipes, steel, wrought iron and cast iron. In other portions of the district, much less corrosive conditions exist and throughout the district will be found soils varying from the extremely corrosive type to the slightly corrosive type. Many times the two extremes will be found very close together, even within the same block.

Another serious cause of corrosion of metal pipes in the District has been electrolysis, due to stray electric currents. In recent years extensive investigations have been conducted in co-operation with other municipal bodies and private corporations in the East Bay area into the causes of electrolysis and corrosion and under this arrangement rail bonds have been tested and improved, stray

current drainage maintained and many related problems have been solved. As a result of these studies and with the installation and maintenance of these facilities, the serious effects of electrolysis are being reduced.

The summaries and tables which follow this text are the result of an extended investigation into the service rendered by the large quantities of light-walled pipe installed in the East Bay system in the past 75 years. As nearly as possible every pipe of this type, 11 in. or greater in diameter, which was in service at the time the District took over the East Bay Water Co. system has been considered; but it is recognized that there have undoubtedly been some omissions due to inadequate or erroneous in-

#### RIVETED OR WELDED PIPE REMOVED FROM SYSTEM AFTER SERVING

Size	15 to 20 yrs. No. Ft.	20 to 25 yrs. No. Ft.	25 to 30 yrs. No. Ft.	30 to 40 yrs. No. Ft.	40 years and over No. Ft.
12"	681	3,452	9,790	4,210	3,771
12½"	2,615	7,071	2,300	.....	.....
14"	.....	.....	.....	1,930	.....
15"	.....	.....	.....	700	27,350
16"	12,160	4,832	8,610	8,810	.....
20"	10,610	1,005	380	1,570	7,000
24"	7,625	14,685	3,058	13,845	19,885
30"	3,600	.....	6,700	20,548	18,742
36"	.....	.....	6,045	.....	.....
37½"	.....	.....	696	.....	12,945
	37,291	31,045	37,579	51,613	89,693

#### RIVETED OR WELDED PIPE IN PLACE ON SYSTEM AFTER PERIODS OF

Size	15 to 20 yrs. No. Ft.	20 to 25 yrs. No. Ft.	25 to 30 yrs. No. Ft.	30 to 40 yrs. No. Ft.	40 years and over No. Ft.
11"	.....	.....	.....	.....	5,900
12"	26,750	13,160	5,740	10,170	5,250
12½"	1,075	.....	.....	6,190	.....
14"	3,300	.....	.....	.....	400
15"	.....	.....	.....	.....	13,660
16"	37,440	9,600	2,400	9,150	2,000
20"	12,700	.....	.....	.....	800
24"	5,800	4,130	4,500	39,525	9,700
30"	.....	.....	.....	.....	43,720
36"	.....	.....	800	300	.....
37½"	.....	.....	11,000	.....	5,050
	87,065	26,890	24,440	65,335	86,480

formation. On the whole, however, the report gives quite an accurate record of actual service and from these records very definite and practical conclusions may be drawn. Only lines which have served for a minimum of 15 years are included in this report which is also confined to pipe 11 in. in diameter and larger.

The data presented herein indicate a comparatively long life for asphalt dipped steel pipe in the corrosive soils of the East Bay area. In order to increase further the life in this area, the District has adopted as standard practice cement lining for the inside and a reinforced gunite coating for the outside of all new steel pipe installed. Steel pipe is largely used and invariably for lines 20 in. in diameter and larger.

## Deer Creek Dam Nears Completion

DEER CREEK DAM neared completion, construction of the 47-mile Salt Lake Aqueduct recorded good progress, and the railroad relocation around Deer Creek reservoir site was finished during 1940 on the Provo River Reclamation Project in Utah. Approximately 2,400,000 cu. yd. of earth and rock fill have been placed in Deer Creek dam, leaving only

470,000 cu. yd. for completion. Penstock pipes and high pressure gates were installed in the outlet tunnel and construc-

**DEER CREEK DAM, a Bureau of Reclamation project, as it looked in October last year before construction was shut down for the winter.**

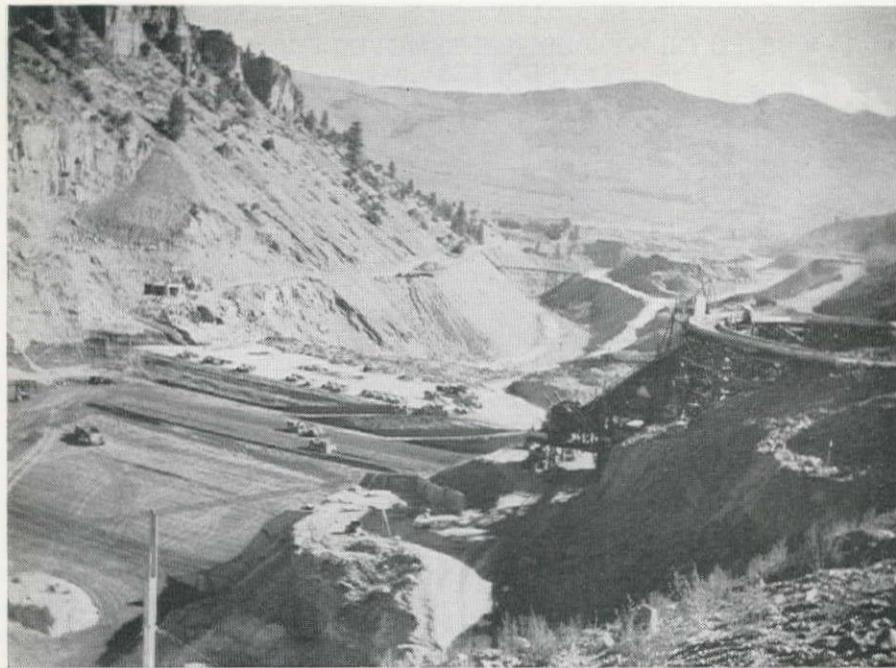
tion of the trash-rack structure was reported complete.

A contract was let for three miles of the 6-mi. Duchesne tunnel in October and work was begun in November on the open cut section.

Other waters to be impounded will be diverted from the Weber River during high water stage through the Weber-Provo Diversion Canal, which is to be enlarged from a present capacity of 210 sec. ft. to an enlarged capacity of 1,000 sec. ft.



# Green



**GREEN MOUNTAIN DAM** will provide 152,000 ac. ft. of storage which will replace the water diverted through the 13-mi. Continental Divide Tunnel.

**T**O REPLACE Colorado River runoff which will be taken by the transmountain diversion required by the Colorado-Big Thompson Project, the Bureau of Reclamation is building the Green Mountain Dam on the Blue River, about 20 miles south of Kremmling, Colo., where 152,000 ac. ft. of storage will be provided. The storage provided will be released after use for developing hydroelectric power to downstream irrigators on the Colorado River as part of the comprehensive exchange of water that forms the basis for this irrigation and power development in northern Colorado. Green Mountain Dam will be an earth and rockfill type of structure with a maximum height of 309 ft. above streambed, and will contain more than 3,500,000 cu. yd. of compacted material, in addition to 850,000 cu. yd. of cobble and rock. At present, the operations are

shut down during the winter season, with a few exceptions, and this article reviews the operations and progress of the past season.

#### General

The general features of the Colorado-Big Thompson Project were reviewed in *Western Construction News*, August, 1937. Briefly, the plan developed by the Bureau of Reclamation provides for the diversion of Colorado River water on the west slope of the Continental Divide through a 13-mi. tunnel under Rocky Mountain National Park, and its use on the east slope to provide supplemental

**CAMP** of the Warner Construction Co., contractor for the project, is located on the south bank just upstream from the dam site. The inlet portal of the diversion tunnel is at the lower right.

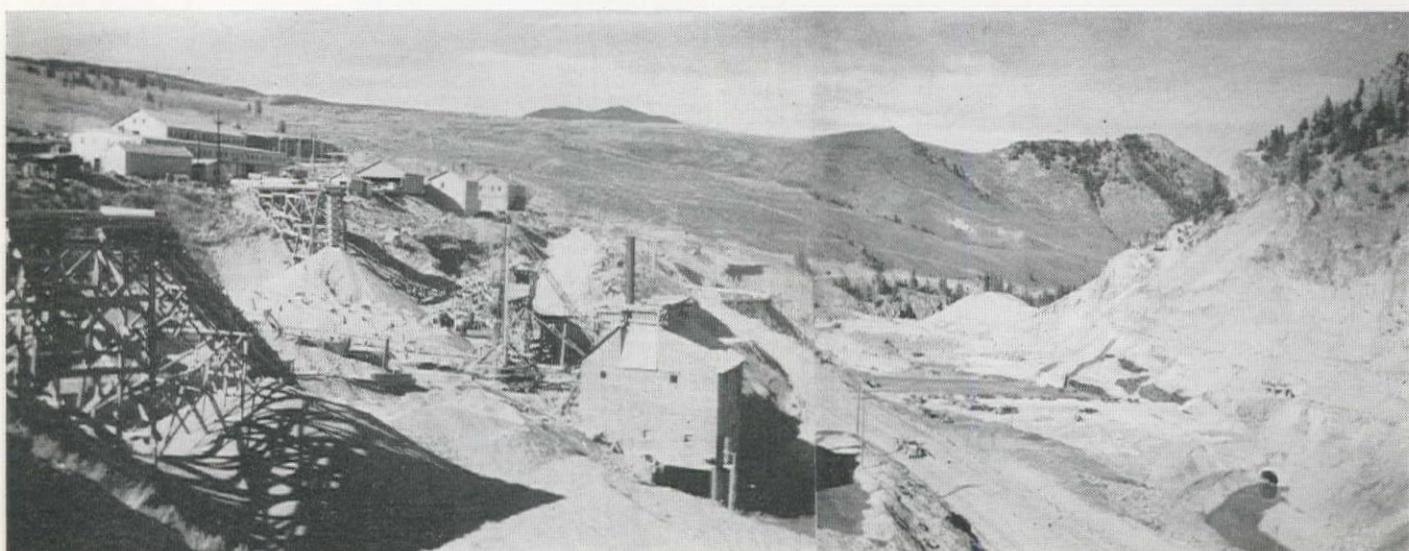
water for important irrigation use along the tributaries of the South Platte River, with important hydroelectric development as a feature of the program. One of the major construction items of this comprehensive project is the driving of the trans-mountain diversion tunnel, and operations on this job were described in *Western Construction News*, December, 1940.

The water to be delivered through this trans-mountain diversion will be stored in the Granby Reservoir, and pumped into Grand Lake, from where it will flow by gravity through the Continental Divide. The Green Mountain Dam, located on a tributary of the Colorado River, will provide the storage that will replace this diversion for users farther down the river.

The site of the dam is in the canyon immediately south of Green Mountain and north of the Gore Range. The existing road from Kremmling—the nearest railroad point—was extended by the Bureau of Reclamation to the dam and camp sites. The camp built for government office personnel includes residences similar to those established on other projects, together with an administration building, warehouse and other structures. The camp buildings are designed for permanent use of the power plant operating staff.

#### Design

In general, the design of Green Mountain Dam conforms to the general features of accepted practice for structures composed of compacted earth and rock fill. The fill is zoned to include an extensive central section (Zone 1) of impervious material which is compacted in 6-in. layers. This zone connects with similar material placed as the construction cofferdam. On the upstream face, a



# Mountain Dam

**Earth and rockfill storage structure of the \$44,000,000 Colorado-Big Thompson project under construction on the Blue River near Kremmling, Colo. — Modified design of fill permits storage of material excavated from dam site and reuse in impervious zone**

zone of semi-impervious material (Zone 2) completes the fill to the 3-ft. layer of rock riprap on a 3:1 slope. On the downstream side of the impervious material, a section of Zone 2 is located next to the blanket of porous cobbles and rock fill. General features of this design are indicated in the accompanying drawing.

A special feature of the design has been the extensive use of excavated material in the fill. This yardage was removed and placed in designated stockpiles for re-use. In fact, the character and quality of the excavated material and also that in the borrow area resulted in slight modifications to the original zoning, based on the economics of getting the maximum benefit out of these materials. The most important feature of this modified design has been the reduction in volume of Zones 1 and 2 material, with corresponding increase in rock fill. The diversion and outlet works are similar in many respects to corresponding features on other Bureau of Reclamation projects of this type. The diversion tunnel was drilled through the north abutment, and lined with concrete, to be used during the construction period.

Upstream from the gate chamber and shaft, located on the axis of the dam, the tunnel is of circular section 18 ft. in diameter, and is lined as a pressure tunnel. Downstream from the gate chamber, the modified horseshoe tunnel, 15 $\frac{3}{4}$  by 23 $\frac{1}{4}$  ft., following the diversion period, will be used for the installation of two 8 $\frac{1}{2}$ -ft. diameter steel pipes which will serve as penstocks for the powerhouse located near the toe of the dam. The inlet used during diversion will be plugged with concrete, and permanent discharge will be through a trashrake structure leading to a vertical shaft.

The spillway will be controlled with three 25 x 22-ft. radial gates discharging down a concrete lined channel which will deliver flood flows into the river below the dam. The spillway is located at the south abutment.

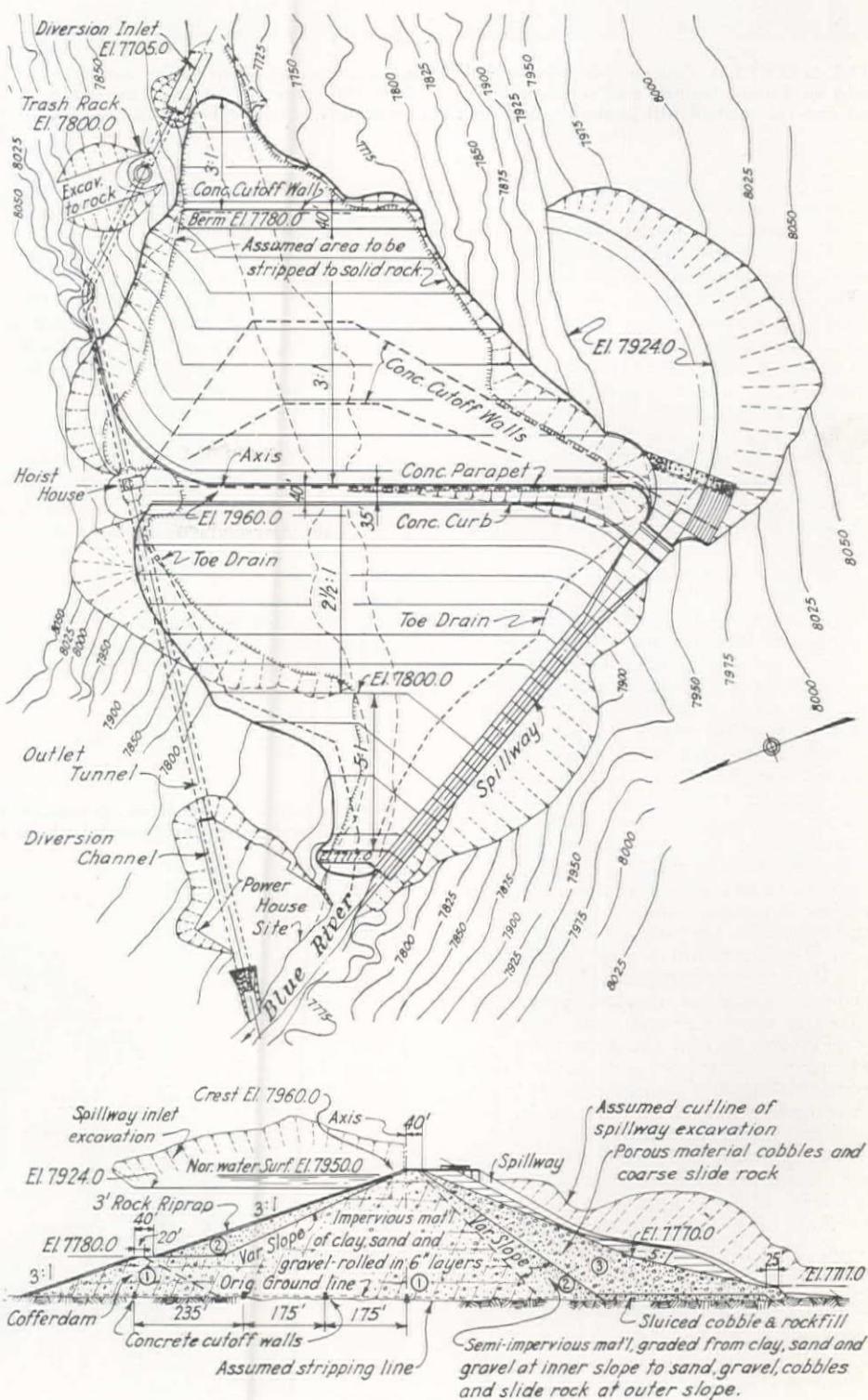
Present plans call for a power plant

MUCH of the material excavated from the dam site was stockpiled and reused in embankment zones 1 and 2. The outlet tunnel through the south abutment was one of the first parts of the work to be undertaken and is now serving to divert the river.

installation consisting of two 12,000-kva. generators, each driven by a 14,000-hp. turbine. Normal water surface in the reservoir will be at El. 7950, and the elevation of normal tail water will be El. 7692.

## Bids and contract

Bids for the construction of the dam and powerhouse were opened Oct. 12, 1938, and the Warner Construction Co. of Chicago submitted the lowest of five bids received at \$4,226,206. Contract was awarded to this organization on November 12. The agreement covering both the construction of the dam and the





**FINE MATERIAL** (minus 3-in.) is hauled from the screening plant to the embankment in Euclid tractor and semi-trailer. The favorable type of material available and careful control will probably establish compaction records at Green Mountain.

building of the power plant was an allowance of 1,620 days.

The contractor began work at the site, including the building of camp and the moving of equipment, in December, 1938. The winter was devoted to the driving of the diversion tunnel as the main construction feature.

Tunnel driving started at the upstream end, where portal excavation was at a minimum. At least 150,000 yd. of earth and rock were required to be excavated at the downstream portal as a part of the powerhouse site. The tunnel was holed through in May, 1940, and concrete lining was completed during the summer.

Drilling was carried out from a carriage which was rebuilt from one used on the Colorado River Aqueduct work. It included four folding platforms, operated by air-jacks, and six drills were mounted for the circular tunnel section, with two more added for the drilling of the modified horseshoe section. Mucking was carried out by a slusher-type of scraper operated by a 3-drum electric hoist loading into 3 cu. yd. trucks. This scraper, which operated on tracks in the tunnel, pulled the muck up a ramp to discharge into the trucks.

Concrete lining was placed in the invert section first, followed by the pouring of the arch behind a collapsible steel form. This arch form was handled on rails laid on the completed invert. The form was designed to telescope and be moved forward. Concrete was deposited by pumping behind the arch form. As indicated in the tunnel section, the minimum thickness of concrete is 18 in. in the circular tunnel and 24 in. in the modified horseshoe section.

The diversion dam and this tunnel provide for a 10,000 sec. ft. discharge in the river, which is approximately twice the flow of record. Such a discharge would leave a 15-ft. freeboard on the cofferdam.

#### Stripping and site preparation

Stripping of the abutments and the channel section, which was carried out during the summer following the com-

pletion of the diversion program in Dec. 1939, involved the moving to date of 725,000 cu. yd. of material. Approximately 50% of this excavation was deposited in stockpiles for re-use in the various zones of the fill. The remainder was wasted upstream from the dam site. These stripping operations were carried out, principally, through the use of shovel and truck equipment, with most of the haul upgrade on temporary construction roads. As excavated, the material was classified by the engineers, and deposited in the required stockpiles.

A particular feature of the excavation work was the discovery of a deep water-worn hole near the axis of the dam, which extended about 35 ft. below the general depth of excavation. The lower 25 ft. of this hole was backfilled, using hand operations because it was not possible to use equipment in the confines of the narrow section.

The preparation of foundation also included the excavation of footings for

the concrete cutoff walls, of which there are four indicated in the plan drawing. These reinforced concrete cutoff walls are of usual design, extending from 5 to 15 ft. into the fill and including provisions for grouting the rock under the footing. Concrete for these walls was distributed by trucks from a central mixing plant. A feature of the concrete operations was the complete lack of adequate aggregate in the vicinity of the dam site, and the need for trucking this material, involving a total of 50,000 cu. yd. from deposits near Kremmling.

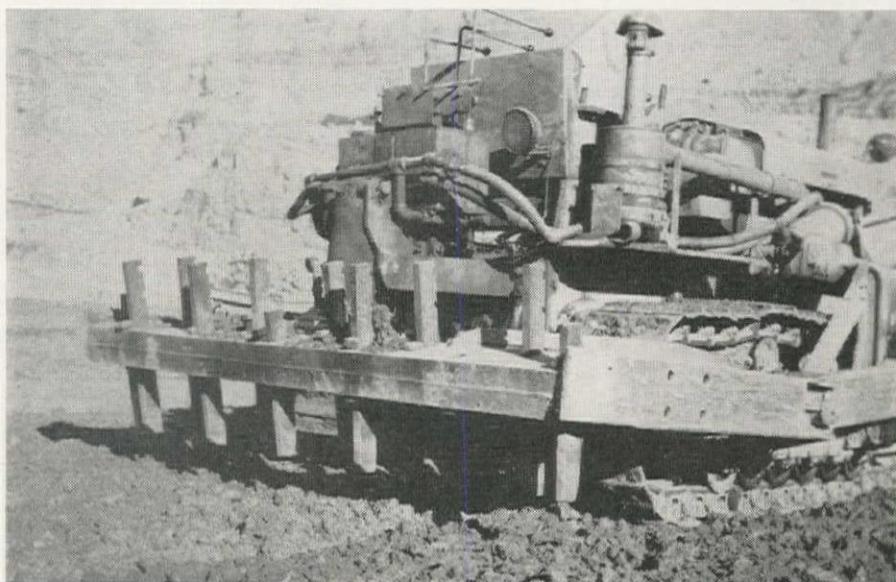
#### Methods of grading and placing fill

The material available for the fill, with adequate volume conveniently located near the site, consists of a heavy glacial deposit which is very closely graded from one-quarter inch size down to clay, the amount of clay averages about 10 per cent. The weight of this fill material is indicated by the tests, which show its specific gravity to be 2.71. As excavated, the glacial material contains a large amount of rock and boulders which are well suited for use in the rockfill sections of the dam. The particular construction problem involved in handling this material is to remove rocks over the 3-in. maximum size for the yardage that is to be placed into impervious sections (Zone 1).

The specifications state that "no-stones which will not pass through a grizzly having 3-in. openings shall be placed in the earth-fill and any stones of such size which may be included in the material placed in the earth-fill portion of the embankment shall be removed by the contractor prior to rolling and compacting the materials in the earth fill. Such stones shall be placed in the cobble and rock-fill or riprap portions of the embankment or in riprap in the spillway and outlet channels as approved by the contracting officer."

The majority of the material going into the impervious zone comes from a borrow area south of the dam site. This location for the material is advantageous

**SPECIAL** heavy-duty scarifier is mounted on the bulldozer leveling the embankment to permit reworking the material where necessary.



in providing a short downhill haul to final location. The volume of rocks and plus 3-in. material in the pit indicated that hand-picking was out of the question, and any light type of portable trommel might not prove adequate for handling the million yards of material.

As a result, the contractor constructed, and used during the 1940 season, a large-size screening plant, established on the south abutment near the spillway cut. This screening plant, indicated in the illustrations, is of heavy timber construction and has a vertical height from the elevation at the intake to the road level at the truck-loading point of about 75 ft. The construction and adaptation of this plant to meet the screening problems resulted in an evolution of plant design. The plant is described as it was operating near the close of the season.

Raw material is trucked from the spillway excavation or the borrowpit areas on a short level hauling road to the upper level of the screening plant. These trucks are loaded by shovel at the spillway or pit. Material discharged from the trucks passes first over a steep grizzly of railroad rails, which takes out all the rock over 7-in. size, and this



REMOVAL of plus 3-in. material from the spillway and borrow pit excavation is accomplished by a large screening plant erected on the bank. The high approach ramp eliminates steep construction roads and permits gravity flow of materials through the plant.

material) pass by gravity into a second loading hopper, and this is the material which is used for the impervious fill (Zone 1).

The rock (plus 3-in. material) is loaded into trucks through a heavy

a weight of 470 lb. per sq. in. on the roller feet. Such tamping equipment is considerably heavier than that used on many earthfill dams. Along the rock contact, the fill is hand-tamped out to a position where the tractor equipment can be operated. Where the sidehill excavation exposed shale material, asphalt emulsion has been sprayed on such surfaces to reduce raveling caused by exposure to the weather.

#### Character of fill obtained

The favorable type of material which is being used for the impervious fill has resulted in securing compactions that will probably set records at the Green Mountain Dam. Moisture control is maintained with the usual care, including both wetting at the pit and final sprinkling on the fill to maintain a content within about one and one-half per cent of optimum. This optimum moisture content has been found to be about 9%. The dry weight density of the minus  $\frac{1}{4}$ -in. material is 130.6 lb. per cu. ft., and the wet density of the earth and rock is 149.8 lbs. per cu. ft. (average for 1940 season), indicating that the weight of this section in a damp condition will be equal to that of concrete. Percolation tests in the field laboratory indicate that this figure will run about 0.2 ft. per year. About 62% of the material, by weight, placed in the impervious section is minus  $\frac{1}{4}$ -in. in size.

#### Organization

The Green Mountain Dam is a part of the Colorado-Big Thompson project which is being built by the Bureau of Reclamation under the general supervision of John C. Page, commissioner, and S. O. Harper, chief engineer. C. H. Howell is acting supervising engineer in charge of the entire Colorado-Big Thompson project, with headquarters at Estes Park. R. B. Ward is construction engineer in charge of operations at the dam site. The office engineer is H. E. Robbins, the field engineer is V. E. Larson, and the laboratory is in charge of S. H. Poe.

The operations of the Warner Construction Co. are under the direction of J. D. Fogg, general superintendent.



RAW MATERIAL passes over a grizzly which removes 7-in. rock and a secondary vibrating grizzly which removes 3-in. rock. Both oversizes are loaded into trucks at the bottom of the plant to be used in the rockfill and riprap sections.

travels directly through gravity chutes into the pocket for all truck loading at the lower level. Because of the steep grade on this primary grizzly, the rocks have a tendency to bounce out of the chute, and this difficulty was eliminated by the use of old tractor tracks suspended over the chute and grizzly for the purpose of keeping the rocks from leaving the chute.

The material passing through the 7-in. primary grizzly goes down to 3-in. vibrating grizzlies and the rejects (3 to 7-in. size) are lifted by conveyor and discharged into the same bins which take the large material passing over the primary grizzly. The fines (minus 3-in.

chain feeder, and is moved to position on the downstream side of the dam, or may be used for the riprap section as directed. The fine material (minus 3-in.) is hauled by a fleet of semi-trailer equipment to a position on the impervious zone.

Work on the fill follows generally accepted procedure, involving spreading with bulldozers to a thickness which will result in a 6-in. final compacted layer, and then rolling with twelve passes of the tamping roller. The specifications require use of a roller which is in accordance with standard Bureau of Reclamation design, and this when ballasted with sand and water, provides

# California Revises its Standard Specifications for Highway and Bridge Work

**Part II of a comprehensive review of the changes appearing in the sixth edition with particular emphasis placed on those factors which must affect contractors' operation and the purchase of materials — Seal coats, road and plant mix surfacing, pavements, concrete and timber structures are discussed in this section**

**C**ONTINUING the study of the California Division of Highways' revisions in the 1940 Standard Specifications for highway and bridge work, this second part will review those sections devoted to all types of bituminous surface treatment, concrete paving and structures. The first part of this review of the Standard Specifications was published in the February issue and included principal excavation and embankment construction requirements.

It might be well to note that recent orders of the California Division of Highways provided that bituminous and aggregate materials to be provided on contracts awarded prior to Nov. 15, 1940, but still under construction, should conform to the new specifications despite the fact that the revised specifications apply, in general, only to those contracts awarded after Nov. 15. The change is intended to avoid confusion on the part of the manufacturers providing bituminous materials, and to simplify the work of the laboratory in testing aggregate. On contracts awarded prior to Nov. 15, 1940, there is no actual change in the grading of aggregates but simply a translation of the grading from the older type of screens to the new sieves. In actual practice, this requirement should have little effect on the operations of the contractor.

#### Penetration treatment and seal coat

Prior to 1935, road oils were termed fuel oils, and classified as light or heavy. This designation was changed in the 1935 edition of Standard Specifications to "liquid asphalt" although some of the materials are liquid only at high temperatures, or with the addition of a solvent. The special provisions for each project usually include what is known as a saving clause, which permits the state to eliminate the construction of an oil surface from the contract if it becomes apparent that weather conditions will not permit the construction of the surface in a satisfactory manner. Under this clause, no payment will be allowed for the eliminated items.

The section on Penetration Treatment has not been changed materially from the 1935 specifications.

Under Section 22 on Seal Coats, seven types have been designated in place of the three previously given. The various types differ principally in the type of screenings to be used, the grade of liquid asphalt, and the number of layers to be constructed. Whichever type is selected for a given job may be designated by name in the special provisions, with reference to the standard specifications,

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Seven types of seal coat have been designated with various screening gradings and binders.

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thus avoiding long descriptions in the special provisions. Where previously only the maximum and minimum limits of the screenings have been defined, the paragraph under Materials now gives complete grading tables for three sizes.

Bituminous surface treatment was formerly designated as "roadmix surface treatment," which was an accurate description, but led to confusion with roadmix surfacing. Bituminous surface treatment provides a very light surfacing—in effect an elaborate penetration treatment, while roadmix surfacing is practically identical to plantmix surfacing except in the method of mixing. Where material is already on the road, and no imported material is required to provide sufficient aggregate, bituminous surface treatment is specified. The surface is prepared by scarifying and breaking up existing material. The state of the completely broken up material has been carefully defined in the new specifications by stating that material retained on a  $\frac{1}{2}$ -in. sieve shall be soaked in water and again passed over the  $\frac{1}{2}$ -in. sieve without losing more than 15% of its weight. In preparing the surface for this type of treatment, the contractor has been required to remove and dispose of all rock larger than 2 in. Since it was

almost impossible for a contractor to accurately determine, for bidding purposes, what amount of this work would be required, the specifications now state that the removal and disposal of 10% of the total volume of material to be mixed is considered as the contractor's obligation. Where it is necessary to remove and dispose of rock which constitutes more than 10% of the total material, the amount over 10% will be paid for as extra work.

Throughout the section on Bituminous Surface Treatment the application temperatures of liquid asphalt are omitted by referring to Section 68, which includes all specifications for that material for all types of work. A paragraph has been added under the mixing requirements, whereby scarifying and reworking of the mixture after it has been approved by the engineer will be paid for as extra work. A seal coat is now provided for this type of treatment.

Specifications for armor coat material have been changed somewhat in the amount of material, and the Standard Specifications should be referred to before undertaking this type of work. Requirements for the rattler test of aggregate have been loosened somewhat, as is the case in most of the other types of surfacing. New gradings for the armor coat have been provided, and conform to the seal coat gradings in the medium and fine classifications. The third designation is designated as rock to distinguish from the coarse seal coat, and is somewhat coarser than the latter. Intermediate gradings have been provided as under seal coats. In order to utilize the same commercial products for as many types of surfacing as possible, gradings of material have been made identical wherever possible.

For the retread surfacing, the three sizes of screenings have the same grading and limits as seal coat screenings.

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Screening gradings for various types of surfacing have been made uniform wherever possible.

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Two sizes of rock have been added to the retread surfacing, with the smaller size conforming to the largest grading of armor coat. All material has complete grading definitions. Non-skid surface treatment is used principally for maintenance work, and does not apply particularly to contract construction.

### Road-mixed surfacing

Imported aggregate and mixed-on-the-road methods are the principal features of road-mixed surfacing. Grading of the mineral aggregate is the same as that used in plant-mixed surfacing, and is specified by reference to the Plant-Mixed Section. For construction of the subgrade, three separate situations are allowed. When the same contract includes the construction of a graded roadbed, or a base course, and the placing of road-mixed surfacing, it is expected that payment for the subgrade or base will include preparation for the surface.

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Construction of the subgrade for surfacing may be provided by any of three different procedures.

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However, when a contractor is placing road-mixed surfacing on traveled ways or bases under a separate contract, the existing surface is to be scarified, watered and rolled before placing the prime coat, with payment for this work to be made as extra work, since it is difficult to determine the exact amount of work required.

The new specifications will permit the application of liquid asphalt under certain cases when the moisture content exceeds 1% by weight of dry aggregate. Loosening of this specification is at the option of the engineer when aggregates are unusually porous. Mixing is, as previously described, by the blade method. However, the new specifications will allow the use of traveling machines subject to the approval of the finished mixture by the engineer. The requirements for applying liquid asphalt by means of distributors will be waived for road-

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Layer construction is required in roadmix surfacing.

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mixing machines that satisfactorily apply the liquid asphalt during mixing operations. The engineer may direct that mixed material may remain in the windrow for a period of more than one day.

The new specifications require that after the aggregate and liquid asphalt have been mixed by the road-mixed method, the material be placed in windrows; also that the mixed material be spread from the windrows and compacted in layers  $1\frac{1}{2}$  in. thick; and also that each layer be fully compacted before the next layer is spread. The use of pneumatic rollers will be permitted

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Materials specified for plantmix surfacing apply also to roadmixed construction.

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on both road-mixed surfacing and plant-mixed surfacing, although the final rolling must be done with a tandem roller.

Payment for road-mixed surfacing has been extended to include three items in

stead of the two previously used. Mineral aggregate will be paid for at the bid price per ton or cu. yd.; liquid asphalt at the bid price per ton; and mixing and compacting at a bid price per sq. yd.

### Plant-mixed surfacing

Placing and compacting of plant-mixed surfacing is nearly identical with the requirements for road-mixed surfacing.

Two types of surfacing specified in the 1935 edition have been combined into a single type in the 1940 edition. The materials paragraph under Plant-mixed Surfacing applies also to road-mixed surfacing. New gradings have been provided in accordance with the change in sieves, as described last month, and a paragraph of maximum variations has been included to ease the carry-over between screen changes and control the aggregate grading. Special provisions have, for several years, required that the

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Layer construction is required in plantmix surfacing.

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contractors provide a suitable dryer for the aggregates, and this provision has now been included in the standard specifications. Mineral aggregate must be separated into three sizes instead of the two formerly designated.

Preparation of the subgrade is provided for in the same manner as under Road-mixed Surfacing, except that when plant-mixed surfacing is to be placed on existing traveled ways or bases, not constructed under the same contract, two methods of subgrade preparation are provided: (1) the existing surface may be scarified, watered and rolled prior to placing the prime coat. This will be paid for as extra work. (2) The prime coat will be applied to the existing surface, and a leveling course of plant-mixed surfacing will be spread to level irregularities and provide a smooth base of uniform grade and cross-section. The leveling

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Specifications for bituminous materials have been combined in a separate section and are specified in the construction details by reference to that section.

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course will be paid for at the contract unit prices for plant-mixed surfacing. Brooming of the surface before applying the prime coat is required.

Layer construction of plant-mixed surfacing is provided as in road-mixed surfacing. After the material has been placed on the road by spreader boxes, all but the lower  $1\frac{1}{2}$  in. is to be bladed to one side, and the remaining material compacted. The material first removed shall then be re-spread and rolled. Irregularities on the finished surface may vary  $\frac{1}{8}$  in. from the 10-ft. straight edge in place of the  $\frac{1}{4}$  in. formerly specified. If it becomes necessary to scarify and re-work the mixture after final compac-

tion of the surfacing, the work will be paid for as extra work.

Power rollers have been re-defined to include the use of the 3-wheel type. Pneumatic rollers will be permitted on plant-mixed surfacing, and are defined as follows: "Pneumatic-tired rollers shall be of the two-axle type, having a

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Pneumatic-tired rollers may be used to compact both roadmix and plantmix surfacing at the contractor's option.

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width of not less than 4 ft. nor more than 6 ft. and equipped with pneumatic tires of equal size and diameter, with treads satisfactory to the engineer. The space between side walls and adjacent tires shall not be greater than 5 in., and the rear tires shall be staggered with relation to the front tires. The tire shall be uniformly inflated and the air pressure in the several tires shall not vary from each other more than 5 lb. per sq. in. The operating weight of the roller shall not be less than 7 tons and the weight per tire not less than 1,500 lb." Where pneumatic tired rollers are used, the final finishing must be done with a tandem roller in order to remove all tire marks.

On small surfacing projects requiring plant-mixed materials, railroad car weights may be accepted in order to avoid scale construction when material is purchased commercially. This provision applies only where the total surfacing required does not exceed 3,000 tons.

### Pavements

Specifications for timber side forms for macadam, asphalt concrete and portland cement concrete are included under the general timber specifications. A new requirement provides that timber side forms shall not vary more than  $\frac{1}{4}$  in. from a true straight line in the length of each individual section of the side form. A paragraph on side forms, to be used on existing pavements which are to be resurfaced, has been included in the specifications. This paragraph has, for some time, been included in the special provisions. The paragraph on metal side forms has been revised and brought to date. Essentially the same material has been used in the specifications where metal forms were required. Construction of bituminous macadam surface is not used to a great extent, but occasionally is placed on laminated timber bridge decks because of the softer consistency. A prime coat, not previously required, is now included, and the Los Angeles Rattler Test requirements have been loosened slightly. Grading specifications

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Softer asphalts will be used for asphalt concrete pavements.

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have been changed to conform to the new sieve requirements. Methods of mix have been modified somewhat.

Specifications for asphalt concrete pavement have been revised to agree with the requirements included in the special provisions which were used about a year before the new standard specifications were issued. New paragraphs on subgrade and side forms have been added. The material in the section is considerably changed from that which appeared in the old standards, and incorporates several items not previously included in the later special provisions.

Requirements for the Los Angeles Rattler Test have been loosened somewhat. A softer asphalt is to be used than has been previously. Grading and composition requirements are included in a single half-page table, replacing more than three pages of tables in the old volume. The grading requirements are, of course, revised to conform to the new standard sieves. The use of bulldozers or other equipment which might cause the segregation of material, or the com-

Screen areas will govern permissible plant output on asphalt concrete.

bining of materials, will not be permitted in placing materials in storage, or moving from storage to plant.

Mixer capacity for the production of asphalt concrete pavement is limited on the basis of screen sizes to prevent overcrowding of screens and resulting poor grading. This section is completely new, and definitely limits the mixer capacity in accordance with the screen capacity of the plant. Description of the proportioning devices and scales is carried over from recent special provisions. Description of the placing equipment has been brought up to date in order to describe modern machines. A paragraph has been added, permitting hand-raking instead of machine finishing where the total width is too narrow to permit the use of the machine, or where the asphalt concrete will extend to a feather edge over existing pavement. For hand-finishing a smaller maximum aggregate will be used. No asphalt concrete surface course may be spread if it cannot be finished within daylight hours of the same day as laid. The surface finish formerly included with asphalt concrete pavement, has been eliminated, and a provision made for a seal coat to be applied before opening to traffic.

#### Portland cement concrete

The specifications for the portland cement concrete pavement have been revised to include requirements which have been used in special provisions for some time before the 1940 edition was published, whereas the 1935 specifications required that concrete pavement be Class "A", or 6 sacks per cu. yd. It is now Class "B", or 5 sacks per cu. yd.

The requirement for surfacing machines is now based on the cubic yards

of concrete placed per hr. in 11-ft. lanes instead of the cubic yards laid per 8-hr.

Finishing machine requirements on concrete pavement are based on a cubic yard per hour basis.

day, as in the earlier specifications. One machine must be provided for each 40 cu. yd. laid in 11-ft. width per hr. However, machines manufactured after 1931, and approved by the engineer, may be permitted to handle 65 cu. yd. of concrete in 11-ft. widths per hr. The description of concrete finishing has been simplified for clarity. An alternative has been included in place of the diagonal float, which will permit the use of a machine float, subject to the approval of the engineer. Curing methods are about the same as in the 1935 edition. However, regardless of the method of curing, the concrete must be covered while still fresh, with heavy burlap laid directly on the pavement, and kept wet.

#### Timber structures

All references to the American Society for Testing Materials have been brought up to date, and specifications for Douglas fir are unchanged. Specifications for redwood have been completely changed upon the recommendation of the California Redwood Association, in accordance with their rules adopted on Feb. 1, 1938. A new grade of redwood has been added, and is known as bulkhead struc-

Bulkhead structural grade has been added to specifications for redwood.

tural. This is to be used for sills, cribbing, bulkheads and deadmen. This grade is to be used where weight and size are the important requirements and little flexural stress will be required. Lengthy descriptions, in many cases, have been eliminated by reference of standard specifications of national organizations, and many items in the section have been shortened in this way.

Bridge railing on concrete structures will be paid for at a unit price per lineal foot in place of the payment per 1,000 ft.b.m. formerly used. This also includes the furnishing of labor, materials, tools and equipment, as well as the necessary hardware, paint and wood preservative.

#### Concrete Structures

Requirements for concrete bridges, culverts, headwalls, drop inlets, retaining walls, and other types of concrete structures remain about the same as in the 1935 specifications. Forms for all surfaces which will not be completely closed or hidden below the permanent surface

of the ground shall be made of surfaced lumber or material which will provide a surface at least equally satisfactory. For the first time, high frequency internal vibrators are required for placing all concrete except that in pipe culvert headwalls; slope paving and aprons; curbs and gutters, sidewalks and concrete placed under water. At least two vibrators must be available at structures at which more than 25 cu. yd. of concrete is to be placed. Elephant trunks are required where fresh concrete is to be dropped more than 6 ft.

The paragraph on depositing concrete under water has been enlarged in some detail. A specification for copper strips to be used as joint seals has been added. Concrete to be used in railings and posts

Two vibrators are required where more than 25 cu. yd. of concrete are to be placed in a structure.

was formerly designated as Class "E" or "F", with 9 sacks of cement per cu. yd. The new specifications require Class "A" concrete unless otherwise designated in the special provisions.

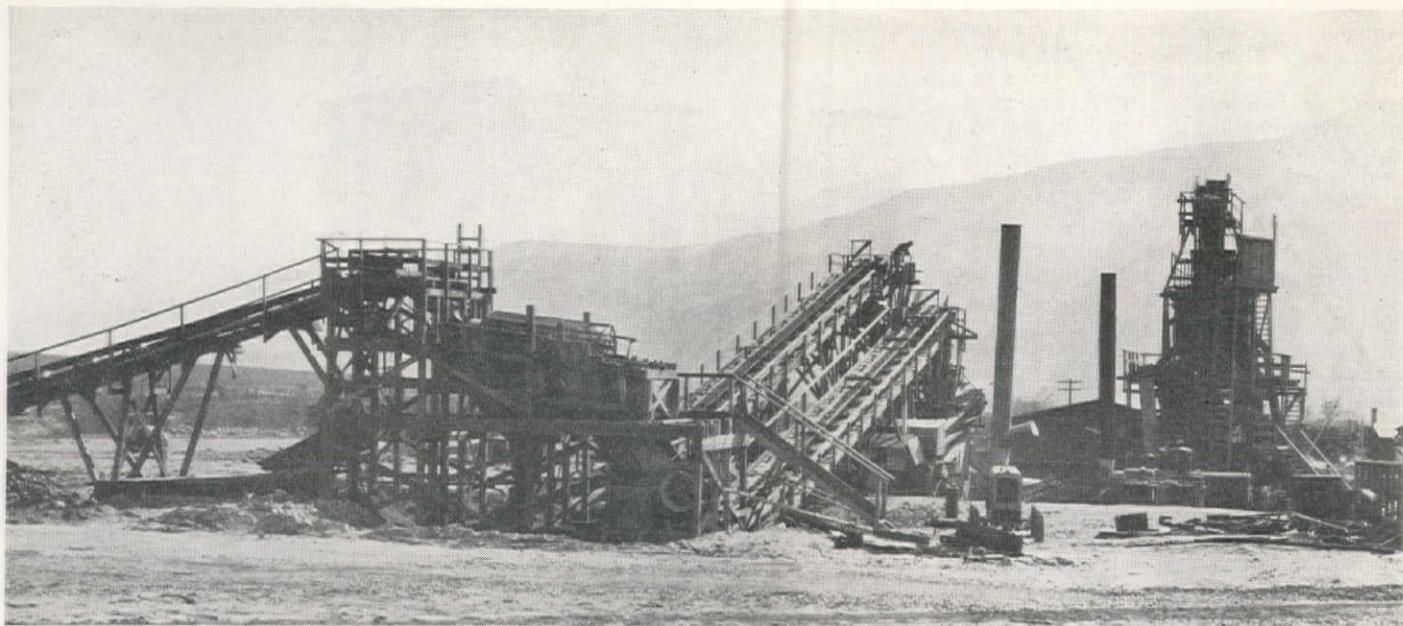
#### Steel structures

Requirements for steel structures include references to the latest publications of the American Association of State Highway Officials, the American Society for Testing Materials and the American Railroad Engineers' Association. An important provision under the general requirements is that shop detail drawings shall be submitted to the engineer for approval not later than 60 days after the approval of the contract. At the completion of the contract, all shop drawings shall be made in ink on tracing cloth, and become the property of the State without additional charge. Specifications for steel castings have been revised; the specification for wrought iron plate has been added; the paragraph on punched work has been revised and brought to date, as have the paragraphs on reamed work and drilled holes. References to galvanizing have been placed

Shop detail drawings of fabricated steel must be submitted within 60 days after the contract is awarded.

wherever necessary; references have been made to the A.S.T.M. and subsequent amendments which may be made to those specifications. Specifications for cutting with a torch have been revised and brought to date, as has the paragraph on welding. A new paragraph requiring the painting of all exposed iron and steel surfaces has been added. The

(Continued on page 97, col. 1)



GEORGE HERZ & CO. plant set up included an 8,000-lb. pugmill type mixing plant complete with two-stage crushing, dryer and steam boiler. All but the dryer were used for producing cement stabilized base.

## Double Duty Mixing Plant

**Asphalt plant of 8,000-lb. capacity turns out cement stabilized base material for 11 mi. of 25-ft. roadway in southern California — Change over for production of plantmix surfacing requires only change of screens and elimination of dryer bypass**

**E**AST of Banning, Calif., on combined highways 60, 70 and 99, which is the main route from the Los Angeles area to the Imperial Valley and eastern points, George Herz & Co. last month completed 11 miles of cement stabilized base, and is at present engaged in placing a plant-mixed surface on the base. The cement stabilized base was mixed in a central plant and hauled to the road by truck for spreading and compacting. Several features of the plant and placing methods are of interest, since this type of base construction is still relatively new. A similar project constructed north of Red Bluff, Calif., was described in the Nov., 1940, issue of *Western Construction News*.

### Description of project

Highways 60, 70 and 99 are combined from Los Angeles to Indio on the same route and traffic over this section is unusually heavy, with a considerable amount of truck traffic. The route passes through the mountains east of Los Angeles at a considerably lower elevation than any other, and therefore is used extensively for hauling of materials to and from the Imperial Valley.

During 1940, Oswald Brothers completed 6 mi. of grading and plant-mixed surfacing on cement stabilized base be-

tween Beaumont and Banning, Calif., and the work on the Herz contract was an extension of this earlier work with provision for the same type of construction. Much of the plant and construction procedure was similar to that used on the earlier contract. The project from Banning to Palm Springs Junction is 11.02 mi. in length, and provides a 23-ft. traveled way to carry westbound traffic. Eastbound traffic will continue to use the existing highway. The cement stabilized base which was placed on the subgrade is 25 ft. in width, extending across the two traffic lanes to the dividing strip berm, and varies in depth from 0.5 of a ft. on the left side to 0.75 of a ft. at the right. The wearing surface on the base consists of a 0.21-ft. plant mix.

### Plant

The mixing plant was erected with the intention of utilizing it for both the stabilized base and the plant-mixed surfacing. It was located just east of Banning, near the west end of the project on the bank of San Gorgonio Wash, where the aggregate pit was located. Material in the pit was relatively clean, but included a considerable amount of oversize rock. It was excavated by a 1½-yd. dragline, and hauled to the plant in 3-ton trucks. A double screen revolving grizzly re-

moved all material over 1½ in., and delivered it to a jaw-crusher for primary reduction. Material from the jaw was delivered over a conveyor belt to a gyratory crusher for secondary reduction, and then recombined with the finer uncrushed material.

At this point, a dryer had been installed for use in the production of plant-mixed surfacing. When cement stabilized base was being produced, the dryer was bypassed and the material carried directly to the top of an 8,000-lb. batching and mixing plant by the usual bucket conveyor. A double-deck screen above the batching plant removed two sizes of aggregate and the oversize, 1½ to ½ in. and minus one-half inch material was used in the base. After the two-stage crushing, very little oversize remained to be wasted at this point.

During wet weather it was found that the finer screen tended to clog with damp material. This difficulty was overcome by going over the screen, at short intervals, with a stream of compressed air and blowing the screen clear. By blowing the screen every 15 to 20 minutes, it was possible to keep it completely clean. Cement was added to the batch by a bucket elevator, which was loaded by hand in a cement shed adjacent to the plant, at a signal from the

plant operator. The complete base mixture included about 6% cement, and was mixed in 4-ton batches at  $4\frac{1}{2}$  sacks of cement per batch. The size of the batch was determined by the truck capacity, since the plant was capable of mixing a 6-ton batch and the trucks could haul only two 4-ton batches.

The output of the plant during the base mixing averaged between 1,800 and 2,100 tons per 8-hr. day.

#### Placing

Spreading the base to a depth of  $\frac{1}{2}$  to  $\frac{3}{4}$  ft. and a width of 25 ft. presented a rather difficult problem, and the procedure adopted was similar to that used on the Oswald Brothers job recently completed. A 95-h.p. diesel tractor with bulldozer formed the basic unit for the spreader. At each side of the bulldozer, a metal plate about 4 ft. high and 5 ft. long was welded, and the two plates braced across the front of the bulldozer. Near the front of each plate was mounted a wheel and screw-jack. By adjustment of the jacks, the height of the bulldozer above the subgrade could be regulated. At the lower edge of the bulldozer blade, a V-shaped blade was placed to assist in distributing the material from the center of the spreader box to the sides. The chief difficulty in operating this unit was discovered to be a



**SPREADER BOX** for placing the cement stabilized base consisted of a bulldozer mounted on a tractor with side walls added to the dozer blade. Wheels and screw jacks provided the depth setting facilities.

The unit spread approximately  $12\frac{1}{2}$  ft. in width, spreading first about 100 ft. on one side and then going back and

spreading the second  $12\frac{1}{2}$  ft. of the roadway width. Compacting was done with a 3-wheeled roller and a single-axle pneumatic roller which was towed behind the water distributor truck.

During the finishing operations, a very fine spray of water was passed over the base to keep the surface material from drying out and to develop or work enough mortar to the surface to fill any voids left by the three-wheel roller. Final rolling was done by the rubber-tired roller. Following completion of the cement stabilized base, the plant was quickly made ready for plant-mixed surfacing by eliminating the bypass around the dryer and changing the screens over the batching plant.

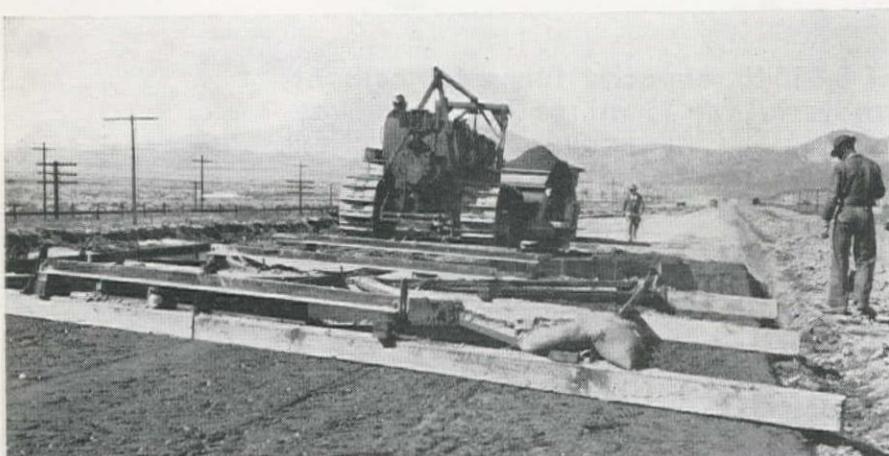
#### Organization

Construction of the project is being carried out by the California Division of Highways, under the supervision of the District VIII office. C. H. Purcell is state highway engineer and E. Q. Sullivan is district engineer. G. E. Malkson is resident engineer for the Division of Highways.

Charles Davin is superintendent for Georg Herz & Co. During the early part of the construction, Ted Williams was superintendent for the contractor.

## To Build 1,500-ft. Viaduct Over Sacramento Lowlands

PRELIMINARY PLANS for construction of an \$847,440 viaduct across the American River lowlands between Sacramento and North Sacramento, Calif., have been completed by the California Division of Highways. The structure will be 1,496 ft. long, consisting of three reinforced concrete girder spans, each 41 ft. long, and one 10-ft. cantilever span at each end. The roadway will have two 25-ft. lanes, separated by a 4-ft. dividing strip, with 4-ft. sidewalks on each side.



**TIMBER DRAG** of three 6 x 6 timbers extending the full roadway width of 25 ft. was pulled behind the dozer-tractor-spreaderbox combination to remove irregularities and eliminate the use of a grader.

greater compaction gained at the center of the machine, and less at each side. In order to reduce the central compaction, three heavy bars were welded to the bottom of the bulldozer blade near the center and extending downward toward the subgrade. These, however, did not sufficiently break up the material and a scarifier, consisting of a timber drag with short teeth, was pulled behind the tractor to further assist in breaking up the material.

Trucks coming up with mixed material backed into the spreader box at the front of the tractor, dumped their loads, and were pushed by the tractor until the load had been completely discharged. It was necessary to keep several laborers working at the spreader box in order to assist in the distribution of the material.

spreading material on the other.

#### Finishing

It was found that use of a motor grader for correcting the spreading of material resulted in a drop of compressive strength, and in place of a motor grader, a drag float was devised and towed behind the tractor which carried the spreader box. The float consisted primarily of three 6 x 6 timbers set transversely across the roadway on an angle of about 30 deg. and three shorter cross blades feeding the main drag. (See accompanying photograph.) Any high spots in the base were immediately picked up by the drag and the material shifted to low spots. The drag covered the full 25 ft. of the base width, and was pulled ahead only when the tractor was

Data and illustrations are from a study submitted to the James F. Lincoln Arc Welding Foundation in a recent program. In its current \$200,000 Industrial Progress Award Program, which closes June 1, 1942, the Foundation is offering 458 awards from \$100 to \$13,700, for reports of advances and improvements made by application of arc welding in design, manufacture, fabrication, construction and maintenance.

—EDITOR.

**I**N DRIVING and concreting the Mono Craters Tunnel, constructed by the Department of Water and Power, City of Los Angeles, some 350 mi. northwest of Los Angeles, the usual questions of suitable equipment and methods arose. The Mono Craters tunnel has a finished cross-section of 9 ft., and most of the equipment had to be specially designed and constructed, to be small, handle easily, and be of long service life.

Because of swelling ground encountered, it was necessary that methods of concreting short sections of the tunnel, and of placing concrete in bulkheads be devised. The regular concreting equipment used in lining completed sections was too burdensome to permit quick moving in and out of the tunnel for this work. The procedures of driving and lining were described in *Western Construction News*, December, 1938.

#### Factors of design

The method devised was a mobile mounting for a half-yard air-gun for pumping concrete, surmounted by a steel fabricated platform upon which a specially designed car could be run, and the car's load of concrete dumped into the hopper of the air gun. A fabricated ramp was to be designed to run the car from track to the platform.

The design of the car was carefully studied, and it was decided that a 2-yd. car separated into four compartments



CARS WERE run onto a specially fabricated steel platform over a half-yard concrete pump and the 2-yd. load of concrete successively dumped in four parts.

# Tunnel Concrete Car Design

was the most feasible. The overall length was to be 10 ft. 2 in., the height 4 ft. 7 in. from the ball of the rail. This size was required by the limited space available in the tunnel. It was concluded that the best method of dumping concrete was through radial gates under the car, thus permitting the placement of concrete while other equipment was being worked on one side of the switch.

The strength of the car was an important consideration. Inasmuch as the car was required to carry a plastic mass, the car walls would have to withstand internal pressure, and the machine would be handled in a more or less abusive manner. A long service life for the car was desirable in order that it have a high

**Necessity for lining short sections of Mono Craters tunnel on Los Angeles Aqueduct required the development of a special car design to transport concrete quickly in limited space**

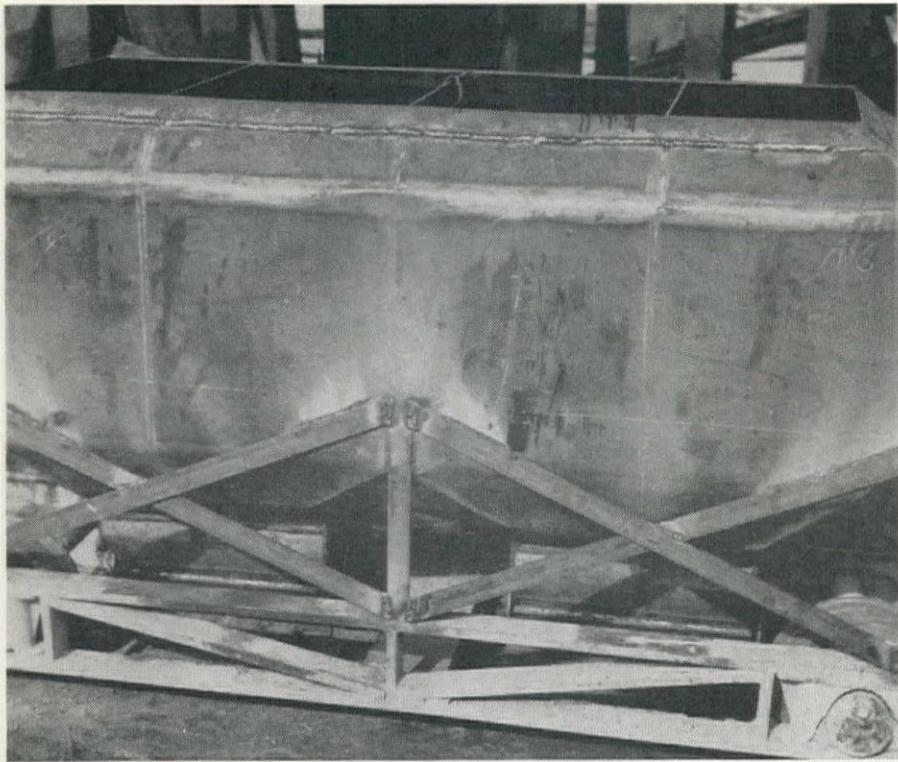
By KENNETH G. WILKES

Junior Civil Engineer, Bureau of Water Works and Supply, Los Angeles, Calif.

salvage value after completion of this job.

#### Explanation of design

The overall width of the car is 3 ft. 3½ in., the length 10 ft. 2 in., the height 4 ft. 7 in. The car has a capacity of 2 cu. yd. divided into half-yard compartments. The arrangement provides two compartments with 6 x 12-in. discharge openings and two with 6 x 10-in. openings. The end walls are of ½-in. plate as are the center and compartment baffle plates. There is a 6-in. splash board of 12-ga. metal all around the top side. The top of this board is reinforced by ½ x 2-in. plate. The compartments are not regular in section, but so formed as to give the



INTERIOR of the car is made up of four half-yard compartments, each with a separate hopper bottom opened by individual radial gates.

capacity required and yet be in such a position that they will readily discharge into the concrete gun.

Most of the welds are  $\frac{1}{4}$ -in. fillets; however, where special stresses occurred  $\frac{3}{8}$ -in. weld was resorted to. The radial type gates have a radius of 10 in. and are operated by a handle on either end of the car. Each control handle operates two compartments. The position for each operation is fixed by a guide welded to cross member on the ends of the car. The sway and diagonal bracings are  $\frac{3}{8}$  x 2-in. straps welded to the car body, crossed and then welded to the car chassis. (See accompanying photographs.) The posts are 2 x 2 x  $\frac{3}{8}$ -in. angle welded on the body and on the chassis. A 1-inch pipe cutting across the discharge opening is merely a housing for the control shaft.

The car operates in connection with a ramp and carriage attached to a concrete gun. (See accompanying illustrations.) The car is loaded at the mixer and shunted along a narrow gage railway until coming to the point of operation. Here it is run up the ramp to a point on the carriage at which the forward compartment is over the concrete gun. The operator then discharges the first compartment by moving the handle in a counter-clockwise direction. After this operation is completed, the car is moved forward until the second compartment is over the gun hopper. The operator throws the handle completely to the left. This operation is repeated until all four compartments are emptied. The car is then returned to the mixer and is ready for another load.

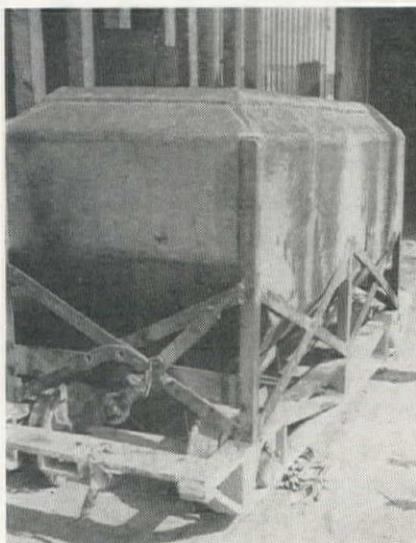
#### Cost data

Because of the compactness of the car

and its weight, it was possible for the welders to place the job in any position for welding. This resulted in most of the welds being made in a horizontal position. In computing welding costs, all welds were considered as being made in such position.

The cost of welding the concrete car was \$41.40, whereas to construct the car by riveting would have cost \$120.90. This shows a saving of \$79.50 on each car. It has been assumed in these com-

A LEVER at each end of the car operates the gates of two compartments. Moving the handle each way from the center positions opens each gate.



putations that in both cases the material needed for the body was the same, the only difference being that used in the riveting method for connections.

Since the efficiency of the usual riveted joint varies from 45% to 75%, the increase in thickness of plate necessary would be such as to increase the total weight of the car by a large amount. Since one of the basic requirements was light weight, this method of construction would not be satisfactory. Then, too, in the riveted joints all crevices would have to be caulked, which would add materially to the cost of the car. Caulking is makeshift at best and is also expensive. It would be necessary to re-caulk after the car was in service a short time. Therefore, the service life of a riveted car would not be very long, whereas the welded car need never be caulked.

The track in a tunnel is never very level or in straight alignment, and operating a car on such track in a short time would tend to loosen and shear riveted joints, and loosen caulking. A welded car, being a homogeneous piece of equipment would not have these troubles. It can readily be seen that the efficiency of welded construction would be greater in that the welded car would not require frequent servicing. In a riveted car the heads of the rivets would protrude into the concrete compartments and accumulate masses of concrete, necessitating daily chipping and cleaning. Welded joints cannot accumulate any of the mix.

Thus in any day the welded car would economize on the services of a clean-up crew of 3 men.

## Idaho Needs \$21,186,100 For Military Highways

DEVELOPMENT of the "vitally necessary" strategic military highways in Idaho will require funds amounting to \$21,186,100, according to a report issued by C. P. Humphreys, state highway director. The estimate was included in the highway director's biennial report to the legislature. Humphreys estimated that the improvement of 683 mi. of first priority roads would require an expenditure of \$9,413,700, and improvement of 504 mi. of second priority roads would require \$11,772,400. He pointed out that at the present rate of improvement 1,186 mi. of military roads are being brought up to the required standards at the rate of \$1,057,000 per year. At this ratio, it would require 9 years to bring the first priority roads up to the military demands. The Idaho highway department is also confronted with the problem of retaining experienced engineering personnel needed in the planning and construction program. Many engineers have been attracted to better positions, and it is feared that construction work may be seriously hampered by the lack of funds to adequately recompense capable engineers.

# Construction Design Chart

## LXIII . . . Concrete Beams in Tension

By JAMES R. GRIFFITH

Lieut. Comdr. CEC-V(S), USNR.  
Seattle, Wash.

**I**N SOLVING for the flexural stresses in a concrete beam reinforced for tension, there are two methods of attack. One method was presented in the November, 1940 issue wherein the flexural stresses were found after having determined the two values

$$p = \frac{A_s}{bd}$$

$$K = \frac{M}{b d^2}$$

The one objection to that particular chart is that it is applicable to only the one value of  $n = 15$ .

In the other method of attack, the position of the neutral axis is determined giving the values ( $k$ ) and ( $j$ ). This solution is the one used for the accompanying chart and has the advantage that it is applicable to all indicated values of ( $n$ ) or ( $f'_c$ ). The chart is solved by the use of a single straight line intersecting all scales.

As an illustration in the use of this chart, let us investigate the slab designed in the November, 1940 issue. In this problem, the conditions finally determined were:

### Slab

Total bending moment,  $M = 9,280$  in. lb. per ft. of slab,

Effective depth,  $d = 2.5$  in.  
Reinforcing,  $\frac{3}{8}$ -in. round bars 5.5 in. on center,  $A_s = 0.24$  sq. in. per ft. of slab,

$$p = \frac{A_s}{bd} = \frac{0.24}{12 \times 2.5} = 0.008$$

$$n = 15$$

$$f_s = 17,750 \text{ p.s.i.}$$

$$f_c = 740 \text{ p.s.i.}$$

On the accompanying chart, a solution line has been drawn between the values given above

$$n = 15$$

$$p = 0.008$$

On the central scale, the following values will be noted

$$k = 0.385$$

$$j = 0.872$$

$$\text{or by computation, } j = 1 - \frac{k}{3} = 0.872$$

Then

$$kd = 0.385 \times 2.5 = 0.962 \text{ in.}$$

$$jd = 0.872 \times 2.5 = 2.18 \text{ in.}$$

$$C = T = \frac{M}{jd} = \frac{9,280}{2.18} = 4,250 \text{ lb.}$$

$$f_s = \frac{T}{A_s} = \frac{4,250}{0.24} = 17,700 \text{ p.s.i.}$$

$$f_c = \frac{2C}{kdb} = \frac{2 \times 4,250}{0.962 \times 12} = 738 \text{ p.s.i.}$$

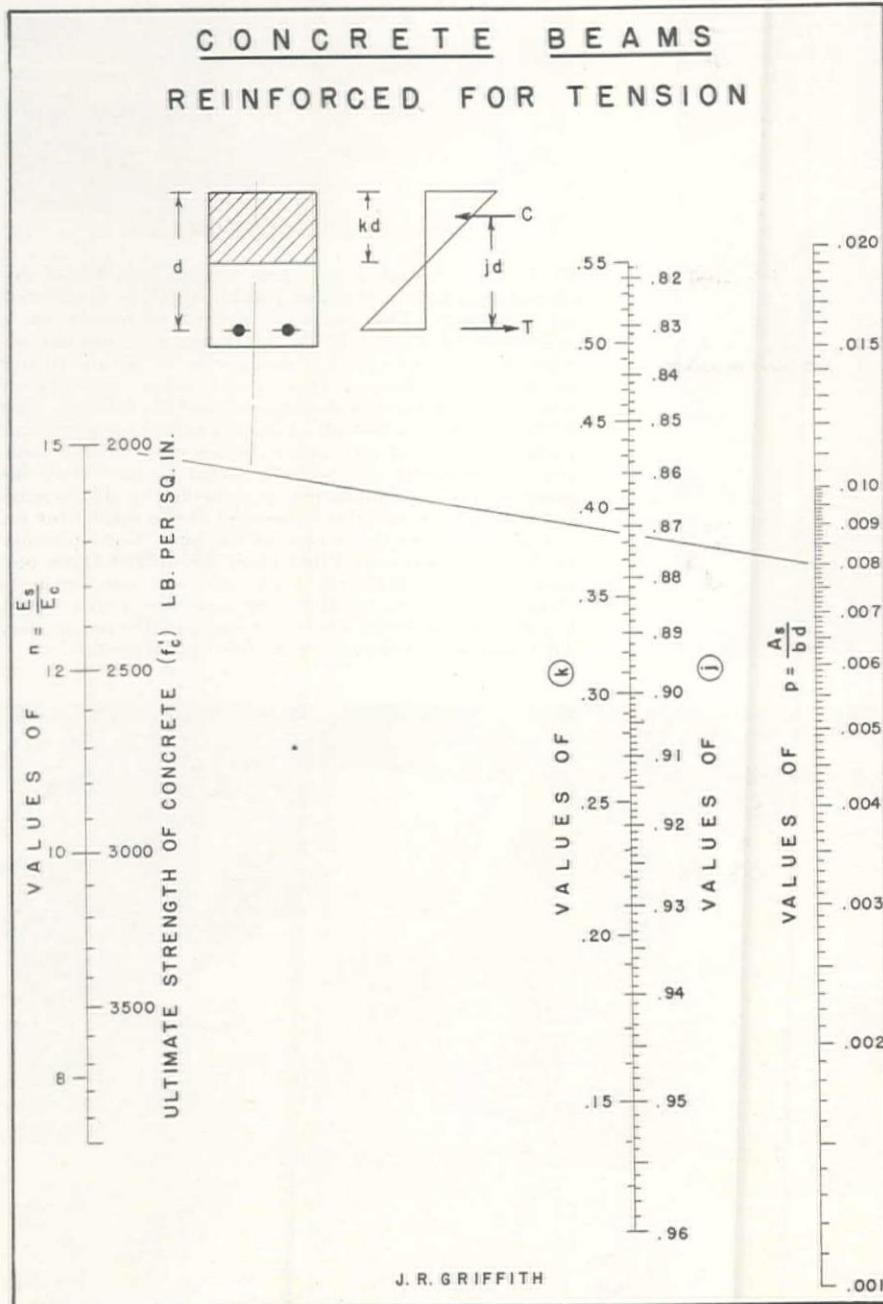
These values will be seen to check very closely to those found before.

The American Concrete Institute<sup>1</sup> specifies for the determination of ( $n$ ) the expression

$$n = \frac{30,000}{f'_c}$$

So values of both ( $f'_c$ ) and ( $n$ ) are given on the left scale. There are numerous published tables, such as that given by Urquhart and O'Rourke<sup>2</sup>, giving similar information as the chart for values of  $n = 10$ , 12, and 15. However, I have seen no tables giving similar values for  $n = 8$ . Yet in modern bridge design there is an increasing tendency towards the use of high strength concrete.

1. Building Regulations for Reinforced Concrete.
2. Design of Concrete Structures



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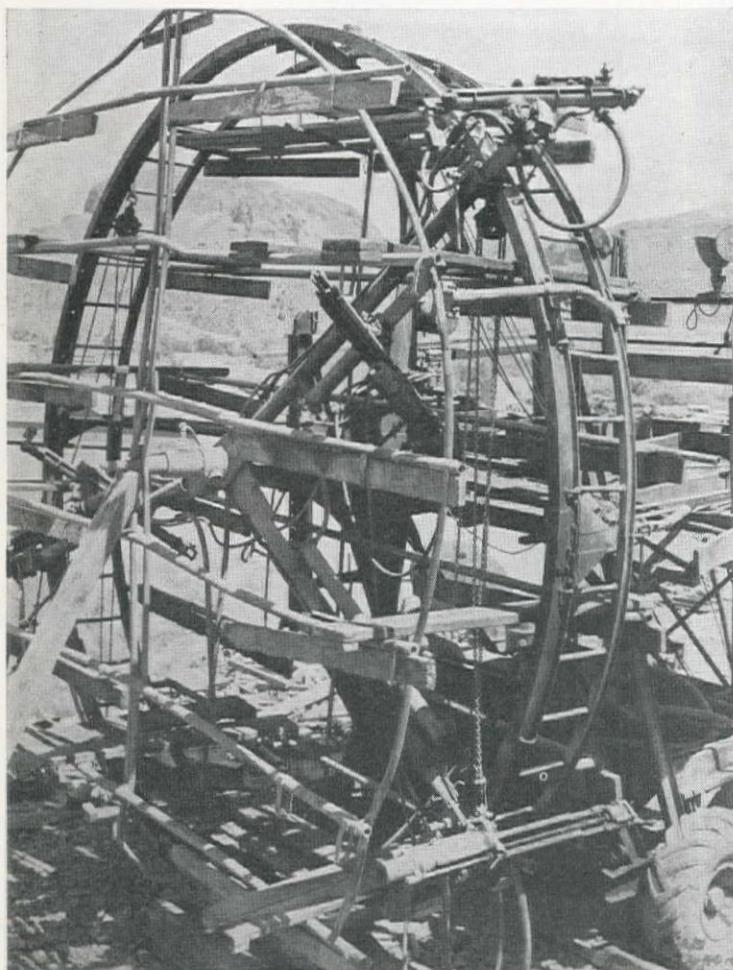
WESTERN CONSTRUCTION NEWS

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San Francisco, California

# HOW IT WAS DONE

JOB AND SHOP TIPS FROM THE FIELD EDITOR'S NOTEBOOK

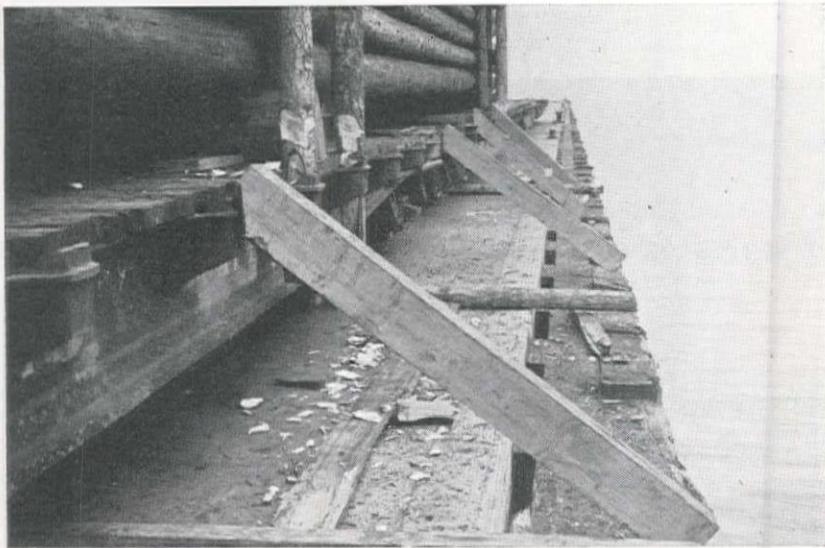
## Circular Tunnel Drill Jumbo



AS A PART of the contract for completing the power plant excavation at Parker Dam on the Colorado River, Clyde W. Wood, Los Angeles contractor was required to drive four 27-ft. penstock tunnels of varying length on grades which varied from 20 to

27%. To accomplish this part of the job, Wood designed and built a circular jumbo which is illustrated on this page. The jumbo consisted primarily of a channel-steel frame 19 ft. in diameter mounted on pneumatic tires in such a manner as to permit tilting of the circular frame. Three radial tubes, pivoting on a central axis furnished supports for six drifters. The drifters were free to slide along the radial supports and could be fixed at any point. Holes were drilled both circumferentially and radially—that is, they were located on the circumference of four circles of decreasing diameter within the A line and at the same time on radial lines from the center of the bore. Consequently all holes on one radial line could be drilled from one position of a radial arm. Each arm was assigned one-third of the area of the face and five crews could handle the six drills since one was usually not in use. All tunnels were driven from the upper portals.

# Unloading Timber Piles



USE OF A RAILROAD crane in unloading timber piling from railroad cars on the docks of the San Diego, Calif., harbor department resulted in the cutting of time required in the unloading from three hours to twenty minutes. The idea was developed by Nick Donnan of the harbor department. The first step, shown above, consists of placing four jump skids between the car and the edge of the dock.



JUMP SKIDS are fastened in place by means of a small metal hook which is placed in the pocket on the side of the car. These piles are 75 and 65 ft. in length. Before this idea was developed, unloading of a car of piling required a crew of five men and occupied about three hours time, each piling being unloaded separately.

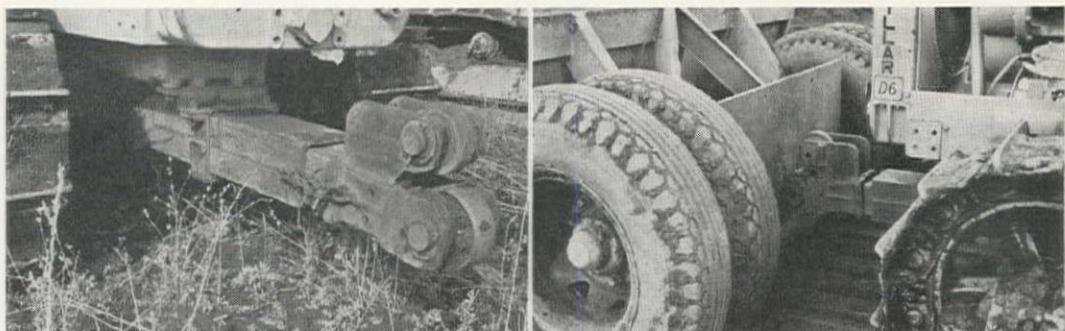


A CABLE is placed under the piling with the loop over the railroad crane hook and the free ends fastened to the metal pockets on the side of the car nearest the water. All tie wires on that side are cut and the upright timbers on that side are partially cut away, permitting them to break as the crane lifts the cable and the piles.

ONCE in the water, the piles are collected into a raft and towed off to the desired location by a small tug. The complete operation occupies about twenty minutes and requires a crew of three men including the operator of the railroad crane.



SAN DIEGO County road department has developed a double roller pusher unit for loading scrapers. The 8-in. box of  $\frac{3}{8}$ -in. steel encloses a discarded tractor spring which acts as a shock absorber when the rollers contact the scraper. Two rolls with Alemite fittings permit free movement up and down the pusher plate. The upper roll is a safeguard to prevent the attachment getting under the scraper plate. J. W. Cole, assistant county road commissioner furnished the data given above.



ROLLER UNIT SERVES AS PUSHER CONNECTION FOR LOADING SCRAPERS

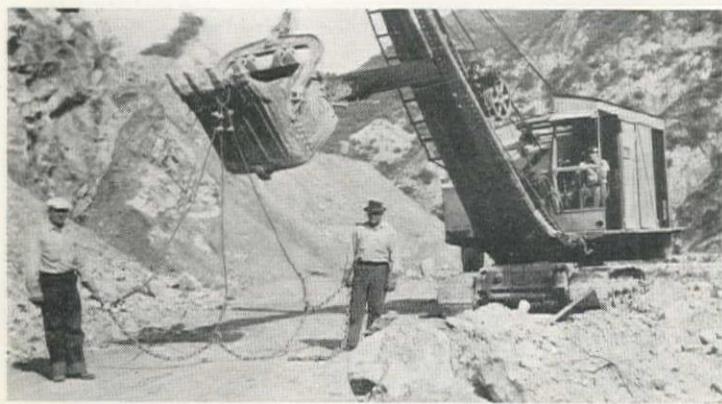


TRACTOR SHOVEL LOADS TRUCKS ON UNDERPASS JOB

WHEN constructing a drain through a highway underpass west of San Bernardino, Calif., Vido Kovacevich, South Gate, Calif., contractor, used a Hough hydraulic loader mounted on a Case DI tractor for loading waste dirt and rock from the excavation into trucks for removal from the job.

DIPPER of a shovel or hook of a crane is spotted over the rock to be moved while a helper wraps the chain securely around the rock and below its greatest dimension. The entire operation is quickly accomplished and has the advantage, when a shovel is being used, of being quickly disassembled. As can be seen below, cable was used for the vertical lines in the experimental sling. Actual operation indicated that chain is preferable to cable since the latter's stiffness prevents to some extent a close wrapping of the lower chain.

## Chain Sling Handles Rock



HANDLING large boulders, or oversize rocks on construction projects is one which often involves considerable delay and difficulty. E. H. Kellogg (right, above), shovel operator for the Los Angeles County road department, developed a chain sling illustrated here which permits the rocks to be removed without breaking them up in order that they may be used in ripraping slopes. The sling consists of three pieces of  $\frac{5}{8}$ -in. cable fastened to a ring at the upper end and at intervals to a 2 or  $2\frac{1}{2}$ -ft. chain at the bottom.



# NEWS OF WESTERN CONSTRUCTION



MARCH, 1941

## PRA Reports \$287,000,000 Needed for Military Roads

THE PUBLIC Roads Administration survey of highway facilities from the point of view of National Defense was made public on Feb. 13, recommending that Congressional appropriations be made totaling \$287,000,000 for immediate defense highway construction. Emphasizing the importance of speed, the report referred to the utilization of the facilities of private enterprise, and recommended that many of the larger and more vital projects be constructed by contractors' organizations.

Types of construction vary from resurfacing and widening of 2-lane roads to the construction of multiple lane highways and large bridges. The appropriation of four funds to provide for as many types of defense roads included (1) access roads, \$150,000,000; (2) tactical roads, \$25,000,000; (3) strategic network, \$100,000,000; and (4) strategic network planning, \$12,000,000.

Access roads are required for military and naval reservation and defense industry sites. The funds available should pay all costs, including right of way, and the individual states should not be required to match the funds. Tactical roads are those which will be used regularly in army maneuvers, and funds should be available for reimbursement of State and local governments without matching for repairs necessitated by tactical use of roads. To provide for the replacement of sub-standard bridges, and the correction of other critical deficiencies in the strategic network, an appropriation should be pro rated to the State on the existing Federal Aid basis, and used solely for designated defense projects. It should be available to pay all legitimate costs on a somewhat higher basis of Federal participation than that existing at the present time. For the making of engineering surveys and plans for the development of this strategic network, an appropriation should be pro rated to the states, and matched by them, on the existing Federal Aid basis.

Supplementary legislation is recommended to facilitate the accomplishment of all necessary improvements. The Federal Highway Act should be amended to authorize additions to the Federal Aid System of roads, conforming to the main lines of the strategic network as desig-

nated by the War and Navy Departments. Roads and bridges on auxiliary lines of the network should be made eligible for improvement with Federal Aid secondary funds. The use of Federal Aid funds should be permissible in payment of part of the cost of acquiring necessary rights of way and property damage. In addition, the report envisions a long range program calling for an annual appropriation of \$458,000,000 over a period of several years. The appropriation recommended for improvement to the strategic network would allot \$18,965,534 to the eleven western states, according to the following tabulation:

Arizona	\$1,435,382
California	3,982,125
Colorado	1,798,524
Idaho	1,235,985
Montana	2,018,907
Nevada	1,274,718
New Mexico	1,620,981
Oregon	1,647,906
Utah	1,123,714
Washington	1,580,939
Wyoming	1,246,353

If the entire appropriation of \$287,000,000 were allocated to the states in the same manner, this would provide approximately \$54,400,000 for national defense highway construction in the eleven western states.

Reviewing the financial and traffic problems of the Federal Defense road

(Continued on page 94)

### P. G. & E. to Take Bids On Two Tunnels

PLANS and specifications for Cresta and Pulga tunnels were ready for delivery to bidders on March 8, according to an announcement from the purchasing agent of the Pacific Gas & Electric Co. at San Francisco, Calif. Proposals are to be returned by 2:30 p. m., March 28.

Driving of the two tunnels, located on the Feather River, is the first work to be undertaken in connection with the construction of two hydroelectric plants which will have a capacity of 75,000 kw. each. The estimated total cost of the Cresta installation is \$11,100,000 and that of the Pulga plant is slightly less. The Cresta plant is to be completed by Jan. 1, 1943, and the Pulga plant by July 1, 1943, according to terms of the licenses issued recently by the Federal Power Commission.

### Santa Barbara Airport Bids

BIDS WILL be opened about March 25 for clearing, grading and drainage of the airport at Santa Barbara, Calif. Construction of the airport will be accomplished under two, or possibly three, separate contracts, with preparation of plans and specifications, and supervision of the construction under the direction of the U. S. District Engineer at Los Angeles, Calif. Plans and specifications for the first section were expected to be ready for bidders about March 5.

### Sales Tax Confuses Defense Work

COMMITTEES representing material men, contractors and general business from both San Francisco and Los Angeles conferred on Feb. 20 with the State Board of Equalization in an effort to remove the confusion which has recently developed with regard to the application of the California State sales tax to cost-plus-a-fixed-fee contracts under the National Defense Program. A year ago, the State Board of Equalization ruled that purchases by the contractors for cost-plus-a-fixed-fee construction were made by the United States and therefore not subject to the California

sales tax. On Jan. 10, 1941, the attorney general of California ruled that contractors were not the purchasing agents of the U. S. Government, and that the contractor does not re-sell to the Government; therefore, the sales of the contractor were not exempt as sales for resale. The 11th and 12th Naval Districts have referred the question to the Bureau of Yards and Docks in Washington, D. C., who, in turn, have requested an opinion from the United States Attorney. Pending receipt of the opinion, the Naval Districts will not permit contractors to admit even contingent liability

for sales tax. At the meeting on Feb. 20, there were present representatives from the U. S. Attorney General's office, the State Attorney General's office, the U. S. Navy, the U. S. Army, the Douglas Aircraft Co., Lockheed Aircraft Co., and the Reconstruction Finance Corporation, in addition to the State Board of Equalization and representatives of the contractors, material men and general business. At the termination of the conference, the State Board of Equalization agreed to call a conference during the first few days of the next session of the California Legislature, which convened on March 3, and the joint committee of the San Francisco and Los Angeles Chambers of Commerce for the purpose of drafting legislation to solve the problem. The attorney general of the United States was asked for an immediate opinion in regard to the problem.

## Military Highway Funds

(Continued from page 93)

program in California, Richard H. Wilson, office engineer of the California Division of Highways, reports that there will probably be a total of about 300 mi. of access roads designated in California, and that the estimated costs for construction and right of way to improve these roads will amount to about \$28,600,000. Most of this access mileage is situated off the State highway system, and expenditures of state highway funds for right of way and improvements is not possible under California statutes.

If access road construction is to be accomplished immediately, the funds must be provided by Congressional appropriation in sufficient amount to care for both right of way and construction. In the tentative list of proposed access roads in California, the Division of Highways lists nine projects, estimated to cost in excess of \$1,000,000 each. Over and above any right of way costs which may be involved, these projects include:

Fort Ord to Salinas, 4.9 mi. of grading, surfacing, and bridge construction, 4 lanes wide, estimated to cost \$1,000,000.

Del Monte Junction to Castroville, 14.5 mi. grading, paving, bridges and grade separations, 4 lanes divided, estimated to cost \$2,010,000.

Jolon to Coast, 26.5 mi. grading and surfacing, 2 lanes, estimated to cost \$1,500,000.

Sacramento Air Depot to Mather Field, 10.5 mi., with 60-ft. grading and 40-ft. base and surface, and American River Bridge, estimated to cost \$1,000,000.

San Francisco Area and military reservations, grading, surfacing and re-surfacing various roads, estimated to cost \$1,750,000.

U. S. Fleet Operating Base on Terminal Island to Willow St., Long Beach, 3 mi. grading and concrete pavement, 6 lanes, divided, bridge and separations, estimated to cost \$5,750,000.

U. S. 101 from Market St., San Diego, to 1 mi. north of San Diego River, 5.2 mi. grading and paving, 6 lanes, divided, 2 pedestrian overheads, 3 highway separa-

tions, and 3 bridge widenings, estimated to cost \$1,520,000.

U. S. 395 from "A" street in San Diego to  $\frac{1}{2}$  mi. south of city limits, 7 mi. grading and paving, 4 and 6 lanes, divided, 6-lane double bore tunnel on University Ave., 7 separation structures, estimated to cost \$1,925,000.

Harbor Drive, San Diego, from U. S. Destroyer Base to the junction of Rosecrans St. and Talbot Ave., 8.2 mi. grading and paving, 4 lanes, divided, and 4 structures, estimated to cost \$1,750,000.

## Structural Engineers' Exam. Not to Be Given

THE CALIFORNIA STATE Board of Registration for Civil Engineers announced at the conclusion of a two-day meeting in San Francisco on February 3 and 4, that hereafter written examination for authority to use the title "Structural Engineer" would be given annually rather than semi-annually as has been the policy in the past. As the number of applicants for the structural title on file at this time are so small the board will not hold an examination before October or November, next, according to H. M. Jones, secretary.

Mr. Jones also announced that at the meeting 47 engineers were granted registration as civil engineers, eight examinees were issued licenses as land surveyors and 5 civil engineers were authorized to use the title "Structural Engineer."

The date of the next written examination for registration as civil engineers and licenses as land surveyors has not been set but will probably be within the next ninety days.

## Army Engineers Plan Large Washington Dike

CONSTRUCTION of a \$750,000 dike for flood control at Aberdeen and Cosmopolis, Wash., has been proposed by U. S. Army engineers at Seattle, Wash. Following a year of surveys, preliminary plans are being drawn in the Seattle district office to be submitted for approval of the Division office in Portland, Ore., and the Flood Control Division at Washington, D. C. The plans under consideration include raising of railroad tracks in Aberdeen, and construction of 8 and 12-ft. earth dikes and concrete retaining walls.

## Western Contractors Low on Arkansas Dam

UTAH CONSTRUCTION CO., Ogden, Utah, and Morrison-Knudsen Co., Boise, Idaho, submitted the low bid of \$10,778,726 to the U. S. Engineer Department, Little Rock, Ark., for construction of the Norfork Dam to be constructed on the North Fork River  $4\frac{1}{2}$  mi. northeast of Norfork, and 105 mi. north of Little Rock, Ark. The dam will be a concrete gravity type structure with an overflow located near the left abutment, and non-overflow sections extending into both abutments. Eleven conduits through the base of the spillway section will be controlled by slide gates in tandem. The dam will have an overall length of about 2,600 ft. and a maximum height above streambed of approximately 220 ft. Construction will require 840,000 cu. yd. of excavation of which about one-third will be rock and 1,470,000 cu. yd. of concrete. W. E. Callahan Construction Co., Dallas, Texas, and Gunther & Shirley, Los Angeles, Calif., were third bidders at \$11,726,624. The engineer's estimate was \$9,413,158.

## California Contractors Get New Rules

NEW RULES covering the filing of applications, and examination and classification of contractors have been adopted by the California Contractors State License Board. The rules provide that the examination given by the registrar shall be an objective written examination, comprehensively testing the applicant's knowledge of the building, safety, health and lien laws of the State, and the rudimentary administrative principles of the general engineering contracting business, applicable to the class of license for which the contractor is applying. Written examinations may be waived when the applicant is the holder of an unexpired license in good standing; when the applicant is a member or an officer of the holder of an unexpired license in good standing; when the ap-

plicant is a joint venture, all the members of which are holders of unexpired licenses in good standing. No license will be issued to an applicant who fails to complete the examination or who fails to maintain a minimum grade of 70 per cent in answering the questions. An applicant who fails to attain a passing grade may apply for, and be re-examined as many times as he may choose, provided at least one full day elapses between the time the applicant fails one examination and the time he requests another. A complete statement on the new rules covering the filing of applications and examination and classification of contractors is contained in the Feb. 1941, issue of the *California Licensed Contractor*, published by the Contractors' State License Board in Sacramento.

## San Diego Is Granted Flood Control Hearing

THE U. S. BOARD of Rivers and Harbors has granted San Diego, Calif., a hearing on the proposed \$3,800,000 flood control project proposed for the San Diego River. The project was approved last fall by the District Engineer Office in Los Angeles, but was acted on unfavorably by the Board in December on the ground that the project was unjustified. Walter W. Cooper, city manager of San Diego, stated that defense industries and military establishments would be menaced by flood waters from the San Diego River. He was supported by Major Reuben H. Fleet, president of Consolidated Aircraft Corp., who said that the \$17,500,000 addition to the Consolidated plant lies in the path of the river, which is now diverted by a narrow dike, and which would probably be inadequate to withstand a serious flood. It was also indicated that the Marine Corps base and a new Navy housing project might be endangered.

## Army Awards Contract for New Mexico Ordnance Depot

SHARP & FELLOWS of Los Angeles, Calif., L. R. Allison of Roswell, N. M., Armstrong & Armstrong of Albuquerque, N. M., and W. A. Smith Construction Co. of Houston, Texas, have been awarded a joint contract by the War Department for construction of an army ordnance depot at Fort Wingate, N. M., ten miles southeast of Gallup, in McKinley County. The contractors have established headquarters at Fort Wingate, where employment and purchasing will be centered. All construction is to be completed in a one-year period. Construction to be undertaken includes 631 reinforced concrete igloo magazines, warehouses, shops, living quarters and hospital facilities. Construction of the depot will require building 90 miles of graveled highway and 21 mi. of railroad. Capt. E. M. Johnson, Quartermaster Corps, will be in charge of the project.

## Oregon Highway Will Have 1,000-ft. Tunnel

RELOCATION of U. S. 99 north of Grants Pass, Ore., will include a 1,000-ft. tunnel underneath Stagecoach Pass. The Oregon State Highway Department has approved a routing from Grants Pass to Glendale Junction, which will reduce the total distance by 6.2 mi., and require only 6 curves. The tunnel under Stagecoach Pass is north of Wolf Creek, and has been chosen in place of an 1,800-ft. tunnel which had been under consideration.



LOS ANGELES RIVER IMPROVEMENTS RECENTLY COMPLETED

CHANNEL improvements on the Los Angeles River completed recently include sections from the Butte St. bridge (out of sight in foreground) to the Fourth St. bridge (fourth structure back). Two contracts included construction of the reinforced concrete trapezoidal channel and replacement of two sewer crossings with sub-surface siphons to improve flow conditions.

## Employees' Organization Sponsored By Southern California A. G. C. Chapter

FORMATION of a contractors' employee organization has been sponsored by the Southern California Chapter of the Associated General Contractors of America at Los Angeles, Calif. The organization, which includes superintendents, engineers, foremen, office managers, and purchasing agents employed by the contractors who are members of the Southern California Chapter, is making rapid strides toward establishment of a valuable and active group under the direction of its first officers. Clarence F. Rees, of the Griffith Company, was elected president; George B. Buckley, of the Ford J. Twaits Company, is vice-president; Earle A. Kiefer, of Sepulveda Constructors, is secretary, and R. Reese Myers, of Myers Brothers, is treasurer. The officers, together with Edwin Ferguson, of Radich & Brown, and Newell M. Miller, of Emsco Concrete Cutting Corp., consti-

tute the board of directors for the first year.

The aim of the Constructors' Club, as it has been named, is to increase the club members' knowledge of construction industry problems in general; to provide an opportunity for group discussion of pertinent problems which face the contractors' employees; to foster a spirit of mutual friendship between the members; to establish and maintain high professional standards among contractors' employees; to encourage sound business methods tending to raise the standing of contractors generally in the business world, and to encourage efficiency among contractors and their employees.

Members of the organization must be bona fide employees of contracting firms who are active members of the Southern California Chapter of the Associated General Contractors. Employees who are actively engaged in a selling capacity

by their firms are restricted from membership in the organization.

Regular meetings of the club are held once each month, and include a dinner and a guest speaker. The club expects that the subjects given at their meetings will cover topics which will aid the members in maintaining professional standards and improving their general efficiency in business methods. Attendance at the first three meetings has averaged more than 100.

## U. S. Needs Construction Superintendents

AN EXAMINATION has been announced by the U. S. Civil Service Commission to secure superintendents of general construction for work in the national defense program. Broad and responsible experience is required, and qualified persons are urged to file their applications at the Commission's Washington office where they will be rated as received until Dec. 31, 1941.

There are several grades of positions with salaries ranging from \$3,200 to \$5,600 a year, less a 3½% retirement deduction. In general, the duties involve the direction of foremen, laborers, and mechanics on large construction projects. Appointees will inspect materials and workmanship to see that they conform to specifications and will organize men and materials for efficient construction operations.

Competitors must have had progressive experience in the field of general construction. Part of this experience must have been as superintendent on large projects involving excavation, reinforced concrete, steel, wood, and masonry, and supervision of three or more foremen of different building or construction trades. Engineering courses completed at a college or technical institute may be substituted for part of the general experience.

Further information and application forms may be obtained from the Secretary of the Board of U. S. Civil Service Examiners at any first- or second-class post office, or from the U. S. Civil Service Commission, Washington, D. C.

## Magoffin Co. Awarded Colorado Tunnel Job

THE THIRD UNIT of the 13.1-mi. Continental Divide tunnel which is being driven for the Bureau of Reclamation in connection with their \$54,000,000 Colorado-Big Thompson water diversion project was awarded on Feb. 27 to the S. S. Magoffin Co. of Englewood, Colo. The contract price was \$784,711.00 and is the second unit that the Magoffin Co. has been awarded a contract on by the Bureau of Reclamation. The first unit which is located at the eastern portal and which is now nearly completed will be followed by this third unit and continuation of the tunnel bore from the eastern side of the divide. The second unit is

under contract to Platt Rogers Co. of Pueblo, Colo., and is the first section to be driven from the western portal. Upon completion of this section, which should be by April 15, another section of the tunnel will be advertised for bids.

In connection with Magoffin's first unit some labor difficulties were encountered on February 2, when approximately 100 American Federation of Labor members who were employees of the contractor stopped work in a "holiday" protest against federally prescribed wage scales for the tunnel bore. Although no change was made in the federal minimum wage scale, union spokes-

men declared a satisfactory agreement providing some wage increases had been made independently with the contractor. It was stated that new wage scales provide payment of \$1.10 an hour to tunnel miners formerly paid 80c; 82½c to miner's helpers formerly paid 70c; \$1.25 an hour to mucking machine operators and mechanics who were paid \$1.10 under the initial contract. The previous scale was established as a minimum by the federal department of labor. The federal scale placed no restriction on independent arrangements between the contractor and the workers for wage increases.

## Idaho Planning Board Recommends \$24,625,300 Six-Year Highway Program

A SIX-YEAR highway program which may ultimately cost \$108,228,300 is envisaged in a report of the Idaho State Planning Board to the 26th Idaho Legislature, now in session.

Emphasizing that the total included many things for which the funds were not immediately visible, including projects deemed desirable by local units, the board set \$24,625,300 as the amount which could reasonably be expected for the period under consideration, including \$12,558,380 of federal funds and \$12,066,920 of state funds. This represents the conservatively estimated funds available for the period.

A further item of \$9,330,000 for bituminous replacements and grade crossing elimination is recommended but not included in the major program. Of this total \$7,380,000 would come from federal funds, because the bulk of work in this category consists of reconstruction and bituminous replacement, and \$1,950,000 from federal funds. Other projects, recommended by district engineers but not included in the grand total because of funds uncertainty, amounted to \$3,362,000 of which \$1,834,800 would come from federal funds.

A huge farm to market program, estimated at \$35,911,000, with \$29,831,400 from federal funds, urged by local groups, has been omitted "because there is no prospect for revenues to meet the cost of many of these projects. Also, the program does not consider military requirements; therefore it should be realized that extensive revision may be necessary in the near future."

The final item in the expanded program is \$35,000,000 for high type pavement, of which it is estimated that \$21,000,000 will come from the federal government. In discussing this item the report points out that while the state highway system carries 70% of the state traffic (as indicated by the state traffic control survey now in progress) it receives less than 58% of the total impost received from highway users.

The five main recommendations of the report are:

1—Primary roads should, insofar as possible, be financed from state motor vehicle registration fees, state motor ve-

hicle license fees, and federal funds. All auto registration fees, a large part of gas tax funds and most of the federal aid funds should be used on these roads.

2—Secondary roads should be financed largely by local revenues derived from local general tax levies. Some state and federal funds may properly be used, on the basis of traffic served by these roads.

3—Third class roads, of a purely local nature, should be financed entirely by local tax revenues. Special assessments on adjoining lands might be justified.

4—Municipal roads or streets should be financed by local taxes or special assessments.

5—Special benefits which result from extraordinary highway undertakings in congested districts may be partially financed at least by special improvements districts.

J. A. TERTELING & SON, Boise, Ida., have been awarded a \$7,547,661 cost-plus-a-fixed-fee contract for an army ammunition depot 4 mi. west of Hermiston, Ore. The project involves construction of 750 igloo-type concrete storage units, about 100 mi. of highway, and 35 mi. of railroad. Construction of the project was started about the middle of February and will require a year for completion. Stevens & Koon, consulting engineers of Portland, Ore., were retained several months ago to carry out surveys and designs, and they will supervise the construction of the project. Capt. R. C. Williams of the Quartermaster Corps will be in charge for the Army.

### Engineers to Meet

Members and guests of the San Francisco and Sacramento Sections, American Society of Civil Engineers and the Structural Engineers' Association of Northern California will gather at their biennial evening assembly in Sacramento on March 28. Albion Ross, foreign editor of the San Francisco "Chronicle," will be the principal speaker. An excursion will be held on March 29.

## Highway Specifications

(Continued from page 84)

chapter on payment for steel structures has been revised in some detail; the assumed weight of rivet heads has been increased; deductions will be made for shop coat painting if applied before weighing; new paragraphs have been included on the weight of welds, of wrought iron and galvanized metal.

### Piling

Section 37, devoted to piling, has been recombined to provide a more efficient treatment of the subject. Description of the materials has been rewritten, and provides that foundation piling for structures shall consist of treated or untreated Douglas fir, redwood, southern yellow pine, or cedar timber piles; either precast or cast-in-place concrete piles; steel piles; or piles of such other materials as may be required by the special provisions. Provisions have been added for the determination of piling lengths by means of test piles; for cast-in-place concrete piles where a mandrel is used in driving a shell, the total weight of the mandrel and the shell will be considered as the weight of the pile.

Paragraphs covering the hammers have been revised, and the fall of drop hammers has been limited to 10 ft. instead of 15 ft. For computing the bearing value, when using either a single or double acting steam or air hammer, an additional formula has been included:

2E

$P = \frac{2E}{S+0.1}$  where  $E$  is the manufacturer's rating for foot pounds of energy developed by the hammer.

New provisions have been included for the cut-off and extension of piles, and a provision has been added for making a cut-off of steel shells for cast-in-place concrete piles. A new chapter has been included, describing precast concrete piles and outlining methods of curing and handling. The section on cast-in-place concrete piles is completely new, and covers materials, dimensions, inspection, shells driven with mandrel, and shells driven without mandrel.

Chapter VI, covering measurement and payment has been completely revised. Section 38, covering the treatment of timber and piles remains about the same, except that the table of incision depths has been eliminated, and the section on incising has been considerably simplified. New specifications have been included for the preservatives to permit the use of petroleum oil. Specifications for the latter are given in detail. There have been no changes in Section 39 covering the preparing of bridge flooring for asphaltic surface, or Section 40 on the expansion details for bridges.

A third article, to appear in an early issue of *Western Construction News*, will complete this study of the revised specifications for highway and bridge work.

The 1940 edition of the Standard Specifications was prepared under the direction of C. H. Purcell, state highway engineer, and under the general supervision of Frank W. Clark, director of public works.

## WPA Workers Placed with Contractors Through Efforts of A. G. C. Chapter

DURING recent months, the Southern California Chapter of the Associated General Contractors of America has taken definite steps to place in private employment as many WPA construction workers as possible. The first step in the program was undertaken on Dec. 6, 1940, when F. J. Connolly, manager of the Southern California Chapter, requested Clayton E. Triggs, acting state WPA administrator, to supply 500 laborers, at the same time suggesting a plan whereby qualified construction laborers at that time on WPA rolls would be referred to contractors who were in need of workers. Preference was to be given to qualified construction laborers, and certificates of referral from WPA would be required by the contractors requesting the labor. Preference was also to be given to bona fide residents of Southern California. The aim of this plan, as stated by the A. G. C. Chapter was to give construction workers regular employment at subsistence wages, and at the same time reducing or lightening the relief load.

Three agencies were involved in the successful operation of the plan—the Associated General Contractors, the Los Angeles Building Trades Council, as well as the various unions forming the council, and the Works Progress Administration. Contractors desiring workers, and being unable to secure them

through the unions or otherwise, informed the Association office, which, in turn, called the Building Trades Council. The WPA was then requested to furnish a list of workers, classified by training and skill. The workers were notified to report by the unions, and were assigned to jobs after joining the union.

Out of the first call for 200 men, 160 reported, and 140 were hired for work on an Army cantonment project at San Luis Obispo. Shortly after the first call, a second was given for 500 men. Out of 26,000 WPA workers in Los Angeles County, there was estimated that some 12,000 were employable.

By Dec. 9, three days after the plan had been suggested, 500 carpenters, 100 plumbers, and other miscellaneous trades had been requested from WPA. Of this group, 484 workers had reported, and 309 had been employed. Seventy were disqualified as incompetent, and 105 rejected due to age or physical conditions. By Jan. 8, nearly 1,000 workmen had been transferred under this plan from WPA to private rolls.

The men who have assisted in this successful operation of this plan are Frank J. Connolly, manager of the Southern California Chapter, A. G. C.; Clayton E. Triggs, acting state WPA administrator; F. L. Holser, deputy WPA administrator, and Lloyd A. Mashburn, vice-president, L. A. Building Trades Council.

## Utah Contractor Wins Damages for Delay

IF UNREASONABLE delay on the part of the Utah State Road Commission in the acquisition of right-of-way causes loss to a contractor, he should be compensated for his loss, Utah's attorney general's office held in a recent opinion.

The decision was asked by W. D. Hammond, road commission chairman, following receipt of claim upon the state by Ora Bundy, Ogden contractor. Bundy sought compensation for damages assertedly incurred as a result of a road commission delay in acquiring right-of-way on a construction job on U. S. Highway 91 in Davis County.

"Where no time is fixed for obtaining the rights-of-way as in this particular case, the law implies a reasonable time under the circumstances and conditions of each project," wrote the attorney general. "If the commission, without any fault of Mr. Bundy, was negligent, or arbitrarily consumed more time in obtaining such rights-of-way than was reasonable, under the circumstances surrounding this particular case, and the contractor was placed in a position whereby it became necessary for him to

incur, and he did incur additional expense to complete the job agreed upon, the contractor is entitled to just compensation therefor."

## Insurance Co. Housing Jobs

THE METROPOLITAN LIFE INSURANCE CO. of New York has announced plans to construct two major housing developments, one in San Francisco and the other in Los Angeles. The Los Angeles project, to be known as Hancock Square, will be located on a 173-ac. site between 3rd and 6th Sts. and Fairfax and Cochran Aves., and will consist of a group of two-story, Class A buildings housing approximately 2,700 rental units. It is to be erected at a total estimated cost of \$12,500,000. The San Francisco development is to be located on a 200-ac. site near Lake Merced, and will consist of a 2,500 rental unit housing group, with specifications similar to the Los Angeles project. Total estimated cost of the San Francisco project is \$11,500,000. Contracts for construction of both projects have been awarded to Starrett Brothers & Eakin, Inc., New York City. Plans are being prepared under the direction of Leonard Schultze & Associates of New York.

# WASHINGTON NEWS

## ... for the Construction West

By ARNOLD KRUCKMAN

**Washington, D. C.**—The gross total of \$234,558,644 to be spent upon construction of defense and public works in the States, Territories and Possessions of the Pacific area of the United States, is part of the supplemental appropriations either about to be enacted by the Congress or pending for passage at this writing. The supplemental appropriation bills are so numerous that almost every person except the clerks in Congress have lost trace of their numerical sequence. The original budget contained \$350,910,000 for defense and public works in the same area. The grand total, therefore, at this time amounts to \$585,464,644. And there are more appropriation bills yet unintroduced which undoubtedly will have more funds for more work in the Pacific West.

It should be marked that this allocation does not include the funds appropriated to be spent upon manufactured products that will come out of the West. And, of course, more ships and more defense industrial plants and more housing are definitely in train.

### Naval station construction

It is estimated the Navy will spend as fast as the work can be done the following totals at the places indicated: Kodiak, \$15,912,000; Pearl Harbor, \$11,271,000; Kaneohe Bay, \$6,378,000; Midway Island, \$13,040,000; Wake Island, \$11,902,000; Johnston Island, \$3,480,000; Palmyra Island, \$3,489,000; Guam, \$80,296,000; Samoa, \$8,100,000; Unalaska, \$10,676,000; Sitka, \$5,396,000; Canton Island, \$860,000; Rose Island, \$1,110,000; Tongue Point, Oregon, \$2,460,500; Hawthorne, Nev., \$2,110,000; Mare Island, \$2,281,000; Oakland, \$11,500,000; San Diego, \$13,967,000; San Pedro, \$3,075,000; Alameda, \$6,861,000; Long Beach-Los Angeles, \$2,500,000; Seattle, \$4,670,000; Puget Sound, \$2,207,000; Bainbridge Island, \$350,000; Keyport, \$30,000; Hawaii (total), \$24,216,000; and the Army has on schedule at Hermiston, Oregon, \$7,547,661; Boise, \$1,159,000; Spokane, \$1,080,000; Albuquerque, \$1,187,000; Everett, Wash., \$982,100.

There is pending in one of the appropriation measures an item of \$40,853,100 to be expended by the Army Air Corps upon airfields and various Air Corps structures in the Pacific area. In the most recently transmitted bill for Navy needs there is an item of \$230,258,000 for shore stations, naval air stations, hospitals, etc., to be erected wherever the Navy has a location. The segregation of these items has not yet appeared. At least half of the total will be expended on the West Coast and on Pacific stations, it is anticipated. It is obvious that clear definition of allocations and of appropriations will not be sharply precise until the end of the year. Much of the detail will be left obscure in the national

interest, and other detail cannot be defined until the bills have passed. The figures here given are reasonable indices of what is in the wind.

### Additional river and harbor funds

By the time this is published a bill will probably have passed appropriating a total of \$35,033,000 for additional rivers and harbors work in the West by the U. S. Corps of Engineers. The great breakwater in the Los Angeles area is to absorb \$17,674,000. Improvements in San Diego harbor will take \$3,875,000. Hawaii in the neighborhood of Pearl Harbor requires improvements which will cost \$3,300,000. Alaska is down for \$184,000. Another bill provides an additional sum of \$7,500,000 for Grand Coulee, and \$1,000,000 for Boulder Dam. The Coos Bay Wagon Road Grant gets \$20,000.

A summary published by the Labor Department reveals that contracts and force account Federal works in the Western area, June to January, totalled \$1,095,496,054. Arizona had \$3,933,335; California, \$636,272,918; Colorado, \$13,426,974; Idaho, \$1,710,891; Montana, \$1,313,236; Nevada, \$3,198,175; New Mexico, \$1,877,140; Oregon, \$38,121,091; Utah, \$7,092,949; Washington, \$335,359,383; Wyoming, \$3,125,477; Alaska, \$9,662,872; Hawaii, \$38,764,113; Midway Island, \$1,337,500.

Federal Power Commission formally told the White House there is a real power shortage in northern California and in southern Idaho. This has put a double extra push behind installation of generators and building of facilities. They tell us here, off the record, the dam to be built at Keswick, near Redding, will go into action before the Shasta works. There is to be a 75,000-kw. installation. The schedule in mind seems to be that the Antioch, Calif., steam power plant will come in first in 1943; next the generator at Keswick, and finally, late in 1943 or early in 1944, the generator at Shasta.

It is hoped the growing shortage of power in the Los Angeles area will be somewhat relieved by scheduled installations, and by the new dam under discussion at Bullhead, on the Colorado, between Boulder Canyon and Parker. They talk about 200,000 kw. potential power at Bullhead. There is also some talk about plans for installations on the Kern River. Of course, in the immediate foreground is the inauguration of the two 10,000-kw. generators at Grand Coulee, "the first day after the first day of spring."

They tell us here that when all power installations presently in mind as a part of the Western defense program are finished the ultimate 4,500,000 kw. will equal the entire present power resources of the West. The Reclamation people

apparently do not anticipate trouble in rushing their part of the work, they chiefly fear that war restrictions may delay production of the needed generators. Although the whole Government power plant on the West slope is from 2 to 4 years ahead of schedule, it is anticipated the need of defense industrial plants, to be built as fast as possible, will constantly crowd those in charge for more speed in installation.

### Federal highway funds

The highway study by the Public Roads Administration rested on the President's desk for several weeks. It has now been transmitted to the National Research Planning Council of which Frederic A. Delano, the President's uncle, is the chairman. This move puzzles the Capital. The military want action on the highway program, and the many interests involved have been pressing for conclusions. It is generally assumed that the President does not feel a general program of road building is urgent at this time. There has been some talk of a billion dollar road program around the White House. But apparently this has crystallized into an ace in the hole for the post-war period when it is anticipated the slump must be met by some vast public works projects. The billion dollar road project is presumed to be one of these projects. This is supposed to explain the transfer of the report to the National Research Planning Board.

Meanwhile, no matter what happens to the report, the gist of it is to be made law under the sponsorship of Chairman Cartwright of the House Roads Committee. Hearings on the proposed law are to start early in March and are to be brief. The plan is to provide \$287,000,000 to improve roads needed for national defense. Apparently \$150,000,000 is to be allocated to build approaches or access roads to military and naval reservations and defense industry sites.

There are 41 military reservations on the West slope and Pacific area. There are 28 in the Ninth Corps area and 5 in the Eighth Corps area. The 11th Naval District has 3, the 12th Naval District, 1; and the 13th Naval District has 4. There are approximately 40 West slope defense industry locations. The sum of \$30,000,000 is set aside for roads used in tactical maneuvers, and \$100,000,000 to replace substandard bridges and to correct weaknesses in strategic highways. From \$15,000,000 to \$25,000,000 is to be spent to engineer surveys and to make technological plans for improvement of other highways of special military importance.

The plan would be carried out jointly by Army, Navy, and State Highway Departments under sponsorship of the Public Roads Administration. Incidentally the bill was passed the other day providing \$126,000,000 for Federal-Aid Highway projects. There is another bill pending with an appropriation of \$150,000,000, sponsored by FDR, which includes an unspecified number of roads and streets at defense concentration points. Rep. White of Idaho has a bill in the hopper calling for \$1,000,000 to build a highway through Yellowstone Park from Old Faithful to the Belcher Ranger

Station on the Idaho-Wyoming boundary. Another bill would allocate \$1,000,000 for the Palmer-Richardson road and bridges in Alaska.

#### Stabilizing labor supply

The National Defense Contract Service, part of the Office of Production Management of National Defense, formed to help prime subcontractors and potential contractors with every service, announced creation of a regional area heading up at San Francisco. It is in charge of Raymond C. Force, co-ordinator, who is chairman of the Board of Directors of the Federal Reserve Bank at San Francisco, and chairman of the Caterpillar Tractor Co., at San Leandro.

Along the same line, William S. Knudsen has appealed to employers to use home labor, not to send for it beyond the area of operations. The transfer of large blocks of skilled and unskilled labor to the West has caused some trouble with the unions. To overcome the difficulty Knudsen asks employers to use the facilities of 1,500 branch offices of the U. S. Employment Service, and to utilize the young people and others trained in the local Federal vocational schools.

Theoretically the U. S. Employment Service is supposed to keep sharp watch on shifting labor bodies. The implication in Knudsen's appeal is that compulsion will be used to stabilize the labor supply if it is not practiced voluntarily.

Considerable confusion in construction operations caused the Quartermaster Construction Division to recall into service Brig.-Gen. George R. Spalding, U. S. Engineers, retired, well known in Rivers and Harbor work on the Coast. Brig.-Gen. Brehon Somervell, chief, QM Construction Division, recently sent a citation for exceptionally efficient and swift work to a number of contractors on camp and cantonment work. More than half the number are on the West slope. He also singled out for praise Frederick Hall Fowler, San Francisco, who is chief of the QM Civil Service Unit; George Edwin Bergstrom, chief, QM Architectural Unit, and Warren H. McBryd, power consultant, both San Franciscans.

#### NEW BOOKS...

**ELEMENTARY STRUCTURAL ENGINEERING**—By Leonard C. Urquhart and Charles E. O'Rourke, both Professors of Structural Engineering at Cornell University. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, New York. 348 pages, 6 x 9. Price \$3.00.

The two principal aims of the book are to produce a text suitable for courses in structures which are given to non-civil engineers and architects; and to produce a compact guidebook for graduate engineers and architects who must demonstrate a fundamental understanding of the principles of structural design in order to obtain a professional license or certificate of registration. The volume

includes a brief explanation of the basic principles of structural mechanics, leading to a deeper understanding of the subsequent design theories. The more important properties and materials commonly used in simple structures are also discussed. Succeeding chapters describe the loads for structures of various types and methods of computing deflections of beams and trusses. Theories involved in the design of various structural elements are explained and applied to homogeneous beams of timber and steel, plate girders, reinforced concrete beams, tension and compression members in steel and timber trusses, columns of timber, steel, and reinforced concrete, and members subjected to bending and axial stresses, and footings.

\* \* \*

**A DESIGNER'S TOOLS**—By William Popper, Sacramento, Calif. 22 pages, 5 x 7. Published by the author, and copies may be ordered direct from William Popper, 5408 "U" Street, Sacramento, California. Price, \$1.00.

The tools described and illustrated in this 22-page booklet are not the manual tools such as slide rule and drafting instruments which the designer uses in his work, but the mental tools, or vivid mental pictures of the physical meaning of certain fundamentals. The purpose of the booklet is to help those who are making up their mental kits to include a few of these tools, and to help those who already possess them to polish off any rust which they may have accumulated. Among the mental tools which are provided with physical concepts are Shear, Moment, Slope, Deflection, Radius of Gyration, Modulus of Elasticity, Section Modulus, and Moment of Inertia.

\* \* \*

**THE WHEELER PROJECT**—By Tennessee Valley Authority, Knoxville, Tenn. Published by the United States Government Printing Office, Washington, D. C. 362 pages. Cloth bound copies may be procured from the Superintendent of Documents, Washington, D. C., at \$1.00 each.

The Tennessee Valley Authority has announced the recent publication of its Technical Report No. 2, "The Wheeler Project." This report covers the history of the Tennessee River development, and describes the part that the Wheeler project plays in this development; the Wheeler project investigations, including social and economic studies; lock, dam, and powerhouse design; access roads; employee housing; construction methods, including construction plant and river diversion; reservoir adjustments, such as reservoir clearing and highway and railroad relocation; initial operations; and a complete summary of construction costs. Appendices include a complete statistical summary of the physical features of the project; copies of the engineering and geologic consultants' reports; and summaries of special tests such as model studies. Comprehensive bibliographies on each phase of the work are also included.

#### OBITUARIES...

Col. J. W. Williams, 61, chief engineer of the Western Pacific Railroad Co. for the past 20 years, died in San Francisco following a short illness. He was born in Ohio and entered the engineering branch of railroad service in 1900 after serving in the Spanish-American War. In 1917-18 he was in France with the 18th Engineers. Most of his career was spent in surveying, locating, constructing and maintaining railroads.

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Alfred J. Cleary, 56, chief administrative officer of the City of San Francisco, died following a heart attack on Feb. 16. He was born in San Francisco and educated at the University of San Francisco and the University of California. His early work was in mining in Death Valley. From 1908 to 1915 he was assistant city engineer of San Francisco, and from 1916 to 1921 he was second assistant and chief assistant engineer in charge of the \$80,000,000 Hetch Hetchy Project. From 1921 to 1930 he served as consulting engineer for the State of California on water resources and various major engineering interests. He was one of the original proponents of the Mokelumne River water supply for the East Bay cities, as well as flood control on the American River, salinity control in the Sacramento and San Joaquin Delta, and the Rincon Hill-Alameda mole, and the San Francisco-Oakland Bay Bridge.

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R. W. Faris, 76, a former state commissioner of reclamation for Idaho, died in LaGrande, Calif., on Feb. 1.

\* \* \*

Walter Davis, city engineer of Antioch, Calif., died on Feb. 14, as a result of injuries received in an automobile accident on Jan. 26.

\* \* \*

Frank N. Hubbard, 70, died Feb. 12. For 23 years Mr. Hubbard was superintendent of streets in San Fernando, Calif.

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Fordyce E. Walker, in charge of field surveys at Shasta Dam, north of Redding, Calif., was killed on Nov. 15. While on a catwalk with several other men a button cable broke severing his left arm and inflicting fatal injuries.

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Isadore Feinstein, resident engineer for the Public Roads Administration in charge of construction at Peach Springs, Ariz., died at Prescott on Jan. 25.

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David H. Ryan, well known contractor of San Diego, Calif., died Feb. 18 in Oakland, Calif.

# PERSONALLY SPEAKING

**F. H. Fowler**, San Francisco consulting engineer and president of the American Society of Civil Engineers, has been appointed as advisor to the constructing quartermaster, Col. B. B. Somervell, who is in charge of the Army construction program. Mr. Fowler will be chief of a new civil engineering unit in the Quartermaster Corps.

Alfred Mannick, field engineer for the Roza Project with the Bureau of Reclamation, has been appointed superintendent of irrigation of the Roza Division, Yakima Project. **Owen H. Test**, assistant engineer with the Roza constructors, will succeed Mannick as field engineer.

**Captain E. C. Siebert**, U.S.N. (CEC), who was recently elevated from the rank of Commander, has been transferred from the Naval Air Station at Alameda, Calif., to the fleet operating base at Terminal Island near Los Angeles, where he will be in charge of construction.

**Cleves H. Howell**, senior engineer on the Colorado-Big Thompson project in Colorado, has been appointed acting supervising engineer, succeeding Porter J. Preston who retired from active service with the Bureau of Reclamation on Jan. 1.

**James W. Carey** was recently elected president of the Washington Society of Professional Engineers at the annual election of the organization. Vice-presidents elected were Burton W. Huntoon, Bellingham; **Leland J. Wright**, Mount Vernon; **W. M. Meacham**, Seattle; **C. C. Casad**, Bremerton; **Donald G. Feltous**, Longview; **C. F. Griggs**, Spokane, and **G. C. Cookerly**, Walla Walla. **Walter W. Weedin**, of Seattle, was elected executive secretary; **Harry H. Sisler**, King County engineer, was elected treasurer, and **Joseph E. Wickstrom**, Seattle, was elected national director.

**James M. Berkey**, planning engineer and architect of Spokane, Wash., has been appointed by the Washington Planning Council to assist towns and counties in making plans for handling population increases expected as a result of completion of reclamation features of Grand Coulee Dam. He will make his headquarters at Ephrata, Wash.

**Donald C. Black**, Chelan County, Washington, engineer, resigned his position on March 1 to accept a position on the Pacific Coast.

**John Clifton**, senior member of the contracting firm of Clifton and Applegate, Spokane, Wash., was elected president of the Pacific Northwest Branch of the Associated General Contractors of America for 1941. Other officers elected at the 18th annual convention held recently in Seattle included **Ed Elliott**, Seattle, vice-president; **M. J. Lynch**, Portland, vice-president; **C. F. Sanborn**, Seattle, vice-president; **F. R. Hewitt**, Spokane, secretary; **J. P. Carson**, Spokane, treasurer; and **Verne Warren**, Spokane, recording secretary.

Presidents of the four chapters which make up the Pacific Northwest Branch are **W. G. Clark**, Seattle Chapter; **Tom Tyler**, Mountain-Pacific Chapter; **J. L. Hazen**, Spokane Chapter, and **Theo. Arenz**, Portland Chapter. The 1942 convention of the Pacific Northwest Branch will be held in Spokane, Wash.



**THEODORE ARENZ**, contractor of Portland, Ore., heads the Portland Chapter of the Associated General Contractors, as president for 1941.

**G. D. Hall**, consulting engineer of Yakima, Wash., has been retained by the town of Waterville to prepare plans and specifications for two water supply reservoirs for which a bond issue was recently approved.

**Lieut. Col. Lee W. Card** has been assigned as constructing quartermaster for the Spokane air base at Spokane, Wash. He has been on duty in Hawaii.

**Lieut Col. Willis A. Platts** has been assigned as constructing quartermaster for the Army air base at Portland, Ore. He has been on duty in Hawaii.

**Lieut. Col. L. V. Murrow**, former state highway director of Washington and recently on special duty with the Army Air Corps at Washington, D. C., has been sent to London, England, as a military aviation observer and will undertake a special mission for the War, Interior and State Departments while in England.

**Allen C. Merritt** has been appointed Commissioner of Public Works for Idaho, succeeding **J. O. Newcomb**. Merritt served several years as a member of the State Planning Board from Salmon, Idaho, and was appointed Commissioner of Public Works in 1937 but was relieved from that position in 1938.

**Max J. Durham**, formerly with the Long Beach Harbor Department, has been ordered to active duty with the Army and is now assistant constructing quartermaster at Fort Lewis, Wash., with the rank of captain.

**M. A. Nickerson**, civilian engineer with the U. S. Corps of Engineers, has been assigned to make additional engineering studies in connection with the proposed construction of a storage dam on the upper Umatilla River near Pendleton, Ore.

**Walter L. Huber**, consulting engineer of San Francisco, Calif., has announced the association of **Edward M. Knapik** as a partner in his practice, under the firm name of Walter M. Huber and Edward M. Knapik, consulting engineers, with offices at No. 1 Montgomery St., San Francisco. Mr. Knapik has been associated with Mr. Huber for 19 years.

**N. E. Fordham**, mechanical inspector with the Bureau of Reclamation at Denver, Colo., has been transferred from Birmingham, Ala., to Glendale, Calif., where he will be engaged in factory inspection of gates, valves and other mechanical apparatus for the Bureau in the Los Angeles district.

**John A. Clark**, associate engineer with the Farm Security Administration at San Francisco, Calif., has been ordered to active duty by the U. S. Navy. He will be project manager in charge of operation and maintenance of the defense housing project which is being constructed at Mare Island, and will hold the rank of lieutenant (jg). For the past 2½ years Clark has been in charge of the sanitation program for the Farm Workers' Migratory Labor Camps and Homes Projects in the western states.

**Mills E. Bunker**, senior engineer with the Bureau of Reclamation, has been transferred from the Colorado-Big Thompson Project at Estes Park, Colo., to Phoenix, Ariz., where he is engaged in investigating several small irrigation projects in Arizona and Nevada, and making surveys for an aqueduct from the Colorado River to central Arizona.

**W. C. Hammatt**, consulting engineer of Los Angeles, Calif., has been appointed water supply engineer for Holmes & Narver, Inc., and is engaged in the design and construction of a water system for a cantonment of 28,000 men at Camp Roberts near San Miguel, Calif.

**Raymond J. Briggs**, consulting engineer of Boise, Ida., was elected president of the Idaho Society of Engineers at the annual meeting on Jan. 18, in Boise. Other officers of the organization include **J. M. Johnston**, district engineer for the Bureau of Highways, vice-president; **Purdy W. Eaton**, Bureau of Highways, secretary, and **Sidney Harris**, chief engineer, A.A.A., treasurer.

**Bruce G. Davis**, formerly assistant office engineer for the Bureau of Reclamation at Boulder Dam, has been transferred to the Panama Canal where he is office engineer of the Special Engineering Division for the Atlantic Area Office, with headquarters at Gatun, C. Z.

**R. B. McKenzie**, formerly construction superintendent for Phil Anderson, contractor of Mount Vernon, Wash., and for several years engineer for the PWA, is now construction engineer for the Public Buildings Administration of the Federal Works Agency. His headquarters are at Tucson, Ariz., where he is supervising a defense housing project.

**Lloyd J. Windle**, for the past six years acting superintendent of the Shoshone Project near Casper, Wyo., has been named superintendent of the project. He has served the Bureau of Reclamation for nearly 20 years and has been on the Shoshone Project since 1928.

**Hjalmar Walberg** has been named Skagit County, Wash., engineer, succeeding **W. A. Costello** who was appointed Whatcom County engineer. Walberg previously had been in charge of bridge work for Skagit County. **T. A. Swanson**, former engineer for the Union Oil Co., and a graduate of the University of Washington in structural engineering, will assume Walberg's former position.

**Harry W. Dennis**, former chief engineer of the Southern California Edison Co., and since his retirement in 1939 consulting engineer of Los Angeles, Calif., has been appointed engineer for the

Ninth Corps construction zone of the U. S. Army Quartermaster Corps with headquarters in San Francisco. The zone organization is headed by **Lieut. Col. E. M. George** as constructing quartermaster. **Timothy L. Pflueger**, San Francisco, has been appointed architect. **Edward T. Foley**, a member of the firm of Foley Brothers, Inc., and the West Slope Construction Co., has been appointed zone operations officer.

**Chris Fauerso**, city engineer of The Dalles, Ore., has been appointed to the joint position of county engineer and roadmaster of Wasco County, Ore. He succeeds **John R. Nichols**, who was called to active duty with the Army, as county engineer, and the late **J. N. Williams** as roadmaster.



**B. C. LEADBETTER**

**B. C. Leadbetter**, general superintendent on the San Jacinto tunnel for the Metropolitan Water District of Southern California, resigned his connection with the MWD on Jan. 6 to accept the position of assistant superintendent of railroad construction at the Seventh Corps Area Training Center at Fort Leonard Wood, Missouri. Leadbetter was one of the first engineers engaged on the Colorado Aqueduct construction, and since 1932 has served successively as division engineer of Divisions 4, 5 and 6, as general superintendent of the Coachella tunnels and the San Jacinto tunnel. The cantonment on which he is now engaged is a \$30,000,000 project under construction by a group of contractors including W. A. Klinger, Inc., Arthur H. Neumann & Bros., Inc., Western Contracting Corp., and C. F. Lytle Co.

**Julian W. Powers**, engineer of materials for the Arizona State Highway Department, has been appointed chairman of the western section of the committee on materials of the American Association of State Highway Officials. Powers, who is also president of the Arizona Section, Am. Soc. C. E., suc-

ceeds **T. E. Stanton** of California, who recently resigned as chairman of the western section.

**R. C. Kay**, recently with the Bureau of Reclamation and a former district engineer with the Wyoming State Highway Department, has joined the staff of the R. Hardesty Manufacturing Co. of Denver, Colo.

**Charles C. Keely**, consulting engineer of Los Angeles, Calif., has been appointed a member of the Los Angeles Water and Power Commission.

**C. V. Isbell** was elected president of the Nevada Chapter of the Associated General Contractors of America for 1941. **F. M. Frandsen** was elected first vice-president; **E. J. Mauphin**, second vice-president; **Andrew D. Drumm**, treasurer, and **Charles L. Hill**, secretary.

**W. D. Shaw**, formerly associated with the Columbia Power Co., has been named to succeed **John Thomas** as secretary-manager of the Mountain Pacific Chapter, A. G. C., with headquarters in Seattle. Shaw attended the A. G. C. secretary-managers' meeting in Houston, Texas, on Feb. 15-16, after which he sat in at the National A. G. C. convention Feb. 17-20.

**A. S. Hanson** has been reappointed county engineer of Klickitat County, Wash., and **Tom Wilson** was reappointed sanitary engineer.

**Rex Nicholson**, who held the position of regional WPA director at Denver, Colo., has been named assistant WPA commissioner for regions seven and eight, covering the Pacific Coast and the Rocky Mountain states. He started with the WPA in Tacoma in 1935, later being transferred to Seattle where he was assistant director of the WPA.

**Ray A. Gillis**, district engineer of the Utah State Road Commission at Cedar City, has been appointed as assistant engineer in charge of statewide maintenance and equipment. The position has been vacant since the resignation of S. L. Cate three years ago. **Douglas J. Larson**, district engineer at Price, succeeded Mr. Gillis, and **William F. Osborne** was transferred from Richfield to Price. **J. E. Garn** of Salt Lake City was named district engineer at Richfield to succeed Mr. Osborne.

**Walter E. Sims**, engineer with the Bureau of Reclamation, has been transferred from the Colorado-Big Thompson project to the Rio Grande project with headquarters at Las Cruces, New Mexico. Sims is engaged on the construction of a power line between Ele-

phant Butte dam and Deming, New Mexico. This is a part of the Elephant Butte power development.

**Guy Newkirk**, Denver engineer and recently connected with the State Engineer's office at Denver has accepted a position as field engineer for **Burton Lowther**, Denver consulting engineer who has been designated as resident engineer on the \$25,000,000 munitions plant which will be built at Denver as a part of the defense program.

**George Musick**, engineer for the Platt Rogers Const. Co., Inc., at Pueblo, Colo., has been transferred to the newly opened Denver office. Musick will have charge of the Denver office. At present the firm has a million dollar contract with the May Co. to build an addition at Denver.

**King Burkhardt**, former structural steel designer for the Colorado State Highway Department has resigned from

that position to accept a position with the resident engineer, **Burton Lowther**, on the Denver munitions plant. Burkhardt has been with the State Highway Department for the past 7 years. In his new capacity he will have charge of the structural designing.

**Art Matthews**, former supervising engineer on the Moffat Water Tunnel project at Denver, has recently been made office engineer at Lowry Field under the project engineer. The engineering department at Lowry Field in charge of all construction was formerly under the Construction Quartermaster and recently has been placed under the supervision of the Army Engineers with the district office being at Omaha.

**J. W. Davison**, formerly junior engineer with the U. S. Corps of Engineers at Redondo Beach, Calif., is now on active duty with the U. S. Army as a lieutenant with the 91st Engineer Battalion at Camp Shelley, Miss.

**Fred W. Doring**, service engineer for the Worthington Pump and Machinery Corp., is in charge of all service for the organization in the Chicago territory. He was formerly erecting superintendent and supervised the installation of the six largest pumps on the Colorado River Aqueduct.

**Claude Epley**, for the past six years foreman and superintendent for the Sloan Construction Co. of Walla Walla, Wash., has been appointed construction superintendent for Walla Walla County, replacing Ernest Moors.

**David A. Hemstreet**, senior partner in the Marysville contracting firm of Hemstreet & Bell, was elected president of the Northern California Chapter, A. G. C. **Oscar Fredrickson** was elected vice-president. Directors for 1941 include **Guy F. Atkinson**, **Stanley A. Ball**, **Howard G. Huntley**, **B. F. Modglin**, and **Ross A. Westbrook**, in addition to the president and vice-president. **Floyd O. Boo** is secretary-manager of the chapter.

## SUPERVISING THE JOBS

**C. D. Jones** is general superintendent for the Fisher Contracting Co. of Phoenix, Ariz., in charge of the construction of transite pipe lines at Flagstaff, in Coconino County, Ariz. The contract was awarded at \$153,060.

**Kenneth Cater** is supervising the construction of 3.6 mi. of grading and 0.6 mi. of topping on the South Unit, Algoma-Terminal Section of The Dalles-California Highway in Klamath County, Ore. **John Landers** is blasting foreman on the job. The \$92,428 contract was awarded to Frank Penepacker of Portland, Ore.

**J. R. King**, formerly construction supervisor for the U. S. Engineer Department at Seattle, Wash., is now general storekeeper for A. Guthrie & Co., Inc., and Al Johnson Construction Co., Burlington, Iowa. The two contracting organizations are building an ordnance depot and munitions plant for the Federal Government at an estimated cost of \$14,000,000. The plant will be under construction for about a year, with a peak employment of 6,000 men.

**Eric Weberg** is tunnel superintendent on underground work near Honolulu, T. H., for the Hawaiian Dredging Co. & Associates.

**Dewey Murrow** is in charge of the construction of 2.5 mi. clearing, grading, draining, surfacing, and light bituminous surface treatment on Primary State Highway No. 10, in the vicinity of Trinidad in Douglas County, Washington. Murrow is being assisted by **Roy Clements** and **Buck Taylor**, grading foremen, and **Bill Traynor**, superintendent of surfacing and oiling. The contract was awarded to F. R. Hewett of Spokane, Wash., on a low bid of \$166,454.

**Jim Graham**, job superintendent for Pacific Bridge Company, San Francisco, is supervising the construction of a drydock at the Destroyer Base at San Diego, Calif. **Ralph T. Keenan** is in charge of the project; **Frank M. Hunter** is office manager, and **Walter Joice** is chief engineer. The contract was awarded on a cost-plus-a-fixed-fee basis at \$2,800,000.

**A. E. Hullin** is job superintendent and **Ralph Wigle** is grading foreman for

**A. Teichert & Son, Inc.**, Sacramento Calif., on the 7.7-mi. highway grading and surfacing project in the Boulder Dam recreational area near Las Vegas, in Clark County, Nevada. The contract was awarded to the Teichert organization at \$264,029.

**O. J. Newell** is supervising the \$129,700 contract awarded to J. E. Burrell & Son, Long Beach, Calif., for the construction of a 3-story reinforced concrete addition to the Science Building, and a 2-story addition to the Music Building, at the San Diego State College, San Diego, Calif.

**Hjalmar Lindstrom** has been appointed superintendent on the construction of temporary housing and utilities for the 115th Cavalry at Fort Lewis, in Pierce County, Wash. **W. B. Hoffman** is office manager. The \$404,983 contract was awarded to L. H. Hoffman of Portland, Ore.



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**Otto Parlier**, superintendent for Trewhitt, Shields and Fisher, Fresno, Calif., is in charge of the \$213,502 contract for the construction of earthwork, canal lining and structures for the Contra Costa Canal, Delta Division, Central Valley Project, in Contra Costa County, Calif.



**NEAL SAUL** is directing construction of a section of Bellflower Blvd., east of Long Beach, between Spring and South Streets, for J. E. Haddock Co., Ltd., of Pasadena, Calif.

Ralph Drollenger is superintendent and Vern Curtis is master mechanic for Fredericksen & Westbrook on the highway construction project nearing completion in the vicinity of McKittrick, Calif.

**D. L. Young** is carpenter foreman for L. E. Dixon Co. at the Army cantonment project near San Luis Obispo, Calif.

**C. P. Bedford**, well known western construction superintendent, who has recently been supervising work on the U. S. Naval Air Station at Corpus Christi, Texas, has returned to the San Francisco Bay area, and is general superintendent of the Todd-California Shipbuilding Co., in charge of constructing a new shipyard at Richmond, Calif.

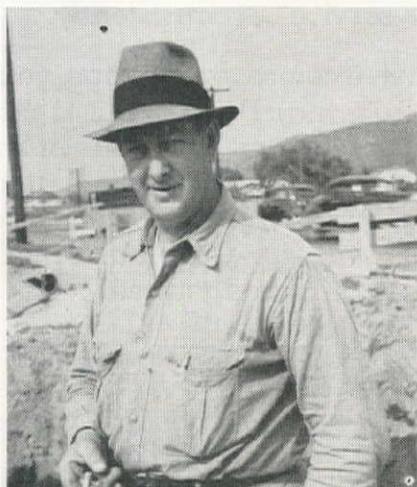
**O. K. Belveal** is foreman of water equipment for the M. J. B. Construction Co. and F. Kaus, on a highway project between Keyes and Hatch Crossing in Stanislaus County, Calif.

**Clarence Lind** has been appointed superintendent of construction for two 37 mm. shell loading plants to be constructed at the Ogden Ordnance Depot, Ogden, Utah, by the Olson Construction Co. and Dobson & Robinson of Lincoln, Nebr., at an estimated cost of \$708,500. **Oscar Hirsch** will be carpenter foreman;

**C. G. Metcalf**, structural steel foreman; **J. L. Mehuron**, engineer; and **Charles White**, office manager.

**Ed Tynsky** is supervising the \$327,114 highway and grading project, including 4 treated timber bridges and miscellaneous work on 24.4 mi. of the Farson-Lander road, in Sweetwater and Sublette Counties, Wyo. Tynsky is being assisted by **John Crockett** and **Glen Keahey**, shift foremen. **Paul Albin** is bookkeeper and timekeeper. This contract is being carried out by J. M. Keahey, Buffalo, Wyo.

**A. Faoro** has been appointed general superintendent in charge of the construction of 1.1 mi. of grading and 1.2 mi. bituminous macadam surfacing on the Depoe Bay Section of the Oregon Coast Highway, in Lincoln County, Ore. **Grant Connor** is assisting Faoro as concrete superintendent on the project. The \$81,590 contract was awarded to Sam Orino of Portland, Ore.



**GEORGE K. THATCHER**

**George K. Thatcher** has been appointed job superintendent by Oscar Oberg and Byerts & Dunn of Los Angeles, Calif., who were awarded the \$366,050 contract for construction of an underpass under the tracks of the S. P. R.R. and 0.7 mi. grading and asphalt concrete and portland cement concrete paving between Broadway and Brighton Streets at Burbank in Los Angeles County, Calif. **Mr. Egglestone** will be in charge of the concrete pipe work and concreting. **Mr. Oberg** and **Mr. Dunn**, members of the two contracting organizations, will personally supervise the project.

**Al Erickson** is supervising the removal and disposal of the existing Fort Scott torpedo wharf and boathouse and the construction of a reinforced concrete abutment and wharf at the same location at Fort Scott in San Francisco County, Calif. Erickson is being assisted by **Ross Phillips** as foreman and **L. C. Bustrack** as timekeeper. Heafey-Moore Co. and

Fredrickson & Watson Construction Co., of Oakland, Calif., secured the contract on a joint bid of \$107,685.

**H. I. Talcott**, formerly with C. C. Woods of Lodi, Calif., is master mechanic for the Isbell Construction Co., and is located at Tonopah, Nev., on an airport construction project.

**P. A. Hansen** is excavation superintendent at Clifton, Ariz., for the W. A. Bechtel Co., who is constructing a reduction plant for Phelps-Dodge. For the past two years Hansen has been employed at Kingsley Dam, near Ogallala, Nebr., as field superintendent of all work preparatory to dredging fill operations and later as night superintendent on the dredger fill.

**Clarence Ratliff** is general superintendent on the construction of 8.3 mi. of gravel surfacing between La Jara and Antonito on State Highway No. 17, in Conejos County, Colo. The Driscoll Construction Co. of Pueblo, Colo., secured this contract on a low bid of \$100,008. **Mark U. Watrous** is president and manager of the organization.

**R. F. McCune** is general superintendent on the construction of the Seventh Corps Area Training Center at Fort Leonard Wood, Missouri. **L. H. Huntley** and **E. W. Dunn** are project manager and assistant project manager, respectively. Others assisting on the project are **Mike (B. C.) Leadbetter**, assistant superintendent, railroad construction; **W. H. Miller**, assistant superintendent, building construction; **Tom Knobel**, assistant superintendent, roads, streets, sewer and water; **E. G. Wernertin**, chief engineer, and **F. A. Villa**, general office manager. The \$30,000,000 contract for this project is held jointly by W. A. Klinger, Inc., Arthur H. Neumann & Brothers, Inc., Western Contracting Corporation, and C. F. Lytle Company.

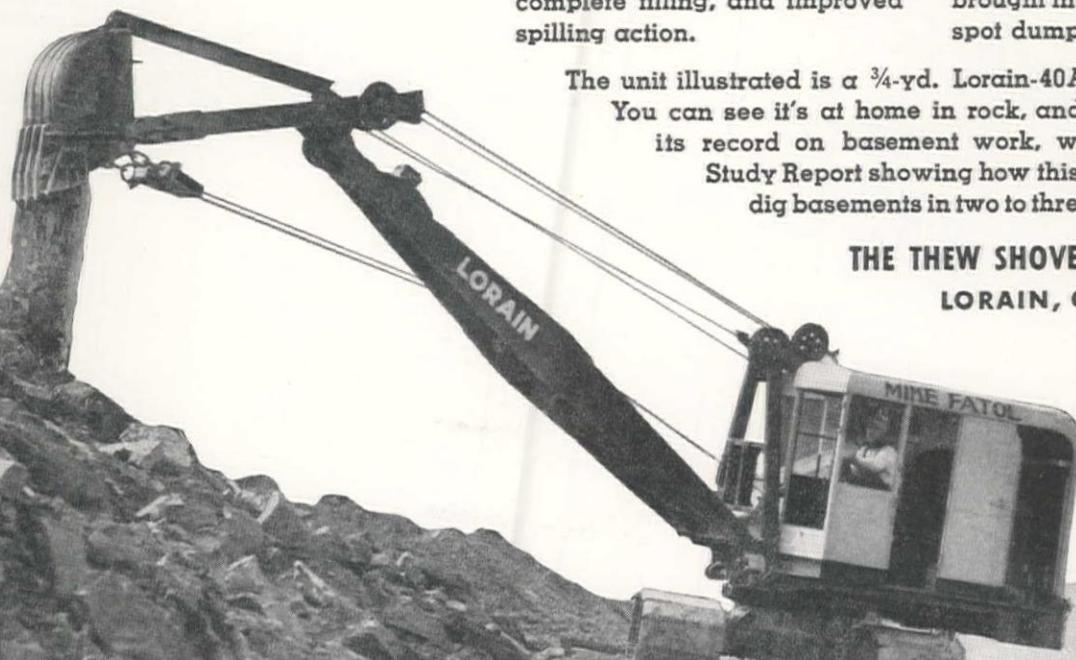
**M. G. Curtis**, general superintendent for L. C. Curtis & Sons, Sunnyside, Wash., is supervising the washing and screening of 20,000 tons of sand and gravel for the Bureau of Reclamation at Sunnyside.

**Ivan H. Gaylord** is foreman for E. L. Rigdon on the Ockerman-Sage Hen Hill highway job in Oregon.

**Cliff Mortensen**, superintendent for Nelse Mortensen & Co., Seattle, Wash., is directing the construction of barracks, officers' quarters, bag filling house, ignition filling and quilting house, etc., at the Naval Ammunition Depot, Puget Sound, in Kitsap County, Wash. **Len Farrell** is carpenter foreman in charge of layout and detailing. The contract was awarded at \$245,413.

*Even*

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• Lorain Backdiggers are trench and basement specialists but whether you work them in rock or dirt makes no "material difference." Backdigger booms are available for  $\frac{3}{8}$  to  $1\frac{3}{4}$ -yd. units.

## 3/8 to 3/4 Yd.

Lorain Backdiggers are equipped with a rugged, torsion-resisting boom and either trench or basement dippers featuring manganese steel lips and teeth for maximum digging effectiveness; round back design to give faster and more complete filling, and improved spilling action.

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Lorain Backdiggers feature the controlled tilting dipper which permits dipper to be set at any digging "rake"; and to hold materials within the dipper at close-in or far-out radius until brought into position for spot dumping.

The unit illustrated is a  $\frac{3}{4}$ -yd. Lorain-40A Backdigger. You can see it's at home in rock, and if you'd like its record on basement work, write for Time Study Report showing how this machine can dig basements in two to three hours' time.

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DIG BASEMENT IN 2 TO 3 HOURS' TIME! THIS BOOKLET TELLS HOW IT'S DONE.



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That dust Jack is working in day after day ... is it harmless? Before he slows up from lung congestion or something worse, give him a Willson Bantam Respirator. He'll be able to do a better day's work ... day after day, without a layoff. The Bantam weighs but 3 1/4 oz... is comfortable to wear for hours because it fits the contour of the face. By merely changing filters, the Bantam becomes U. S. Bureau of Mines approved protection against lead ... which means that you need stock but *one* respirator for all jobs. Ask for folder BR 40. E. D. Bullard Co., 275 Eighth Street, San Francisco, California.

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This 160-lb. workman is wheeling 1500 lbs. of brake castings in a Gar-Bro barrow. Scientific design makes heavy loads easier to carry than in ordinary barrows. Sizes 3 to 12 cu. ft. 1- or 2-wheel. Write for catalog.

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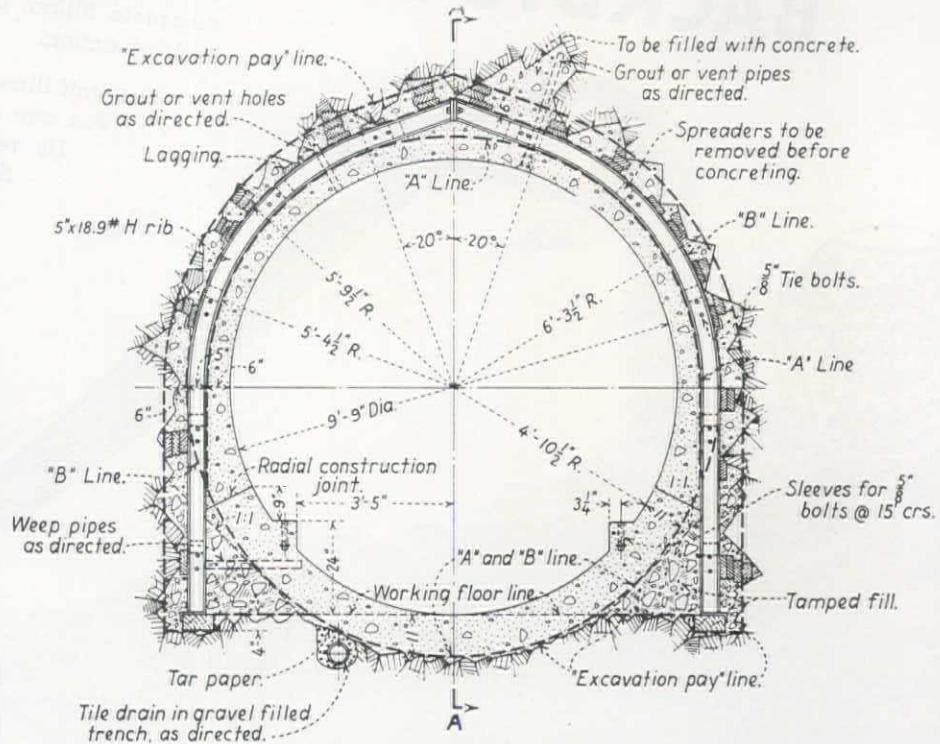
See GAR-BROs at Your Local Dealer

# UNIT BID SUMMARY

## Tunnel ...

### Colorado—Larimer County—Bur. of Recl.—Excavation & Lining

S. S. Magoffin Construction Co., Inc., Englewood, \$784,711, low to Bureau of Reclamation, Denver, for the excavation of 7,000-ft. of tunnel and the installation of 15,000-ft. of concrete lining of the Continental Divide tunnel, Colorado-Big Thompson project. The tunnel is in the continental divide, the eastern terminus near Estes Park and the western in the vicinity of Granby, and has a diameter of 9-ft., 9-in. The Government will furnish cement for use in concrete; calcium chloride, if required, for use in gunite and grout; reinforcement bars; metal water stops for use in core wall; drain tile for underdrains under the invert of the tunnel; tar paper for use over drains; all pipe and fittings for permanent installation in connection with pressure grouting operations and for weep pipes; timber ties, timber decking, anchor bolts, anchor-bolt sleeves, and nails for elevated track on concrete invert; and also all other materials that will become a part of the completed construction work. The contractor will be required to furnish all sand and broken rock or gravel for concrete; all sand for gunite, mortar, and grout; all form materials, including oil for oiling forms; all wire, wire ties, or other appliances used for holding forms and for securing reinforcement bars; metal or other temporary supports, if used, for reinforcement bars, pipe, and other metalwork; all water used for mixing, cleaning, and curing concrete and gunite, for mixing mortar and grout, for moistening material for tamped



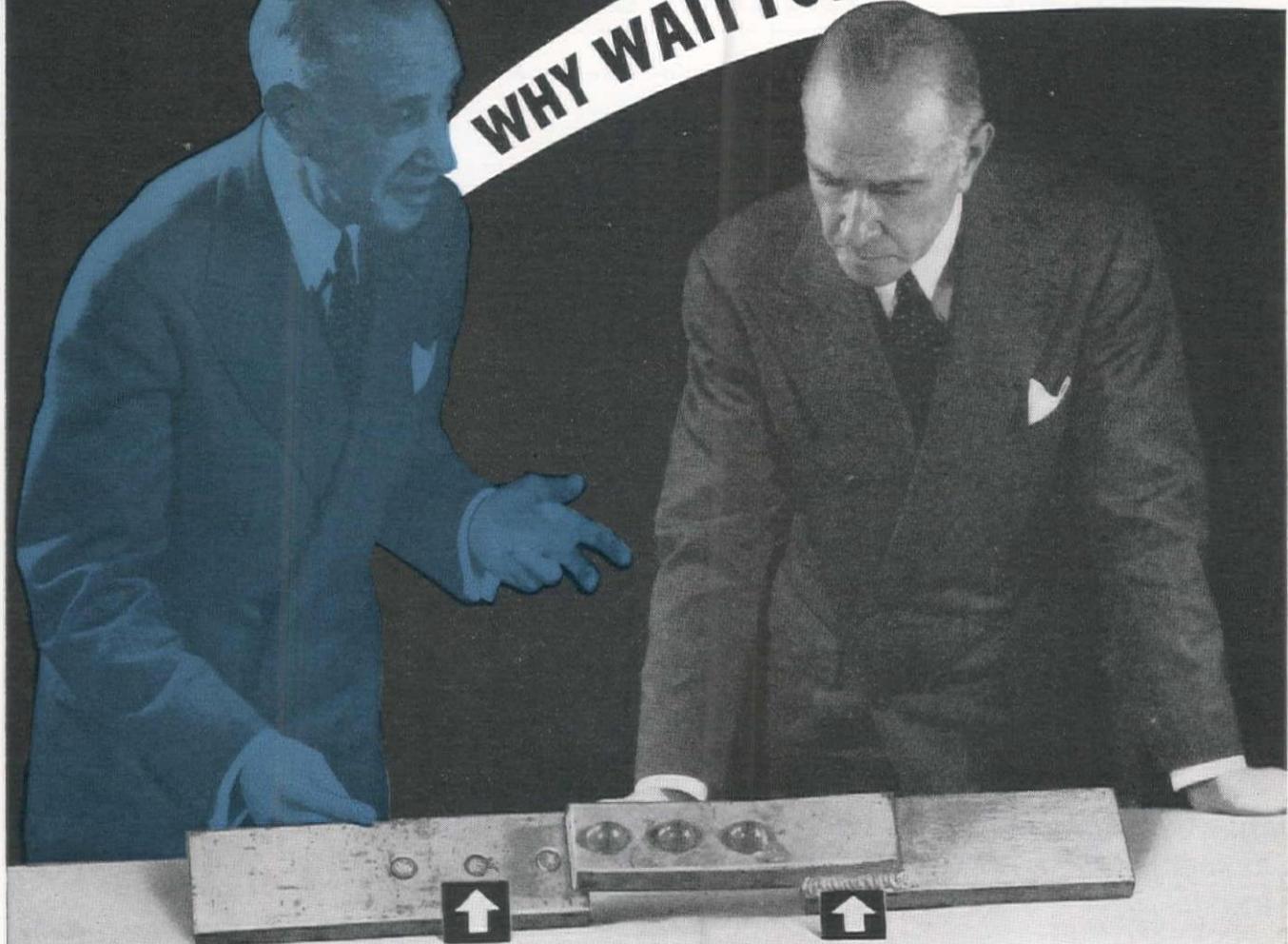
### 5" H STEEL RIB SUPPORT

fills in corners of tunnel invert, and for compacting fills in dam at the outlet end of the tunnel; all permanent steel tunnel supports; all permanent timbering; steel tunnel-liner plates, if required; all timber or other materials used for filling spaces outside of permanent timber lagging; all washed gravel and spalls used for filling spaces back of steel tunnel-liner plates; all materials for tamped fills in corners of tunnel invert; gravel or broken rock for embedding tile drains; all material for compacted fills about the core wall for the dam at the outlet end of the tunnel; all permanent ventilating pipes, pipe supports, and coating materials as required; oakum or other suitable materials for caulking grout pipes; sawdust, if required, for use in grouting operations; all rails, splice plates, splice-plate bolts, and track spikes for the elevated track on the concrete invert of the tunnel; and all other materials not a part of the completed construction work. Bids were received from the following:

(1) S. S. Magoffin Construction Co., Inc.	\$784,711
(2) Ed H. Honnen	819,462
(3) J. N. Gordon and Hinman Brothers Construction Co.	869,415
35,000 cu. yd. excavation, all classes, in tunnel.	13.33
30 cu. yd. excavation, all classes, for sumps in tunnel.	10.00
1,000 cu. yd. excavation, all classes, for enlargement of tunnel.	15.00
3,000 cu. yd. excavation, stripping sand and gravel deposits.	.30
4,000 cu. yd. compacting fills in dam at outlet end of tunnel.	.60
8,000 lin. ft. tunnel tamped fills in corners of tunnel invert.	1.00
1,050,000 lb. furnishing and installing permanent steel tunnel supports.	.065
375 M.F.B.M. furnishing and erecting permanent timbering in tunnel.	90.00
50,000 lb. furnishing and installing steel tunnel-liner plates.	.07
100 cu. yd. washed gravel or spalls outside of steel tunnel-liner plates.	6.00
10,000 lb. removing permanent steel tunnel supports.	.20
3 M.F.B.M. removing permanent timbering in tunnel.	\$150
5,000 lb. reinstalling permanent steel tunnel supports.	.04
2 M.F.B.M. re-erecting permanent timbering in tunnel.	50.00
25,400 lin. ft. furnishing and installing ventilating pipe.	1.60
100 cu. yd. gunite in gunite coating.	30.00
4,600 lin. ft. constructing 6-in. diameter tile drains under concrete invert.	1.00
350 lb. installing weep pipes from drainage sumps.	.20
10,000 lin. ft. drilling feeler or pilot holes ahead of tunnel excavation.	.60
3,000 lin. ft. drilling grout holes following tunnel excavation.	.75
250 lin. ft. drilling grout holes under concrete core wall.	1.00
1,600 lb. placing grout pipe and fittings.	.20
4,700 cu. ft. grouting ahead of tunnel excavation.	2.00
1,600 cu. ft. grouting following tunnel excavation.	2.00
	2.00
	2.00

(Continued on next page)

# WHY WAIT FOR THE MOB?



**ALTER EGO:** Literally "one's other self" Rivets sheared at  
—the still, small voice that questions, in- 96,000 lbs.  
spires and corrects our conscious action.

**ALTER EGO:** See the little union on the right and the big disunion on the left—proving again that "In Union (perfect union) there is strength."

*But I'm still nervous about welding.  
Why don't more people use it? Let's  
make a survey of welding opinion.*

**ALTER EGO:** Oh, so you want the mob to do your thinking? Don't you realize that the progressive man never waits for the habit-bound crowd? He strikes out for himself—for *prestige, leadership and security*—for **SUCCESS**.

*But wasn't this test made by Lincoln  
for their own promotion?*

Welds are good for  
125,000 lbs.

**ALTER EGO:** Not at all! It was made by an important builder having the aforementioned qualifications, with the aforementioned **SUCCESS**.

• •

**LINCOLN SUGGESTS:** How can *you* take advantage of the economy, light-weight and dependability of arc welded construction? How can you use welding as a *thinking tool* for ingenious designs? See Structural Studies (gratis). The Structural Section (Pages 521-757) of the Procedure Handbook of Arc Welding Design and Practice (\$1.50 postpaid) gives the answers to these and hundreds of other questions relating to structural welding. It should be in your reference library.

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THE LINCOLN ELECTRIC COMPANY  
Cleveland, Ohio

Authoritative Information on Design • Production • Welding Equipment

# "BERG"

Equipment for Many Applications



Model A-G2

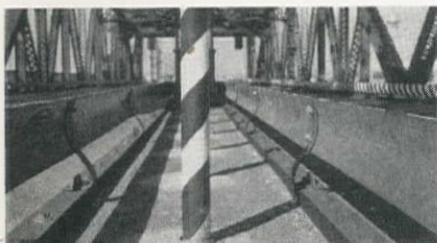
- Model A-G2 Gasoline Heavy Duty Surfacer—for surfacing bridges, culverts, etc.
- Model A Portable Electric Concrete Surfacer—for surfacing concrete and cleaning sandstone buildings at lower cost than sand blasting equipment.
- Model WA Portable Electric Water Feed Surfacer—for wet grinding.
- Model V2-AS Electric Vibrator—for concrete vibrating.
- Model H-8 Hi-Way Surfacer—gasoline—for removing irregularities on highways.
- Also have Right Angle Heads and Right Angle and Cylinder Heads for surfacing curved construction.

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## THE CONCRETE SURFACING MACHINERY CO.

Winton Place, Cincinnati, Ohio

U. S. - TUTHILL BEAM TYPE HIGHWAY GUARD RAIL IS REALLY VERSATILE!



Installation on Baxter Street Bridge at Terminal Island, Los Angeles, Made by L. A. Harbor Dept.

### THIS IS A TYPICAL INSTALLATION THAT PROVES IT

In addition to its everyday duties on highway curves, bridge approaches, overpasses, etc., U. S. - Tuthill Highway Guard Rail is ideal for extraordinary installations as well, as shown above. Remember, the heat treated spring steel shock absorbing brackets that afford perfect deflective action against impacts can be permanently attached to concrete center dividing strips, abutments, retaining walls, etc.

Request full engineering specifications

Manufactured by

## UNITED STATES SPRING & BUMPER CO.

4951 Magnolia Ave., Los Angeles, Calif.

1,000 cu. ft. grouting behind steel tunnel-liner plates	1.00	2.00	2.00
1,350 cu. ft. grouting under concrete core wall	1.00	2.00	1.50
6,550 cu. yd. concrete in tunnel invert	15.00	12.70	18.00
350 cu. yd. concrete in core wall	16.50	14.00	20.00
25,000 lb. placing reinforcement bars	.03	.03	.02
14,640 lin. ft. constructing track on concrete invert	.40	1.30	1.50

## Highway and Street . . .

### California—Ventura & Los Angeles Counties—State—Grade

Contract awarded to Fredericksen & Westbrook, Sacramento, \$256,033, by California Division of Highways, Sacramento, for 5.7 mi. grade, concrete paving and placing plantmix surface between Piru Creek and Los Angeles County line. Bids were received from the following:

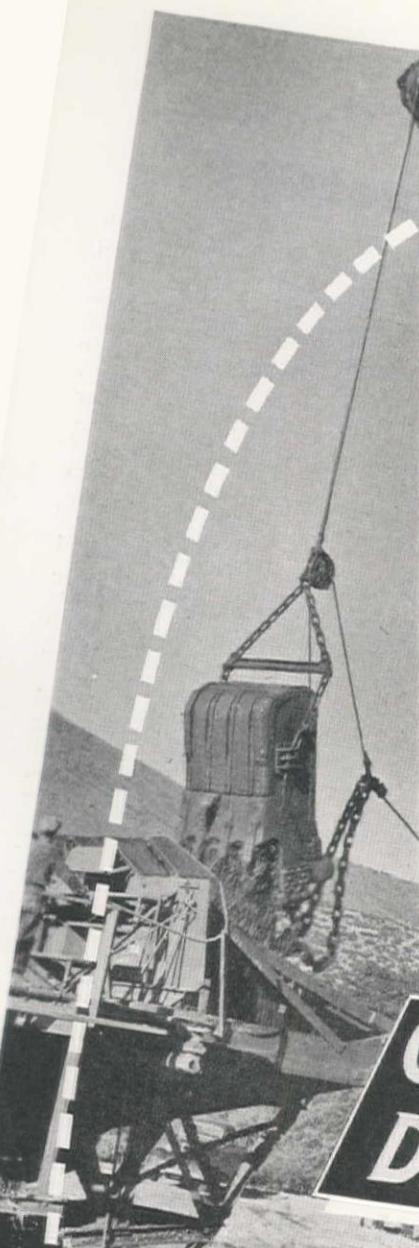
(1) Fredericksen & Westbrook	\$256,033	(5) J. E. Haddock, Ltd.	\$296,711
(2) Oswald Bros.	279,928	(6) Clyde W. Wood	296,724
(3) Matich Bros.	292,631	(7) Radich & Brown	332,814
(4) Griffith Co.	296,086	(8) Ralph A. Bell	336,363

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
303 sta. clear. & grubbing roadway	10.00	8.80	22.00	7.00	9.00	15.00	12.00	10.00
55 cu. yd. clearing & grubbing chan. change	60.00	14.00	70.00	60.00	63.00	20.00	\$115	50.00
Dev. water supply and furn. water equipment	\$2000	\$5600	\$4000	\$5000	\$6000	\$8000	\$10160	\$8000
3,000 M. gal. applying water	1.20	.40	.70	.25	.55	.25	.65	1.50
6,500 cu. yd. remov. conc.	.85	1.38	.75	1.15	1.25	1.25	1.75	2.50
108,000 cu. yd. roadway excav. w/o class	.19	.20	.255	.21	.27	.20	.20	.22
122,000 cu. yd. chan. change excav.	.28	.17	.26	.295	.22	.20	.205	.20
2,900 cu. yd. struct. excav.	.85	.70	1.00	1.00	.65	.75	.75	1.00
5,200 cu. yd. ditch & chan. excav.	.50	.35	.60	.57	.45	.45	.85	1.00
16,500,000 sta. yd. overhaul	.001	.0016	.0015	.0013	.0015	.0015	.00275	.0025
73,200 sq. yd. prep. subgrade	.05	.07	.10	.11	.09	.09	.10	.10
303 sta. finishing roadway	5.00	3.50	4.00	5.00	4.50	10.00	10.00	5.00
500 sq. yd. asph. paint binder	.05	.05	.05	.05	.03	.10	.07	.10
4 ton liq. asph. SC-2 (pr. ct.)	11.00	12.50	20.00	10.00	9.00	10.00	20.00	16.00
35 ton liq. asph. ROMC-4 or 5 (P.M.S.)	8.25	8.00	9.00	8.40	8.00	10.00	7.50	8.00
640 ton min. agg. (P.M.S.)	2.90	3.00	3.00	3.00	4.00	4.00	3.00	3.50
55,000 sq. yd. prep. mix. & shap. surf.	.04	.06	.05	.06	.07	.08	.10	.10
670 ton liq. asph. SC-2	6.00	7.00	7.00	7.40	6.50	9.00	9.00	7.50
15,500 cu. yd. cl. "B" P.C.C. (pavt.)	6.80	8.50	7.90	8.20	8.35	8.45	8.50	9.00
108,000 lb. bar reinf. steel	.046	.045	.045	.057	.054	.045	.06	.05
47,000 lb. wire mesh reinf. (pavt.)	.06	.055	.07	.066	.054	.065	.08	.06
11,000 ea. pavt. dowels	.165	.16	.08	.08	.09	.21	.12	.08
700 cu. yd. class "A" P.C.C. (struct.)	23.00	19.00	22.00	21.40	24.00	22.00	22.00	22.00
400 lin. ft. 8-in. C.M.P. (16 ga.)	.90	1.00	1.00	1.00	1.00	1.25	1.17	1.00
50 lin. ft. 18-in. C.M.P. (16 ga.)	2.70	1.65	1.80	1.90	1.70	2.00	2.25	2.00
920 lin. ft. 24-in. C.M.P. (14 ga.)	3.50	2.50	2.40	2.70	2.45	3.20	2.75	2.75
320 lin. ft. 30-in. C.M.P. (14 ga.)	4.00	3.20	3.20	3.40	3.05	3.75	3.35	3.75
370 lin. ft. 36-in. C.M.P. (12 ga.)	6.00	5.00	5.00	5.15	4.75	5.00	5.00	5.50
70 lin. ft. 42-in. C.M.P. (12 ga.)	6.75	6.00	6.00	6.00	5.65	6.00	5.65	6.50
26 ea. spillway assemblies	17.50	15.50	15.00	17.00	15.00	15.00	15.00	13.00
2 ea. rem. & rel. spillw. assem.	25.00	8.00	8.00	6.00	6.00	5.00	12.00	15.00
105 lin. ft. salv. exist. pipe culvs.	.50	.70	.60	.55	.60	.75	1.00	1.00
70 lin. ft. rel. salv. pipe culvs.	.50	.30	.60	.55	.60	.75	1.50	1.00
200 lin. ft. bank protection fence	13.00	8.50	12.00	12.00	9.25	18.00	16.00	20.00
20 cu. yd. cl. "A" P.C.C. (slope pav.)	17.00	15.00	20.00	15.00	18.00	15.00	16.00	15.00
70 lin. ft. laminated guard railing	2.00	1.20	1.25	1.50	1.50	1.50	2.25	2.00
120 ea. culvert markers	2.00	2.50	2.75	2.70	2.50	3.00	3.25	2.50
22 ea. guide posts	2.00	2.50	2.50	2.40	2.25	3.00	3.00	2.50
3.6 mi. new property fences	\$1400	\$1850	\$1500	\$2100	\$1400	\$1350	\$1475	\$1400
1.0 mi. moving & resetting fences	\$575	\$1330	\$400	\$1000	\$550	\$400	\$850	\$700
12 ea. drive gates	18.00	20.50	15.00	22.00	26.00	25.00	30.00	28.00
65 ea. monuments	2.25	2.50	2.50	3.00	3.00	3.00	3.00	3.00

### New Mexico—McKinley County—State—Grade and Drain Structures

Contract awarded to Brown Bros., Albuquerque, \$87,715 (using reinf. conc. pipe), by New Mexico State Highway Department, Santa Fe, for 3.7 mi. grade, minor drainage structures and miscellaneous construction on Highway Route No. 32 between Gallup and Zuni. Alternate bids were received from the following:

	C.M.P.	R.C.P.	C.M.P.	R.C.P.
(1) Brown Bros.	\$ 89,487	\$ 87,715	(5) E. W. Everly	111,880
(2) Skousen Bros.	88,120	.....	(6) L. R. Allison	140,415
(3) A. O. Peabody	89,969	.....	(7) Sharp & Fellows	149,839
(4) Henry Thygesen & Co.	95,047	96,063		149,396
	(1)	(2)	(3)	(4)
Lump Sum removal of old drainage struct.	50.00	75.00	\$100	\$100
Lump Sum removal of obstructions	50.00	75.00	20.00	25.00
140,000 cu. yd. excavation—unclassified	.31	.31	.30	.40
1,800 cu. yd. excavation for structures	.50	1.00	.50	1.00
600 cu. yd. excavation for pipe culverts	1.00	.70	.50	.80
240,000 sta. yd. overhaul	.02	.01	.01	.008
15,000 3/4 mi. haul	.10	.04	.06	.05
193 sta. finishing earth graded roads	2.00	2.00	2.00	2.00
500 hr. rolling	3.00	2.50	3.00	3.00
2,000 M. gal. watering	1.50	.70	1.00	.50
543 cu. yd. Class "A" concrete	20.00	19.50	23.00	19.00
6 cu. yd. Class "B" concrete	20.00	20.00	20.00	21.00
57,500 lb. reinforcing steel	.04	.05	.05	.05
690 lin. ft. cedar posts—bank protection	.25	.25	.20	.25
450 cu. yd. rockfill—bank protection	1.00	1.00	1.00	1.25
4,100 sq. ft. wire fabric—bank protection	.07	.07	.06	.05
540 sq. yd. concrete blanket—6-in. thick	2.70	3.00	3.00	3.00
2 each reinf. conc. monument and marker	25.00	25.00	25.00	25.00
50 each right of way and station markers	3.00	3.00	3.00	3.50
26,000 cu. yd. subgrade reinforcement	.36	.50	.60	.37
13 each warning posts	5.00	5.00	5.00	4.00
1,072 lin. ft. corr. galv. metal culv. pipe—24-in.	4.00	3.50	2.70	2.25
460 lin. ft. corr. galv. metal culv. pipe—30-in.	5.00	4.00	3.30	3.80
240 lin. ft. corr. galv. metal culv. pipe—36-in.	6.00	5.60	5.20	5.00
1,072 lin. ft. std. reinf. conc. culv. pipe—24-in.	3.00	.....	3.00	3.00
460 lin. ft. std. reinf. conc. culv. pipe—30-in.	4.00	.....	4.00	4.00
240 lin. ft. std. reinf. conc. culv. pipe—36-in.	5.00	.....	5.50	5.00



If its fuel economy were not backed by proved dependability and low maintenance . . . the Cummins Diesel would not be so formidable a weapon in cutting operating costs . . . in meeting the rising tide of higher taxes, higher salaries, higher material costs . . . but contractors' records covering millions of hours of operation in all types of heavy-duty equipment establish these facts: (1) Work cycles speeded up and stabilized. (2) Power failures minimized. (3) Less time out for repairs. *Plus*, an unexcelled record for more yards moved on less fuel. That's why the nation's leading contractors standardize on Cummins Dependable Diesels . . . that's why these contractors say: "Cummins Diesels run cheaper . . . longer." Cummins Engine Company, 1916 Wilson St., Columbus, Indiana.

*Big Bug Dredging Co., Prescott, Ariz., operates this 2½-yd. Lima dragline powered with a Model KO-600 Cummins Diesel rated at 230 hp. at 1000 rpm.*

*BELow: Model HBI-600 Cummins Dependable Diesel. 150 hp. at 1800 rpm. 672 cu. in. displacement. 4⅞" bore by 6" stroke.*

**CUMMINS**  
*Dependable*  
**DIESELS**

\* **Fuel economy is not enough**

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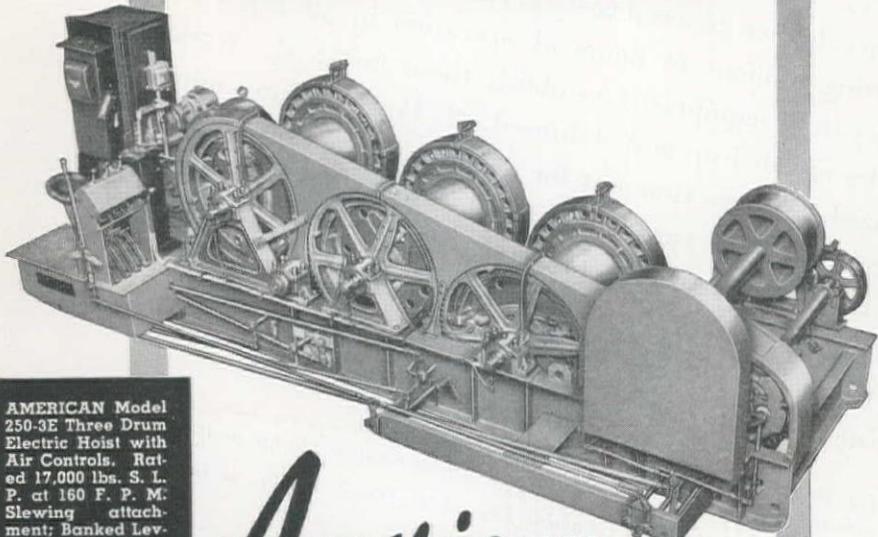
Cummins Diesel Sales Corporation  
Alaska General Equipment Corp.  
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Cummins Diesel Sales of B. C., Ltd.  
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Portland, Oregon . . .  
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San Francisco, California . . .  
Seattle, Washington . . .  
Spokane, Washington . . .  
Vancouver, B. C. . .

Cummins Diesel Sales of Oregon, Inc.  
Intermountain Diesel Sales Corporation  
Cummins Diesel Sales Corporation  
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March, 1941—WESTERN CONSTRUCTION NEWS

**INSURE UNINTERRUPTED  
PROSECUTION OF  
EMERGENCY CONSTRUCTION**



AMERICAN Model 250-3E Three Drum Electric Hoist with Air Controls. Rated 17,000 lbs. S. L. P. at 160 F. P. M. Slewing attachment; Banked Levers. Owned by Panama Canal.

**American  
AIR CONTROLLED  
CONTRACTING BAND  
FRICTION HOISTS**

Have the necessary Power, Ease and Flexibility of Operation

— and RUGGEDNESS — to give one hundred per cent. service on present day "High Pressure" jobs. With the AMERICAN Improved Air Control all operations are accomplished with the finger tips. The resultant reduction of fatigue insures a bigger day's work.

Two, Three and Four-Drum types with Slewing Attachment or Independent Slewers.

Steam — Gasoline — Diesel — and Electric Power.

**AMERICAN HOIST & DERRICK CO.**

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

Write for CATALOG 100-H-3.



**Bond Strengths of  
Steel in Concrete  
Measured**

INFORMATION concerning strength of the bond between concrete and steel reinforcing bars, based on actual measurements of stresses in the steel, is available for the first time as a result of tests conducted at the National Bureau of Standards. These tests are difficult to carry out, which probably accounts for the failure of most investigators to attempt them, although the importance of knowing the bond strength has long been recognized. If it were not for this adhesion between the concrete and the steel, the former would have but limited utility because of its low tensile strength. The reinforcing bars, which carry practically all the tensile loads convert it into an excellent material for most building purposes.

The Bureau's investigation included tests of eighteen cylindrical concrete pull-out specimens containing  $\frac{3}{4}$ -in. steel reinforcing bars. Each specimen had 12 one quarter-inch openings in the concrete which extended down to the bars, thus permitting strain gage measurements to be made on the steel. Overall elongations of embedded bars were measured in a similar series of tests on 18 solid specimens. These provided a check on both the strength and computed elongations of the bars in the perforated pull-out specimens. Complete information on the stresses in the bars and their behavior under load was obtained.

**Moore Dry Dock Co.  
Extending Shipyards**

MOORE DRY DOCK CO., Oakland, Calif., has been awarded \$4,000,000 for expansion of its shipbuilding facilities by the Navy Department. Expansion of the plant was started some time ago. Fourteen firms were awarded contracts for expansion of shipbuilding facilities, which made available \$13,183,000 for the work. The Lake Washington shipyard at Houghton, Wash., is also among those receiving awards.

**Shipyard Construction  
On Terminal Island**

CALIFORNIA Shipbuilding Corp. has signed a 5-yr. lease for an 86-ac. shipyard on Terminal Island in Los Angeles Harbor. Eight building ways will be constructed, and six fitting out ways will also be provided. Construction of the facilities is expected to cost about \$3,000,000. The Maritime Commission has contracted with the California Shipbuilding Corp. for construction of 31 cargo vessels at a cost of about \$49,000,000.

## Idaho—Bannock County—State—Grade and Surface

Contract awarded to Olof Nelson Construction Co., Logan, Utah, \$227,860 (using conc. culv.) by Idaho State Bureau of Highways, Boise, for 5 mi. grade, construct drainage structures and a two-lane P.C.C. paving of the Yellowstone Park Highway between McCammon and Arimo. Alternate bids were received on metal and concrete pipe culverts. Bids were received from the following:

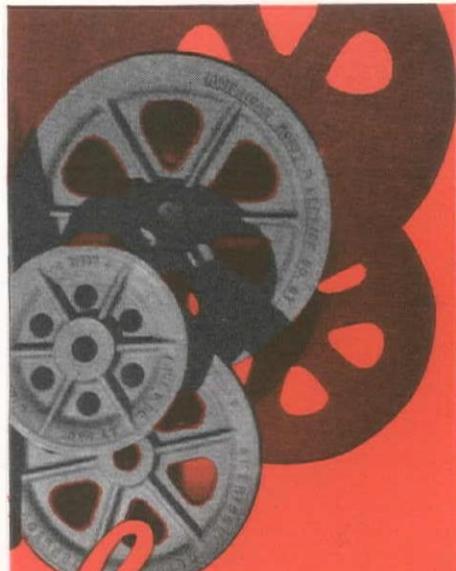
	C.M.P. Culv.	Conc. Culv.
(A) Olof Nelson Construction Co.		\$227,860
(B) Hoops Construction Co.	\$232,129	231,542
(C) Dan J. Cavanagh	246,544	245,452
(D) W. W. Clyde & Co.	246,437	246,149
(E) Triangle Construction Co.	251,643	
(F) Northwestern Engineering Co.	253,658	254,656
(G) Strong & Grant	274,937	276,631
(H) Floyd S. Whiting	278,142	279,812
(I) John H. Moser	289,212	
(1) 33,300 cu. yd. excavation, borrow	(19) 350 lin. ft. 24-in. C.M.P. culv. (alt. item)	
(2) 128,500 cu. yd. excavation, unclassified	(20) 60 lin. ft. 36-in. C.M.P. culv. (alt. item)	
(3) 3,250 cu. yd. excavation, ditch	(21) 170 lin. ft. 12-in. conc. pipe culv. (alt.)	
(4) 1,550 cu. yd. excavation, structure	(22) 1,030 lin. ft. 18-in. conc. pipe culv. (alt.)	
(5) 79,600 sq. yd. overhaul on excavation	(23) 350 lin. ft. 24-in. conc. pipe culv. (alt.)	
(6) 48,600 mi. yd. haul on excavation	(24) 60 lin. ft. 36-in. conc. pipe culv. (alt.)	
(7) 50,000 ton sand and gravel subbase in place	(25) 470 lin. ft. 24-in. C.M.P. siphons	
(8) 40,000 ton crushed gravel surf. in place	(26) 160 lin. ft. 36-in. C.M.P. siphons	
(9) 4,580 cu. yd. binder	(27) 2,100 lin. ft. 6-in. corr. perft. pipe culverts	
(10) 9,160 mi. yd. overhaul on binder	(28) 6,400 lin. ft. construct small ditch	
(11) 6,000 M. gal. sprinkling water	(29) 900 cu. yd. gravel backfill	
(12) 50 days rolling, power roller	(30) 20 stas. obliterate old road	
(13) 200 days rolling, tamping roller	(31) 70 stas. scarify bit. mat.	
(14) 165 cu. yd. cement concrete, class "A"	(32) 3 each remove concrete siphons	
(15) 23,000 lb. metal reinforcement	(33) 7 each remove conc. headwalls	
(16) 1.8 MFBM No. 1 common lumber, untr.	(34) 65,420 sq. yd. concrete pavement	
(17) 170 lin. ft. 12-in. C.M.P. culv. (alt. item)	(35) 1 each project marker	
(18) 1,030 lin. ft. 18-in. C.M.P. culv. (alt. item)	(36) 35 each righ of way markers	

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)
(1)	.14	.14	.20	.15	.20	.12	.20	.25	.25
(2)	.24	.24	.24	.27	.32	.18	.33	.25	.34
(3)	.20	.25	.18	.30	.40	1.08	.50	.40	.60
(4)	1.00	.90	2.00	1.25	2.00	1.25	2.00	1.00	2.00
(5)	.01	.005	.01	.01	.01	.015	.015	.01	.03
(6)	.10	.09	.12	.12	.12	.12	.12	.15	.15
(7)	.30	.32	.30	.35	.50	.41	.40	.30	.60
(8)	.38	.35	.50	.40	.60	.60	.54	.50	.60
(9)	.10	.09	.15	.25	.15	.15	.25	.50	.40
(10)	.10	.06	.15	.12	.10	.12	.12	.15	.15
(11)	.90	.80	1.25	1.00	.50	1.25	1.25	2.00	1.00
(12)	20.00	16.00	18.00	24.00	16.00	30.00	25.00	20.00	20.00
(13)	16.00	16.00	18.00	24.00	16.00	30.00	20.00	20.00	15.00
(14)	24.00	23.00	28.00	25.00	28.00	30.00	25.00	30.00	26.00
(15)	.06	.07	.08	.065	.08	.06	.08	.06	.08
(16)	\$100	\$100	\$150	\$100	\$100	85.00	\$125	\$100	\$100
(17)									
(18)									
(19)									
(20)									
(21)	1.20	.97	1.00	1.03		2.00	1.60	2.00	
(22)	1.90	1.45	1.75	1.68		2.50	3.00	3.00	
(23)	3.20	2.40	3.00	2.80		4.00	4.00	4.00	
(24)	4.70	4.35	5.00	5.10		6.50	7.00	8.00	
(25)	3.75	3.10	4.00	3.50	4.00	4.00	3.60	4.00	4.25
(26)	6.60	6.50	8.50	6.75	7.00	7.35	7.00	8.00	7.00
(27)	.90	.75	1.00	.68	1.00	.90	.85	1.00	1.00
(28)	.04	.05	.08	.05	.05	.15	.08	.05	.12
(29)	1.00	.80	1.00	1.00	1.00	2.00	1.50	1.00	.40
(30)	5.00	4.00	5.00	5.00	11.00	5.00	10.00	5.00	6.00
(31)	5.00	1.00	5.00	3.00	10.00	5.00	8.00	2.00	10.00
(32)	75.00	35.00	\$100	50.00	\$100	30.00	\$100	\$100	25.10
(33)	3.00	5.00	4.00	7.00	5.00	10.00	20.00	10.00	10.00
(34)	1.95	2.07	2.00	2.05	1.80	2.15	2.14	2.35	2.10
(35)	10.00	10.00	15.00	15.00	10.00	15.00	15.00	10.00	10.00
(36)	3.00	3.50	4.00	5.00	3.00	4.00	5.00	3.10	5.00

## Colorado—Boulder County—P. R. A.—Grade

Contract awarded to Larson Construction Co., Denver, \$46,802, by Public Roads Administration, Denver, for 1 mi. grade, structures on the Boulder-Idaho Springs Forest Highway Route, located within Roosevelt National Forest. Bids were received by the following:

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Larson Construction Co.	\$46,802								
(2) Hamilton & Gleason	46,907								
(3) H. Fred Watts Co.	47,017								
(4) J. H. & H. M. Monaghan	48,117								
(5) C. A. Switzer	51,765								
6 acres clearing	\$150	75.00	75.00	\$150	\$100	\$125	\$100	\$100	75.00
2 acres grubbing	50.00	\$100	75.00	\$100	25.00	\$150	20.00	50.00	.58
68,000 cu. yd. unclassified excav.	.48	.51	.54	.54	.57	.60	.60	.58	.62
700 cu. yd. uncl. exc. for str.	2.00	1.75	1.20	1.00	3.00	1.50	2.00	2.00	2.00
80,000 sta. yd. special overhaul	.02	.02	.018	.01	.01	.02	.01	.01	.02
2,200 C.Y.M. special overhaul	.20	.10	.18	.10	.10	.18	.10	.10	.20
10 units obl. of old roads	50.00	10.00	20.00	10.00	5.00	15.00	5.00	5.00	5.00
.930 mi. fin. earth grad. rds.	\$500	\$400	\$400	\$250	\$300	\$500	\$200	\$750	\$100
.65 cu. yd. class "A" concrete	25.00	23.00	18.00	25.00	33.00	25.00	25.00	30.00	25.00
9,100 lb. reinforcing steel	.06	.06	.055	.06	.07	.08	.08	.056	.07
30 cu. yd. class "A" cement stone masonry	20.00	20.00	18.00	20.00	15.00	20.00	18.00	25.00	25.00
444 lin. ft. 24-in. C.G.S.M. pipe (14 gauge)	2.75	2.50	2.50	2.60	3.00	2.40	2.60	3.00	2.95
58 lin. ft. 30-in. C.G.S.M. pipe (14 gauge)	3.50	3.00	3.10	3.20	3.50	2.95	3.00	4.00	3.40
190 lin. ft. 30-in. C.G.S.M. pipe (12 gauge)	4.50	3.85	4.00	4.00	4.30	3.80	4.00	4.50	4.25
132 lin. ft. 36-in. C.G.S.M. pipe (10 gauge)	6.00	5.50	5.70	5.65	6.50	5.40	5.70	5.50	5.80
50 cu. yd. hand laid rock emb.	5.00	4.00	1.00	5.00	8.00	5.00	4.00	10.00	5.00
5 ea. conc. maint. posts	6.00	7.00	7.00	10.00	5.00	5.00	10.00	10.00	8.00
1,900 lin. ft. barbed wire fence	.15	.18	.14	.12	.11	.05	.15	.12	.15
L. S. rem. old struct.	\$2000	\$1750	\$1000	\$1750	\$1530	\$376	\$1500	\$3500	\$2500
F. A. mov. & relay. 2-in. water pipe	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
100 ea. tr. refl. guard posts	2.50	2.50	2.25	2.50	2.00	2.00	3.00	3.00	2.50



1—Thickness through the Web.  
2—Length and Thickness of Hub.  
3—Depth and Smoothness of Rope Groove.  
4—Thickness of Flanges;

**American WIRE ROPE SHEAVES**  
prove their unfailing high quality in every fixture.  
Poorly made sheaves of soft metal can double your wire rope expense. AMERICAN Wire Rope Sheaves are easy on the rope.  
Made of Hard Iron and Cast Steel, and in two types:

**EXTRA HEAVY.** for the toughest, heaviest jobs;

**STANDARD.** for the average run of construction and industrial service.

Take the first step today toward lower sheave and wire rope expense —

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CHICAGO ST. PAUL, MINN. NEW YORK  
AMERICAN TERRY DERRICK CO., SOUTH KEARNY, N.J.

# You Can Install More Piles Per Hour with **MONOTUBES**



Job records show use of Monotubes for installing cast-in-place concrete piles has resulted in time savings of many days, yes, even weeks. Here's why: Tapered steel Monotubes are light weight for fast handling. Inherent strength of these cold rolled steel casings results in speedy driving because no mandrel is needed. Use of any crawler crane equipped with standard leads and hammer simplifies equipment problem.

Monotubes are made in gauges, tapers and lengths to meet every soil condition. Union Metal's experienced foundation engineers are always at your service. Write for Catalog No. 68A.

THE  
**UNION METAL**  
MANUFACTURING CO.  
CANTON, OHIO

## Washington—Douglas County—State—Grade

Contract awarded to F. R. Hewett, Spokane, \$166,454, by Director of Highways, Olympia, for 2.5 mi. clear, grade, drain, surface and construct a light bituminous surface treatment on Primary State Highway No. 10, Trinidad vicinity. Bids were received from the following:

(A) F. R. Hewett.....	\$166,454	(J) Erickson Paving Co.....	\$197,729
(B) Leonard & slate.....	166,493	(K) White Trucking Co.....	198,879
(C) C. E. O'Neal.....	166,882	(L) Berke Bros.....	205,635
(D) M. L. O'Neill & Sons.....	174,744	(M) Northwest Construction Co.....	205,720
(E) Diesel Oil Sales.....	179,385	(N) A. C. Greenwood Co., Inc.....	206,663
(F) G. D. Lyon & Co.....	181,823	(O) Fiorito Bros., Inc.....	208,689
(G) Morrison-Knudsen Co.....	186,863	(P) Roy L. Barr.....	208,971
(H) Goetz & Brennan.....	187,000	(Q) L. Romano Engineering Co.....	231,567
(I) Peter Kiewit Sons Co.....	194,589		

		(A)	(B)	(C)	(D)	(E)							
(1) Lump Sum clear and grub.....		\$100	\$1000	\$500	\$1000	\$500							
(2) 1,034,170 cu. yd. com. excav. incl. 600 ft. haul.....	.11	.11	.114	.1125	.12								
(3) 18,020 cu. yd. solid rock exc., incl. 600 ft. haul.....	.50	.50	.50	.70	.50								
(4) 310 cu. yd. com. trench exc., incl. 600 ft. haul.....	.75	1.00	.50	.50	1.00								
(5) 50 cu. yd. solid rock exc., incl. 600 ft. haul.....	1.50	3.00	1.00	1.00	2.00								
(6) 1,332,290 cu. yd. sta. overhaul.....	.005	.005	.006	.005	.01								
(7) 3,588 mi. cu. yd. sta. overhaul.....	4.50	3.00	3.00	3.70	3.60								
(8) 580 cu. yd. struc. excav., incl. haul.....	.30	2.00	1.00	1.00	1.25								
(9) 17,380 lin. ft. slope treatment.....	.03	.05	.03	.05	.05								
(10) 139 sta. finishing roadway.....	4.00	5.00	4.75	5.00	5.00								
(11) 11,630 cu. yd. select. roadway borrow, in place.....	.36	.50	.35	.40	.30								
(12) 6,720 tons crushed stone surf., top course.....	.75	1.00	.75	1.10	.60								
(13) 1,910 cu. yd. crushed cover stone, in stockpile.....	.65	1.00	.65	.79	.60								
(14) 350 cu. yd. sand filler in place, incl. haul.....	.50	.50	.60	.40	.50								
(15) 343 M. gal. water.....	2.00	2.00	3.00	2.00	1.50								
(16) 2.64 mi. prep., const. & finish light bitum. surf.....	\$100	\$100	\$125	\$150	\$150								
(17) 112 T. bitum. cement, M.C.-2, in place.....	24.00	20.00	24.00	24.00	21.50								
(18) 960 T. place crushed cover stone, bitum. surf.....	.80	1.00	.75	1.30	.70								
(19) 2 ea. reinf. conc. markers.....	5.00	10.00	5.00	7.00	10.00								
(20) 59 ea. reinf. conc. right-of-way markers.....	2.00	3.00	1.50	2.50	2.00								
(21) 22 sq. yd. paved culvert spillways.....	5.00	5.00	2.50	3.00	6.00								
(22) 93 lin. ft. 18-in. plain conc. or vitr. clay pipe.....	1.60	1.75	1.45	1.50	1.50								
(23) 382 lin. ft. 18-in. std. reinf. conc. or vitr. clay pipe.....	2.35	2.00	1.90	2.10	2.00								
(24) 222 lin. ft. 24-in. std. reinf. conc. or vitr. clay pipe.....	3.25	3.00	2.75	3.00	3.00								
(25) 112 lin. ft. 36-in. std. reinf. conc. or vitr. clay pipe.....	6.50	5.00	5.50	6.00	6.50								
(26) 220 lin. ft. 30-in. extr. strength reinf. conc. or VC pipe.....	6.50	4.00	5.35	5.80	6.50								
		(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)
(1)	\$2000	\$400	\$8000	\$1500	\$200	\$2500	\$300	\$500	\$2000	\$2000	\$2000	\$600	\$10000
(2)	.1325	.13	.12	.13	.15	.14	.14	.14	.12	.14	.13	.16	
(3)	.55	.55	.70	.80	.60	.50	.35	.75	.80	.60	.70	.80	
(4)	.75	.60	1.00	1.00	.30	.50	1.00	1.00	1.50	1.00	1.00	.40	
(5)	3.00	1.50	2.00	2.00	2.00	2.00	1.00	4.00	2.50	3.00	3.00	5.00	
(6)	.002	.004	.005	.005	.005	.005	.005	.01	.005	.005	.005	.01	.005
(7)	2.00	4.00	3.00	3.00	10	4.00	2.50	3.00	8.00	5.00	7.00	.08	
(8)	1.00	.60	1.00	1.00	1.00	1.00	1.00	1.00	2.00	1.00	1.00	1.00	
(9)	.04	.04	.10	.10	.07	.06	.07	.08	.10	.08	.05	.05	
(10)	3.00	4.00	4.00	5.00	5.00	5.00	5.00	6.00	10.00	5.00	3.50	2.00	
(11)	.35	.30	.40	.35	.35	.35	.35	.25	.50	.40	.45	.60	
(12)	1.00	.65	1.00	.75	1.10	.70	1.85	1.30	1.10	1.10	.85	1.50	
(13)	.75	1.80	1.00	1.50	.79	.70	1.85	1.50	.79	.79	.85	1.50	
(14)	.25	.40	.50	.75	.40	.30	.35	1.00	.40	.40	.50	.50	
(15)	3.00	2.50	2.00	3.00	2.00	2.00	2.50	2.50	2.00	2.00	2.00	3.00	
(16)	\$125	\$300	\$150	\$500	\$150	90.00	\$400	\$500	\$150	\$150	\$150	\$600	
(17)	25.00	20.00	24.50	17.00	24.00	25.00	27.00	35.00	24.00	24.00	23.00	35.00	
(18)	.75	.60	.60	1.50	1.20	1.00	1.15	1.00	1.30	1.30	1.25	1.50	
(19)	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	15.00	
(20)	2.50	3.00	1.70	5.00	2.00	2.00	2.50	2.00	4.00	2.00	2.00	3.00	
(21)	4.00	4.00	3.00	5.00	4.00	26.00	1.75	5.00	7.00	4.00	2.00	5.00	
(22)	1.60	2.00	1.60	3.00	1.50	1.60	1.55	1.60	3.00	1.60	1.80	2.00	
(23)	2.10	3.00	2.20	4.00	1.96	2.00	1.80	2.00	3.50	2.05	2.20	2.50	
(24)	3.00	4.00	3.30	5.00	3.30	2.90	2.40	3.00	5.00	3.25	3.15	4.00	
(25)	6.00	6.50	5.50	7.00	6.10	5.50	4.75	6.00	10.00	7.00	6.50	8.00	
(26)	5.60	6.50	5.40	6.00	6.00	5.50	3.60	8.00	8.00	6.75	5.70	6.00	

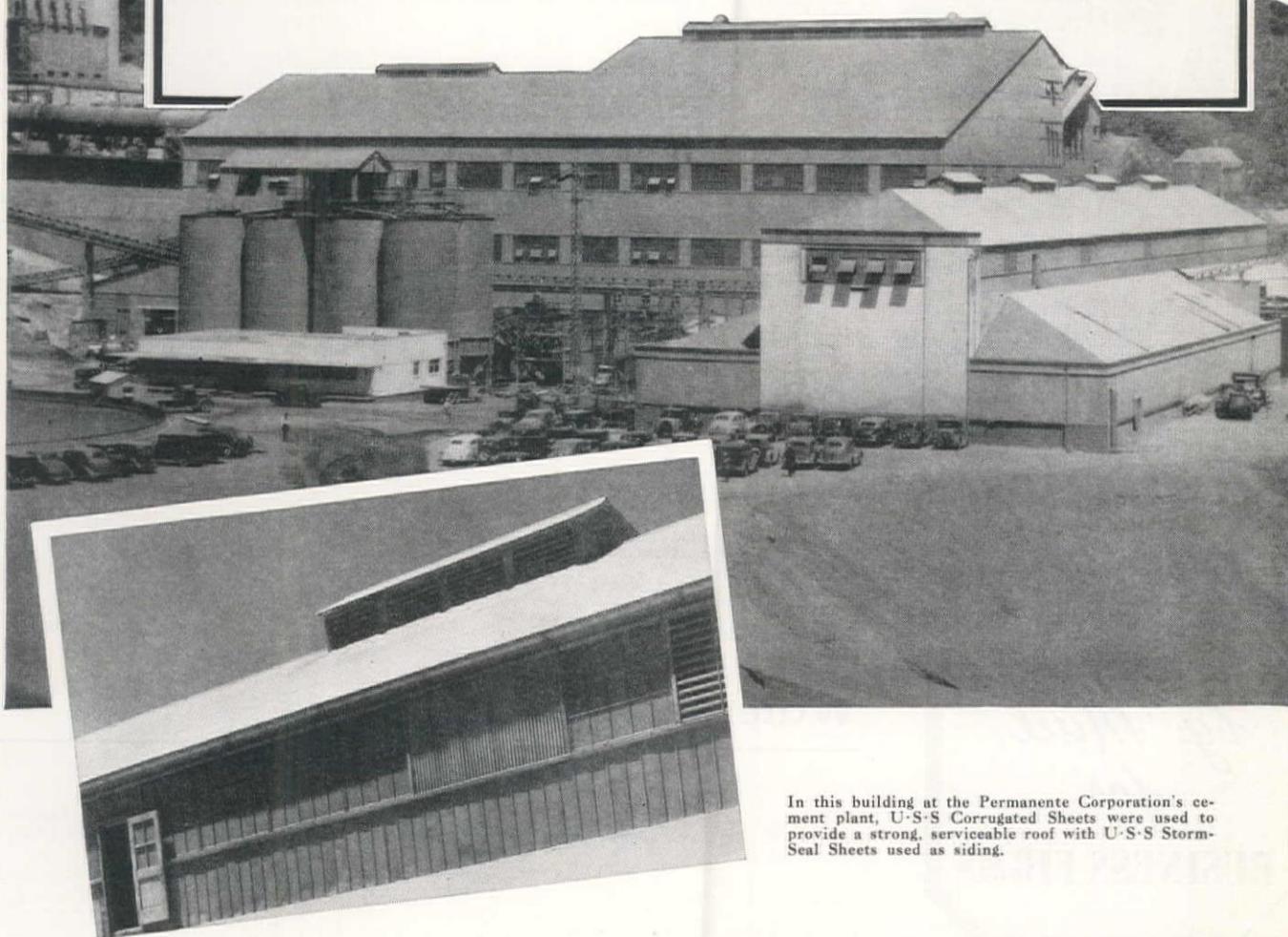
## Arizona—Maricopa County—State—Grade and Surface

Contract awarded to Olof Nelson Construction Co., Inc., \$139,995, by Arizona State Highway Department, Phoenix, for 6 mi. grading, draining, aggregate base course and plantmix surfacing from Whittman about 35 mi. NW of Phoenix and extending northwesterly on the Phoenix-Prescott Highway. Bids were received from the following:

(1) Olof Nelson Construction Co.....	\$139,995	(3) W. E. Hall Construction Co.....	\$147,894
(2) Tanner Construction Co.....	141,565	(4) Phoenix-Tempe Stone Co.....	148,920
		(1)	(2)
31,792 cu. yd. roadway excavation (unclassified).....	.20	.25	.20
2,820 cu. yd. drainage excavation (unclassified).....	.30	.16	.20
2,461 cu. yd. structural excavation (unclassified).....	1.00	.75	.75
207 cu. yd. removal of old concrete.....	7.00	7.00	9.00
41,909 sta. yd. station yard overhaul.....	.01	.01	.015
1,067 cu. yd. mi. haul.....	.20	.25	.40
25,236 ton imported borrow (C.I.P.).....	.30	.21	.23
37,234 ton coarse aggregate base course (C.I.P.).....	.40	.40	.45
14,748 ton fine aggregate base course (C.I.P.).....	.45	.42	.50
5,000 cu. yd. stripping pits.....	.10	.10	.06
2,893 M. gal. sprinkling (C.I.P.).....	1.00	1.60	1.50
959 hours rolling.....	3.00	3.00	3.00
1,077 cu. yd. class "A" concrete (including cement).....	21.00	18.00	19.00
51 cu. yd. class "B" concrete (including cement).....	21.00	18.00	19.00
298 cu. yd. class "D" concrete (including cement).....	21.00	18.00	20.00
224,933 lb. reinforcing steel (bars) (C.I.P.).....	.05	.05	.045
15,066 lb. structural steel (C.I.P.).....	.10	.11	.15
258 lin. ft. 24-in. C.M.P. (C.I.P. except excav.).....	2.40	2.75	2.50
50 lin. ft. 30-in. C.M.P. (C.I.P. except excav.).....	3.00	3.50	3.50
464 lin. ft. 36-in. C.M.P. (C.I.P. except excav.).....	4.80	5.00	5.00
30 lin. ft. resetting 36-in. C.M.P. (C.I.P. incl. all materials and work).....	2.00	1.50	2.00
8 each standard steel gates (Type 1) (C.I.P.).....	20.00	25.00	25.00
27,611 lin. ft. reconstr. fence (C.I.P. except new posts).....	.04	.04	.05
330 each line fence posts (for reconstr. fence) (C.I.P.).....	.50	.50	.60
320 lin. ft. rail bank protection (Type "A") (C.I.P.).....	3.00	3.25	3.50
150 lin. ft. rail bank protection (Type "B") (C.I.P.).....	2.50	2.50	3.00
112 each guide posts (C.I.P.).....	4.00	2.50	2.50
33 each r/w markers (Type "E") (C.I.P.).....	3.00	3.00	3.00
8,614 ton plantmix (including haul).....	1.23	1.40	1.45

(Continued on next page)

# U·S·S STEEL Roofing and Siding speeds construction of Sturdy Factory Buildings



In this building at the Permanente Corporation's cement plant, U·S·S Corrugated Sheets were used to provide a strong, serviceable roof with U·S·S Storm-Seal Sheets used as siding.

WHEN the Permanente Corporation was awarded the contract for the low-heat cement for the Shasta Dam Project, they built a 7,000 barrel per day mill near Los Altos, Calif. — at the source of an ample supply of limestone. A sturdy, serviceable plant had to be built in a hurry — so they took advantage of the quick application and durability of steel sheets for roofing and siding.

Many industrial companies are

faced today with an urgent need for new buildings. They want sturdy construction — but they want that construction completed in a hurry. And in U·S·S Roofing and Siding Sheets they are finding a material that goes on fast, but stays on for a long time. These famous steel sheets are carefully galvanized to prevent rust. And their availability in a wide range of sizes and types gives your designer greater flexibility in his plans without sacrifice in either

time or economy of construction.

Whether you are planning new construction or remodeling — whether your chief concern is speedy construction or long life, get the facts now about steel roofing and siding. Write us for information of the many types and sizes of steel sheets for industrial construction. And remember, to be sure of full value for your money — build with U·S·S Roofing and Siding Sheets — the brand that is famous for long life.



COLUMBIA STEEL COMPANY, San Francisco  
CARNEGIE-ILLINOIS STEEL CORPORATION, Pittsburgh and Chicago  
TENNESSEE COAL, IRON & RAILROAD COMPANY, Birmingham  
Scully Steel Products Company, Chicago, Warehouse Distributors  
United States Steel Export Company, New York

## UNITED STATES STEEL

**Prevent Engine Wear**  
use  
**WINSLOW**  
**OIL CONDITIONERS**



The Above Installation Used and Approved by  
The Largest Contractors on the West Coast

WINSLOW OIL CONDITIONER NO. PK-1240 REPLACES THE FACTORY EQUIPPED "K" TYPE PUROLATOR ON CATERPILLAR AND ALLIS-CHALMERS ENGINES. NO OUTSIDE LINES NECESSARY.

Winslow full-flow Oil Conditioning elements are the only replacement elements that will provide full oil flow to the bearings and at the same time filter and condition the oil at each pass through the filters. See your Dealer or write Winslow Engineering Co., 4514 Hollis Street, Oakland, Calif. for Catalog No. 10.

**WINSLOW ENGINEERING CO.**  
4514 HOLLIS ST., OAKLAND, CALIF.

Banking  
by Mail  
for  
**BUSINESS FIRMS**

**CONVENIENT**

Overnight service to most  
points in California.

**SAFE**

Used in increasing numbers by out-of-town business houses.

**ECONOMICAL**

Saves money because it  
saves valuable time.

**CROCKER FIRST  
NATIONAL BANK**

OF SAN FRANCISCO

*California's Oldest National Bank*

Member Federal Deposit Insurance Corporation

362 ton road oil (SC-6) (for plantmix) (C.I.P. in mixer)	16.00	17.00	18.00	16.50
104,015 gal. road oil (SC-2) (for prime coat & salv. oil mix) (C.I.P.)	.05	.06	.06	.055
5,921 mi. placing plantmix	\$200	\$200	\$250	\$275
2,195 ton screenings (C.I.P. on road)	2.00	2.50	2.00	2.30
306 ton emulsified asphalt (Class "A") (for seal coat over new and relaid oil mix) (C.I.P. on road)	25.00	27.00	28.00	28.00
6,119 ton salv., mix. & relaying oil mix (C.I.P. except liq. asph.)	1.30	1.50	1.60	1.75
50 lin. ft. 3-in. iron pipe (sta. 1004-50) (C.I.P.)	1.50	1.00	2.00	.85
500 ton stockpiling plantmix (C.I.P. except liq. asph.)	1.20	1.40	1.45	1.15
23 ton road oil (SC-4) (for stockpiled plantmix) (C.I.P. in mixer)	16.00	17.00	18.00	15.00

**Nevada—Clark County—State—Grade**

Contract awarded to Carl E. Nelson, Logan, Utah, \$93,381, by Nevada State Highway Engineer, Carson City, for 17.3 mi. grade, surface and construction of small drainage structures from the California-Nevada State Line to 3 mi. south of Searchlight. Bids were received from the following:

(1) Carl E. Nelson	\$ 93,381	(6) Dodge Construction, Inc.	\$104,057
(2) W. W. Clyde & Co.	126,905	(7) A. Teichert & Son	127,693
(3) Fredericksen & Westbrook	125,051	(8) Isbell Construction Co.	125,994
(4) Hoops Construction Co.	104,543	(9) Olof Nelson Construction	
(5) Silver State Construction Co.	96,515	Company	123,729

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
L. S. signs	\$100	\$150	\$500	\$300	\$100	\$250	\$100	30.00	\$400
116,772 cu. yd. roadway excav	.14	.18	.19	.12	.14	.15	.15	.20	.18
53,698 cu. yd. channel excav	.14	.18	.14	.13	.13	.15	.12	.20	.16
2,601 cu. yd. drainage excav	.20	.25	.50	.17	.30	.20	.25	.25	.20
204 sta. V type ditches	1.50	6.00	2.00	3.00	4.00	2.50	3.00	2.00	4.00
200 hr. 95 hp. trac. & Carryall	7.00	7.00	8.00	6.75	5.00	7.50	6.00	7.50	7.00
100 hr. 95 hp. tractor and bulldozer or angledozer	6.00	6.00	7.00	6.25	4.00	7.50	5.50	7.50	6.00
50 hr. $\frac{1}{2}$ ton pickup	1.50	2.00	2.50	2.00	1.00	1.50	2.00	1.50	2.00
F. A. clean. chan. (see by engr.)	\$425	\$425	\$425	\$425	\$425	\$425	\$425	\$425	\$425
281,097 sta. yd. overhaul	.01	.015	.01	.01	.01	.01	.005	.01	.01
4,100 yd. mi. overhaul	.10	.15	.20	.20	.09	.10	.20	.25	.10
2,573 cu. yd. structure excav	.75	1.00	.80	1.00	.70	1.00	1.00	1.00	1.00
2,249 cu. yd. backfill	.40	1.00	.50	.45	.40	.50	.70	.50	.50
17.28 mi. subgrade, type "C"	75.00	\$100	\$150	75.00	50.00	75.00	\$200	\$100	\$100
58 M. gal. water	2.00	4.00	10.00	3.00	4.00	3.00	4.00	10.00	3.00
150 cu. yd. class "A" concrete	24.50	28.00	26.00	28.00	24.00	27.50	26.00	27.00	26.00
267 cu. yd. class "B" concrete	24.50	27.00	26.00	26.00	24.00	22.50	25.00	27.00	26.00
262 cu. yd. class "D" concrete	24.50	30.00	26.00	24.00	27.50	26.00	27.00	26.00	26.00
73,320 lb. reinforcing steel	.05	.06	.045	.055	.05	.06	.06	.055	.07
252 lin. ft. structural steel rail	5.00	5.50	7.00	4.00	5.00	6.00	6.00	5.00	5.00
1,270 lin. ft. steel bear. piles	2.50	2.80	1.80	2.50	2.50	2.50	2.25	2.85	2.50
36 ea. drive steel piles	28.00	30.00	30.00	35.00	35.00	25.00	\$100	60.00	30.00
256 lin. ft. 24-in. C.M.P. (dipped)	3.00	2.75	3.00	3.00	3.00	3.00	3.50	3.00	3.00
1,420 lin. ft. 30x17-in. C.M. arch pipe (dipped)	3.00	2.90	3.00	3.00	2.50	3.00	3.80	3.50	3.50
38 lin. ft. 44x25-in. C.M. arch pipe (dipped)	5.00	5.60	6.00	6.00	5.00	5.50	6.00	5.75	6.00
1,251 cu. yd. grouted hand laid riprap	4.00	9.00	10.00	9.00	8.00	4.50	14.00	10.00	10.00
7 cu. yd. class "A" concrete curb and gutter	24.50	27.00	26.00	30.00	30.00	25.00	25.00	27.00	26.00
34 ea. monuments	5.00	4.00	3.00	3.00	4.00	3.00	3.00	3.50	3.00
84,688 ton select mat. surf	.26	.39	.42	.31	.26	.32	.42	.35	.40
L. S. special signs	\$300	\$720	\$600	\$500	\$100	\$500	\$400	\$400	\$100

**Water Supply . . .**

**California—Kern County—U. S. E. D.—Pipeline**

Contract awarded to Radich & Brown, Burbank, \$25,276, by U. S. Engineer Office, Los Angeles, for construction of a water supply system and pumping station at Muroc Lake. Bids were received from the following:

(A) Radich & Brown	\$25,276	(G) Underground Construction Co.	\$29,209								
(B) Charles J. Dorfman	25,403	(H) Hoagland Engr. & Constr. Co.	29,336								
(C) W. J. Nolan	26,074	(I) Central California Constr. Co.	29,921								
(D) Williams & Van Valkenburgh	26,611	(J) Marks Matich	30,109								
(E) Edward Green	27,001	(K) Bebek & Brkich	30,297								
(F) A. L. Gabrielson	27,303	(L) G. E. Kerns	31,505								
(1) Lump Sum deep well turbine pump	(12)	1 each 10-in. gate valves									
(2) Lump Sum pump house	(13)	14 each 8-in. gate valves									
(3) Lump Sum electrical system	(14)	2 each 6-in. gate valves									
(4) 2,100 lin. ft. 10-in. C. I. pipe and fittings	(15)	4 each 4-in. gate valves									
(5) 4,150 lin. ft. 8-in. C. I. pipe and fittings	(16)	2 each 3-in. gate valves									
(6) 470 lin. ft. 6-in. C. I. pipe and fittings	(17)	4 each 2-in. gate valves									
(7) 40 lin. ft. 4-in. C. I. pipe and fittings	(18)	2 each $\frac{3}{4}$ -in. hose bibbs									
(8) 3,350 lin. ft. 3-in. C. I. pipe and fittings	(19)	16 each fire hydrants									
(9) 700 lin. ft. 2-in. galv. wrot. iron pipe, ftgs.	(20)	1 each 8-in. check valve									
(10) 60 lin. ft. 1-in. galv. wrot. iron pipe, ftgs.	(21)	1 each 8-in. meter									
(11) 40 lin. ft. $\frac{3}{4}$ -in. same											
(A) \$1050	(B) \$1166	(C) \$1090	(D) \$1670	(E) \$1222	(F) \$2160	(G) \$1500	(H) \$1090	(I) \$2121	(J) \$1250	(K) \$1405	(L) \$1200
(2) \$1200	\$2000	\$3750	\$2100	\$2000	\$2155	\$2276	\$2040	\$1858	\$4000	\$2900	\$2000
(3) \$1400	\$750	\$700	\$900	\$1000	\$945	\$600	\$960	\$575	\$4600	\$900	\$4500
(4) 2.48	2.54	2.36	2.42	2.57	2.72	2.60	3.15	3.27	2.38	2.90	2.60
(5) 2.04	2.00	1.86	1.92	2.08	2.05	2.20	2.30	2.44	1.88	2.30	2.15
(6) 1.45	1.52	1.30	1.44	2.00	1.50	1.80	2.00	1.95	1.37	1.70	1.60
(7) 1.33	3.90	3.37	1.08	2.40	1.22	1.50	3.90	1.55	1.15	1.50	4.00
(8) .81	.77	.73	.87	.94	.95	1.30	1.00	1.00	.80	.90	1.00
(9) .68	.87	.68	.65	.60	.70	.70	.70	.81	.70	.70	.70
(10) .30	.49	.39	.51	.60	.57	.70	.70	.50	.50	.50	.45
(11) .25	.40	.30	.50	.50	.40	.50	.50	.40	.45	.45	.45
(12) 65.00	71.00	85.53	80.00	90.00	80.00	80.00	88.00	85.00	70.00	85.00	70.00
(13) 44.00	49.00	54.70	56.50	55.00	57.00	60.00	55.00	50.00	42.00	55.00	47.00
(14) 32.00	35.00	39.50	45.00	42.00	43.00	40.00	37.00	34.50	28.50	40.50	36.50
(15) 21.75	24.00	27.50	36.00	30.00	32.00	30.00	27.00	24.00	20.00	25.40	25.00
(16) 14.00	20.00	23.60	27.00	28.00	27.00	25.00	22.00	20.00	17.00	23.20	25.00
(17) 8.00	14.00	13.50	20.00	20.00	16.00	20.00	11.00	15.00	10.00	12.00	20.00
(18) 5.00	1.00	2.45	8.00	3.00	5.00	5.00	1.00	1.50	2.00	10.00	
(19) \$123	95.00	\$165	\$124	\$100	\$108	\$100	\$110	\$105	\$135	\$145	\$125
(20) 60.00	61.00	72.26	80.00	70.00	85.00	\$100	70.00	60.00	65.00	\$100	65.00
(21) \$300	\$420	\$290	\$340	\$350	\$310	\$400	\$300	\$700	\$315	\$620	\$600

**C**ONNECTING the pipe and assembling the joints is an easy, fast and foolproof operation with U. S. Mechanical Joint Pipe, resulting in a bottle-tight line. We have on hand large stocks of mechanical joint, bell-and-spigot and flanged Super-de Lavaud centrifugally cast pipe, pit-cast pipe and standard fittings in plant and storage yards at strategic shipping points throughout the country.

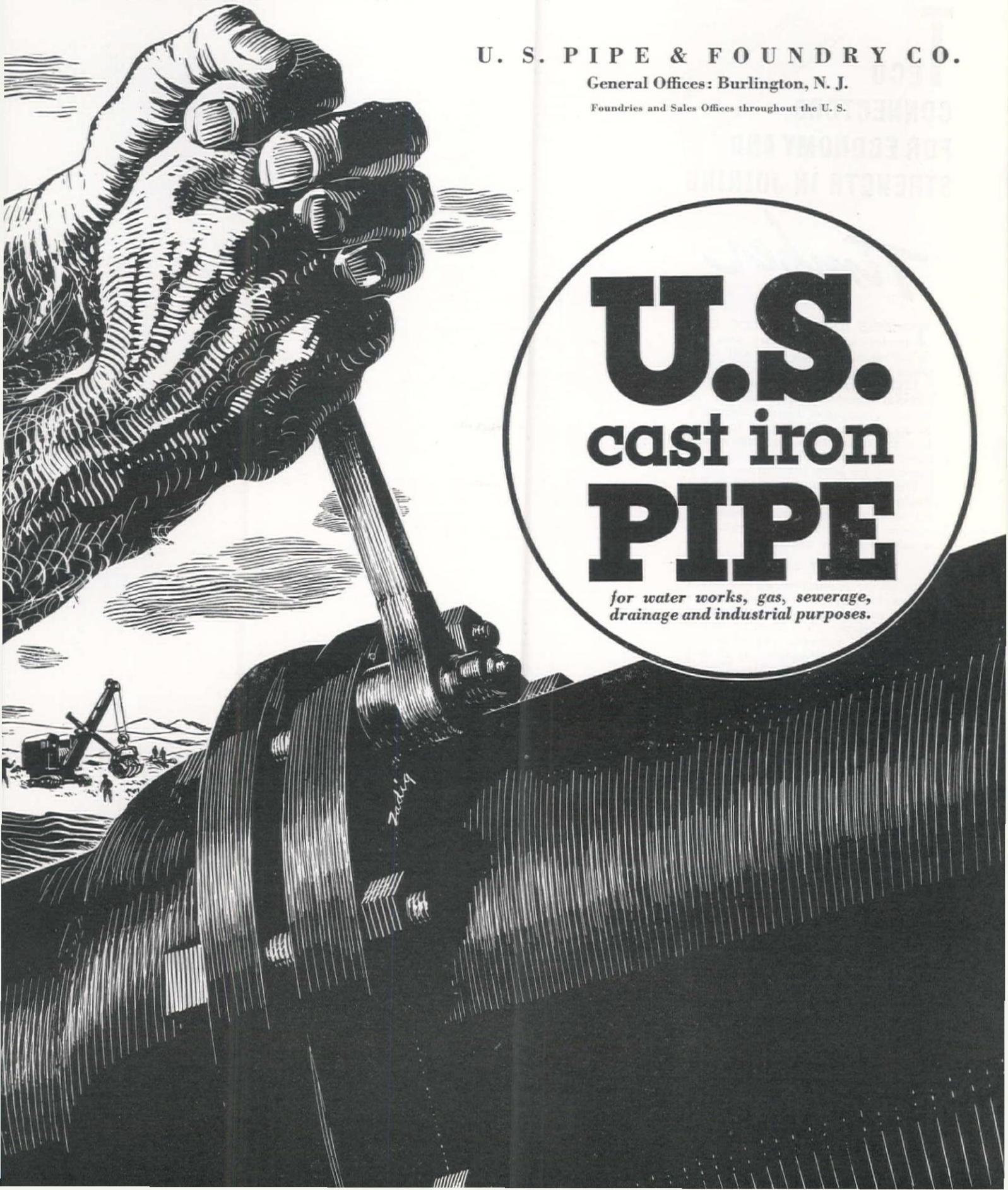
U. S. PIPE & FOUNDRY CO.

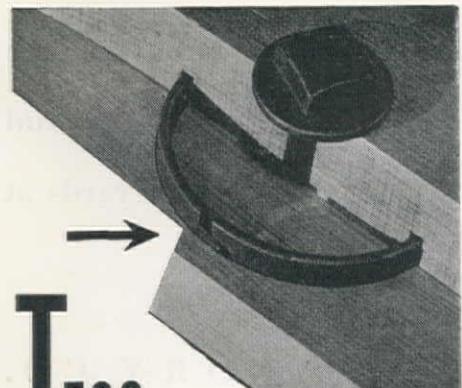
General Offices: Burlington, N. J.

Foundries and Sales Offices throughout the U. S.

**U.S.  
cast iron  
PIPE**

*for water works, gas, sewerage,  
drainage and industrial purposes.*





# TECO CONNECTORS FOR ECONOMY AND STRENGTH IN JOINING *Timber*

**TIMBERS JOINED** by TECO Connectors will safely carry from two to six times the load they will carry when fastened with nails or bolts.

TECO Connectors have revised traditional formulas for designing in timber... changed it from a carpentry to an engineering material. In addition, the connector system has stimulated the creation of widespread new capacity for shop fabrication.

More than 30 publications, from the design Manual to reprints of articles on various noteworthy structures involving connector-type design, are available for the asking.

#### ADVISORY SERVICES

Most of the Authorized Agents listed below have engineers available for direct consultation with prospective users of timber connectors. These engineers will examine any plans for the adequate and proper use of connectors without charge. Also, Timber Engineering Company of California has available over 300 illustrative or typical designs of timber structures in which timber connectors are used.

#### TIMBER ENGINEERING COMPANY OF CALIFORNIA

85 Second Street, San Francisco, California

#### AUTHORIZED AGENTS FOR TECO CONNECTORS

*Timber Engineering Co. of California.....	85 Second St., San Francisco
*Timber Structures, Inc. ....	303 S. W. First Ave., Portland
*Northwest Bolt and Nut Co. ....	4518 - 14th Ave., N. W. Seattle
*Summerbell Roof Structures.....	754 E. 29th St., Los Angeles
Summerbell Roof Structures of No. Calif.....	1746 - 13th St., Oakland
The Hallack and Howard Lumber Co. ....	Denver, Colorado
Morrison-Merrill and Company.....	Salt Lake City, Utah
Summerbell Roof Structures of Arizona.....	806 West Madison, Phoenix
R. H. Lawder.....	2531 Ferdinand Ave., Honolulu
Norton & Harrison Co. ....	P. O. Box 782, Manila

\*Asterisk indicates warehouse at which stock of Teco Timber Connectors and tools are maintained.

#### California—Inyo County—City—Water Distribution System

Contract awarded to Fred W. Weber, Downey, \$67,296 (C. I.), by City Council, Bishop, for construction of a settling forebay, treatment plant, pressure line and reconstruct water distributing system in Bishop. Bids were received from the following:

	Cast Iron	Seamless Steel	Welded Steel
(1) E. C. Nickel .....	\$76,998	\$80,949	\$71,858
(2) Williams & Van Valkenburgh.....	73,885	79,056	67,965
(3) Radich & Brown.....	74,100	.....	.....
(4) A. Teichert & Son, Inc.....	88,459	.....	81,775
(5) H. B. Nicholson.....	85,264	82,877	80,286
(6) Werner & Webb.....	360,017	361,545	356,151
(7) Fred W. Weber (awarded).....	67,296	75,086	65,429
(8) Basich Bros. ....	85,807	.....	82,026
(9) A. L. Gabrielson.....	69,327	.....	64,015
	(1) (2) (3) (4) (5) (6) (7) (8) (9)		
3,000 cu. yd. excav., forebay, intake and diversion works.....	.50 .50 .35 .41 .50 .50 .45 .30 .50		
500 cu. yd. concrete.....	20.50 14.50 13.50 21.00 17.00 20.00 14.30 20.00 13.75		
5 cu. yd. rubble masonry.....	15.00 20.00 25.00 20.0! 10.00 8.00 10.00 20.00 6.00		
14,500 lb. reinforcing steel.....	.06 .055 .06 .06 .07 .05 .043 .06 .05		
276 squares reinf. mesh.....	2.25 2.00 2.75 2.25 3.00 2.00 2.00 3.00 3.00		
100 cu. yd. decomposed granite.....	1.00 1.10 1.50 .68 1.00 1.25 .55 1.25 .50		
2 lin. ft. 30-in. CIP, 14 ga., dipped.....	7.00 10.0! 5.00 5.00 3.25 6.00 3.50 5.75 21.77		
360 lin. ft. 24-in. CIP, 16 ga.....	2.40 3.00 2.30 2.60 2.50 2.60 2.17 4.00 2.38		
120 lin. ft. 24-in. CIP, 14 ga.....	2.60 3.00 2.75 2.90 3.00 3.00 2.45 4.25 2.62		
160 lin. ft. 8-in. CIP, 16 ga.....	1.40 1.20 1.00 1.15 1.10 1.10 .90 2.70 1.29		
110 lin. ft. 14-in. CIP, Cl. 100.....	3.25 3.38 3.07 3.85 3.45 5.00 3.48 3.50 3.24		
110 lin. ft. 14-in. seamless steel pipe.....	3.20 3.28 ..... 3.20 5.00 3.30 .....		
110 lin. ft. 14-in. welded steel pipe.....	2.28 2.86 ..... 3.20 5.00 3.07 3.20 2.94		
6,943 lin. ft. 12-in. COP, Cl. 100.....	2.50 2.59 2.40 3.00 2.50 3.20 2.50 2.60 2.58		
5,900 lin. ft. 12-in. CIP, Cl. 150.....	2.70 2.80 2.61 3.25 2.90 3.42 2.70 2.80 2.80		
12,843 lin. ft. 12-in. seamless steel pipe.....	2.90 3.09 ..... 2.50 3.42 3.20 .....		
1 ea. 12-in. gate with 10-ft. frame.....	35.00 54.00 27.00 32.00 25.00 35.00 25.30 36.00 25.00		
1 ea. 24-in. gate.....	80.00 \$120 65.00 \$100 65.00 80.00 69.20 90.00 \$110		
1 ea. gate lift.....	20.00 45.00 20.00 22.00 15.00 24.00 17.00 22.00 30.00		
1 ea. 24-in. gate with 4-ft. frame.....	45.00 85.00 38.00 47.00 35.00 40.00 35.70 45.00 61.50		
2 ea. 14-in. std. flange low pressure gate valves .....	\$120 \$140 \$250 \$180 \$165 \$160 \$124 \$200 \$110		
1 ea. 8-in. same.....	60.00 54.00 57.00 58.00 50.00 70.00 44.30 80.00 55.26		
1 ea. 6-in. same.....	45.00 41.00 40.00 38.00 35.00 40.00 30.00 55.00 36.00		
1 ea. 4-in. same.....	30.00 28.00 25.00 25.00 20.00 20.00 14.20 26.00 26.00		
1 ea. 14-in. meter measuring device.....	\$500 \$460 \$500 \$525 \$450 \$530 \$480 \$600 \$475		
2 ea. 2-in. air valves.....	50.00 40.00 45.00 36.00 35.00 40.00 38.00 75.00 40.00		
1 ea. 12-in. pressure reduc. valve.....	\$475 \$456 \$590 \$550 \$500 \$510 \$550 \$550 \$512		
12,000 lin. ft. recl. 8-in. O.D. press. pipel.....	.40 .35 .45 .50 .60 23.00 .28 .40 .15		
1 ea. 24x14-in.—48-in. flange reducer.....	80.00 88.00 80.00 \$120 \$100 77.00 78.00 \$200 60.00		
2 ea. 14-in. 45° std. ells.....	35.00 37.00 30.00 50.00 25.00 55.00 27.50 55.00 46.00		
1 ea. 24x8x14-in. bell, flange and flange low pressure tee.....	75.00 87.00 80.00 \$200 \$100 \$110 67.50 \$250 90.00		
1 ea. 14x14x14-in. flge. low pres. tee.....	50.00 66.00 48.00 78.00 50.00 70.00 47.00 95.00 70.00		
650 lin. ft. 12-in. CIP, Cl. 150.....	2.70 2.80 2.71 3.25 2.91 3.50 2.57 2.80 2.72		
1,430 lin. ft. 10-in. same.....	2.30 2.33 2.15 2.68 2.81 2.60 2.09 2.50 2.55		
1,980 lin. ft. 8-in. same.....	1.80 1.83 1.67 2.05 1.81 2.00 1.57 2.00 1.85		
380 lin. ft. 6-in. same.....	1.35 1.35 1.20 1.45 1.30 1.75 1.36 1.60 1.40		
1,610 lin. ft. 4-in. same.....	1.00 .94 .95 1.10 .95 1.20 .82 1.15 1.15		
12,000 lin. ft. recl. 8-in. O.D. pipe, joint with Dayton cplgs. or equiv.....	.60 .46 .75 .70 1.00 .60 .37 .90 .38		
1 ea. 4x4x8-in. Cl. tee.....	20.00 24.00 18.00 27.00 20.00 26.00 19.06 30.00 20.00		
5 ea. 4x4x4-in. same.....	12.00 18.00 12.00 15.00 10.00 15.00 11.85 22.00 15.00		
3 ea. 6x6x4-in. same.....	18.00 23.00 15.00 18.00 15.00 20.00 15.91 25.00 15.00		
1 ea. 6x6x6-in. same.....	19.00 24.00 16.00 21.00 15.00 21.00 17.15 25.00 20.00		
5 ea. 6x6x6-in. same.....	24.00 30.00 20.00 30.00 20.00 35.00 22.89 35.00 20.00		
2 ea. 8x8x8-in. same.....	24.00 31.00 25.00 29.00 25.00 32.00 24.07 35.00 20.00		
8 ea. 8x8x4-in. same.....	24.00 31.00 21.00 27.00 20.00 26.00 21.28 30.00 20.00		
14 ea. 8x8x6-in. same.....	24.00 31.00 22.00 30.00 20.00 28.00 22.31 30.00 27.00		
3 ea. 10x10x6-in. same.....	30.00 38.00 28.00 39.00 30.00 35.00 29.56 45.00 30.00		
1 ea. 12x8x10-in. same.....	40.00 45.00 37.00 60.00 50.00 54.00 39.60 65.00 60.00		
2 ea. 8x4x8x4-in. cast iron cross.....	30.00 37.00 24.00 48.00 25.00 47.00 29.60 50.00 40.00		
6 ea. 8x8x4x4-in. same.....	24.00 34.00 23.00 30.00 25.00 32.00 24.00 35.00 20.00		
1 ea. 10x6x8x4-in. same.....	37.00 41.00 33.00 58.00 40.00 56.00 34.50 65.00 45.00		
1 ea. 10x10x4x4-in. same.....	35.00 40.00 30.00 40.00 30.00 38.00 31.40 45.00 25.00		
1 ea. 10x10x8x4-in. same.....	40.00 43.00 37.00 82.00 50.00 88.00 39.00 \$100 35.00		
1 ea. 8-in. 90° CI elbow.....	42.00 46.00 44.00 53.00 50.00 53.00 40.80 55.00 35.00		
15 ea. 4-in. std. flange high pressure gate valves .....	18.00 24.00 16.00 23.00 20.00 21.00 18.00 45.00 20.00		
15 ea. 4-in. std. flange high pressure gate valves, install. only.....	23.00 25.00 21.00 24.00 30.00 30.00 24.00 34.00 35.00		
7 ea. 6-in. same.....	8.00 8.00 4.00 5.50 15.00 6.00 8.00 12.00 5.00		
3 ea. 8-in. std. flange high pressure gate valves .....	9.00 10.00 5.00 8.50 25.00 9.00 9.00 15.00 5.00		
6 ea. 8-in. std. flange high pressure gate valves .....	50.00 53.00 50.00 57.00 75.00 60.00 53.00 60.00 50.00		
2 ea. 10-in. same.....	10.00 12.50 5.00 12.00 35.00 12.00 10.00 15.00 7.15		
11 ea. fire hydrants.....	12.00 17.00 7.00 15.00 50.00 14.00 12.00 20.00 7.15		
3 ea. inst. fire hydrants.....	75.00 80.00 64.00 85.00 70.00 90.00 70.80 \$110 62.00		
	15.00 25.00 10.00 20.00 20.00 20.00 9.00 30.00 21.00		

#### Sewerage ...

#### California—Santa Clara County—Sanitary Dist.—V. C. Sewers

Contract awarded to Bebek & Brkich, Los Angeles, \$59,174 (omitting last 5 items), by Burbank Sanitary District, San Jose, for construction vitrified sanitary sewerage system in Burbank School District, San Jose. Bids were received from the following:

(A) Bebek & Brkich.....	\$64,890	(F) A. Granzotto.....	\$79,646
(B) Oakland Sewer Construction Co.....	67,650	(G) E. J. Tobin.....	80,890*
(C) Leko & Bosnyak.....	71,493	(H) Sutalo & Ramljak.....	81,897
(D) John Pestana.....	71,680	(I) W. J. Tobin.....	83,642
(E) McGuire & Hester.....	73,247	(J) M. J. Lynch.....	86,589
(1) 29,485 lin. ft. 4-in. vitr. clay sew. lateral	(9) 30 ea. 10x4-in. V.C. wye branches		
(2) 31,493 lin. ft. 6-in. vitr. clay sewer	(10) 116 ea. manholes, complete		
(3) 7,429 lin. ft. 8-in. vitr. clay sewer	(11) 3 ea. risers, complete		
(4) 2,244 lin. ft. 10-in. vitr. clay sewer	(12) 3,400 T. macadam base rock		
(5) 3,353 lin. ft. 12-in. vitr. clay sewer	(13) 320 T. coarse screenings		
(6) 60 lin. ft. 8-in. cl. "A" C.I. pipe sewer	(14) 160 T. fine screenings		
(7) 1,304 ea. 6x4-in. V.C. wye branches	(15) 3,000 gal. road oil, SC-1A		
(8) 64 ea. 8x4-in. V.C. wye branches	(16) 4,500 gal. 90-95 bitum. road oil		

(Continued on next page)

## "LET'S TALK ABOUT WOOLDRIDGE SCRAPERS"

Do you know that a WOOLDRIDGE SCRAPER will pick up a heaping load in from *45 to 65* seconds—they will! And more important, they will do it in less than *100 feet*, on the average. So you start saving time right in the cut—no fooling around there.

"WOOLDRIDGE SCRAPERS" are rugged. They take any kind of material that any scraper can handle. The controls are fast—and easy. Independent cables control the hoist, the apron, and the load ejector. No cable has to perform two operations—therefore cable life is greater, and of course cable cost is much less, (about one-third the cost of other

scrapers). Time ordinarily wasted in cable replacements is employed in moving pay dirt.

These same advantages improve Tandem Scraper operation. "WOOLDRIDGE SCRAPERS" in tandem are short-coupled—the total length is only 58 feet, (only 16 feet longer than single-scraper hookup). The load is close to the drawbar, and all the tractive effort is effective. This short-coupled outfit gives flexibility, shorter turning radius, lighter draft, and easy maneuverability in cut and on fill. "WOOLDRIDGE" exclusive ball-and-socket front yoke construction permits removal of the front trucks of the second scraper and the yoke is coupled directly to the leading scraper.

Why not put these tremendous time-saving, cost slashing, dirt-moving advantages to work for you on your job.

Write for full details . . . . . WRITE NOW!



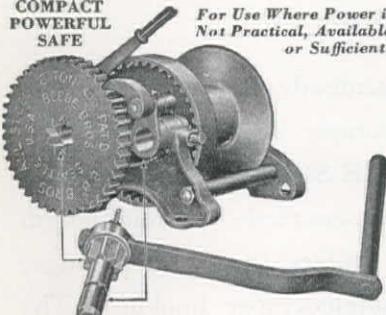
**WOOLDRIDGE MANUFACTURING COMPANY  
SUNNYVALE**

SCRAPERS • POWER UNITS • RIPPERS • BULLDOZERS • TRAIL BUILDERS

**BEALL**  
STEEL HAND HOIST  
SEATTLE, U.S.A.

COMPACT  
POWERFUL  
SAFE

For Use Where Power is  
Not Practical, Available  
or Sufficient.



"The strongest geared power for its weight in the world"

Three sizes: 2-, 5- and 15-ton. Capacity comparison figuring  $\frac{1}{2}$ " flexible plow steel cable.

2-ton "Lightweight" . . . . . 75 ft.  
5-ton "General Utility" . . . . . 250 ft.  
15-ton Triple-Gear'd "Special" . . . . . 1200 ft.

With patented instant gear change and positive internal brake that never fails, and will lock and hold load until released.

Gear Ratios Weight Price  
2-ton 4 & 22 to 1 . . . . . 60 lb. \$50  
5-ton 4 & 24 to 1 . . . . . 110 lb. \$75  
15-ton 4, 19 & 109 to 1 . . . . . 680 lb. \$250

15-ton special priced f. o. b. Seattle 5-ton size can also be furnished from factory with special 18" or 24" wide drum in place of standard drum 8" wide. Scatter them around the job to suit, one or 100, distributing the load "evenly". Place assembled pipe lines, caissons, trusses, girders, or what have you. Just be sure of your rigging and anchorage. Manpower never grew that could break a Beebe Hoist on a fair pull—a 5-ton General Utility withstood a mechanical pull of 41,000 lbs. on official test, breaking a  $\frac{3}{4}$ " plow steel cable with Hoist remaining intact.

Complete literature and list of dealers principal U. S. cities and foreign gladly mailed. Warehouse supply stocks for dealers: Seattle, Chicago, Brooklyn, Houston.

**BEEBE BROS.**

(Incorporated)

2726 Sixth Ave., So. SEATTLE, WASH.



## A Mark that Means "PROFIT INSURANCE"

Whether it's drain pipe, a steel tank or a heavy machinery trailer—the Beall diamond trade-mark stands for equipment that will "hold up" on the job. You'll find that engineers and contractors in the Northwest demand Beall quality.

**DUMP BODIES AND HOISTS  
HEAVY DUTY TRAILERS  
STEEL TANKS**

**CULVERTS AND DRAINAGE PIPES  
MUNICIPAL WATER SYSTEMS  
PUMPING PLANTS  
IRRIGATION AND MINING PIPE**

**BEALL**

**PIPE & TANK CORP.**

1945 NORTH COLUMBIA BOULEVARD  
PORTLAND, OREGON

Offices in: SEATTLE, SPOKANE, BOISE

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
( 1 )	.57	.56	.70	.55	.55	.69	.63	.52	.49	.63
( 2 )	.67	.67	.75	.70	.75	.73	.70	.84	.60	.80
( 3 )	.90	.81	.85	.80	.90	.84	.97	.90	.79	1.10
( 4 )	1.13	1.23	1.00	1.00	1.05	1.00	1.50	1.75	1.16	1.35
( 5 )	1.37	1.37	1.20	1.25	1.25	1.47	2.10	2.50	1.71	1.75
( 6 )	3.00	3.00	2.00	3.40	3.85	7.00	3.50	3.00	4.40	6.00
( 7 )	.30	1.50	2.00	2.50	2.00	2.70	.75	2.25	3.58	3.00
( 8 )	.75	2.00	3.00	3.15	3.00	3.20	1.00	3.00	4.00	4.50
( 9 )	1.00	2.00	4.00	4.40	4.00	3.94	1.50	4.50	4.50	6.00
(10)	58.00	65.00	55.00	73.50	89.00	65.00	72.00	75.00	66.50	\$100
(11)	25.00	15.00	25.00	20.00	25.00	25.00	17.50	45.00	12.00	25.00
(12)	1.30	1.50	.60	1.95	1.50	2.50	3.25	2.00	4.00	2.00
(13)	1.70	2.20	1.50	2.80	1.90	3.75	3.00	3.00	4.00	4.00
(14)	1.70	2.40	1.50	2.80	1.90	3.75	3.00	3.00	4.00	4.00
(15)	.055	.06	.04	.085	.07	.09	.05	.08	1.00	.07
(16)	.07	.08	.05	.095	.09	.10	.07	.08	1.00	.09

## Bridge and Grade Separation . . .

### California—Los Angeles County—State—Underpass

Contract awarded to J. E. Haddock, Ltd., Pasadena, \$192,392, by California Division of Highways, Sacramento, for construction of an undercrossing under the tracks of the A. T. and S. F. R. R., on Foothill Boulevard in the City of Azusa, and includes reconstruction of Virginia Avenue and of service roads. Bids were received from the following:

(1) J. E. Haddock, Ltd.	\$192,392	(5) Carlo Bongiovanni.	\$212,222
(2) United Concrete Pipe Corporation	207,573	(6) Ralph A. Bell.	212,323
(3) Griffith Co.	208,667	(7) Werner & Webb.	227,053
(4) Charles J. Dorfman.	209,450	(8) Nick Perscallo.	227,603

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
1,950 cu. yd. removing concrete	1.45	1.50	1.50	4.40	1.75	2.00	1.60	2.00
Clearing and grubbing	\$200	\$500	\$200	\$500	\$300	\$400	\$2500	\$700
Dev. water sup. & furn. wat. equip.	\$225	\$300	\$1100	\$700	\$700	\$600	\$150	\$1300
1,300 M. gal. applying water	.45	.70	.30	1.00	.30	1.00	.25	.80
22,000 cu. yd. roadway excav. w/o class.	.28	.30	.31	.485	.30	.45	.60	.38
3,400 cu. yd. structure excavation	.72	.80	.75	1.00	1.00	1.00	.80	.80
1,450 cu. yd. structure backfill	.54	.50	1.00	.75	.50	.35	1.10	.50
34,000 cu. yd. imported borrow	.38	.45	.49	.59	.30	.45	.70	.40
10,200 sq. yd. preparing subgrade	.12	.14	.11	.15	.10	.10	.15	.10
Finishing roadway	\$400	\$200	\$150	\$300	\$300	\$600	\$500	\$600
3 ton liq. asph. SC-2 (prime coat)	11.75	20.00	16.00	20.00	15.00	18.00	12.00	22.00
1,600 sq. yd. asphaltic paint binder	.03	.02	.03	.05	.05	.05	.06	.06
22 ton liq. asph. ROMC-4 or ROMC-5 (P.M.S.)	9.65	9.00	8.00	10.00	12.00	12.00	12.00	11.40
420 ton min. aggr. (P.M.S.)	2.50	2.00	1.90	2.20	2.40	2.50	3.80	2.80
165,000 lb. furn. bar reinf. steel	.031	.03	.034	.03	.032	.032	.04	.035
165,000 lb. plac. bar reinf. steel	.006	.01	.008	.00723	.009	.014	.01	.01
1,565 cu. yd. class "A" P.C.C. (struct.)	14.00	17.50	14.50	15.00	20.22	17.00	20.00	20.00
664,000 lb. furn. str. carbon steel	.074	.075	.08	.07	.078	.076	.075	.08
388,000 lb. furn. str. alloy steel	.083	.0838	.09	.08	.087	.085	.082	.09
1,052,000 lb. erect. str. steel	.02	.024	.022	.018	.021	.02	.015	.025
1,500 lb. misc. iron and steel	.19	.20	.19	.15	.17	.18	.20	.30
200 sq. yd. galv. corr. metal (12 ga.)	5.00	2.20	5.00	3.00	5.00	1.25	.20	4.00
80 lin. ft. 18-in. std. R. C. P.	2.15	2.00	2.50	3.30	2.50	2.50	2.50	2.90
550 lin. ft. 21-in. std. R. C. P.	2.40	2.50	2.70	2.75	3.40	2.70	3.00	2.90
32 lin. ft. 24-in. ex. str. R. C. P.	3.35	4.00	3.50	4.00	6.00	4.50	3.80	3.60
86 lin. ft. 30-in. ex. str. R. C. P.	4.65	5.00	5.00	5.00	6.30	5.50	5.20	4.75
380 lin. ft. 8-in. C. M. P. (16 ga.)	.93	1.00	1.00	.90	1.10	.90	1.10	1.00
260 lin. ft. 12-in. C. M. P. (16 ga.)	1.20	1.30	1.25	1.25	1.80	1.40	1.60	1.30
2,000 lin. ft. 8-in. P. M. P. (underdr., 16 ga.)	.84	1.00	1.00	.90	.99	.90	1.30	1.30
580 cu. yd. rock filling material	2.25	1.50	2.30	1.60	2.00	2.00	2.25	1.60
610 cu. yd. cl. "A" P.C.C. (curbs, gutters & dwks.)	11.60	12.00	11.60	13.00	15.00	13.00	13.50	15.00
160 lin. ft. curb armor	.95	1.00	1.00	1.25	1.00	1.00	1.50	1.10
900 sq. yd. waterproofing	.37	.40	.38	.30	.40	.30	.20	.41
1 ea. adjusting manhole to grade	12.00	20.00	15.00	30.00	10.00	20.00	30.00	30.00
3,450 ton asphalt concrete	2.60	2.20	2.45	2.35	2.40	3.00	3.10	2.75
4 ton asphaltic emulsion (A.C.S.C.)	24.00	25.00	23.00	25.00	30.00	22.00	30.00	25.00
17 cu. yd. protective covering	50.00	20.00	50.00	40.00	35.00	25.00	50.00	42.00
30 lin. ft. 6-in. V. C. P.	.60	.40	.60	.60	.20	.60	.120	.70
260 lin. ft. 8-in. V. C. P.	.60	.50	.60	.60	.60	.75	.80	.80
1 ea. flushing manhole "B"	90.00	\$100	80.00	\$150	\$150	\$100	\$160	\$100
1 ea. std. jct. chamber	90.00	\$100	80.00	\$140	\$100	70.00	\$160	98.00
1 lot electrical equipment	\$3800	\$4000	\$4000	\$3754	\$3500	\$4000	\$3500	\$3500
42 ea. removing and repl. palm trees	3.50	12.00	12.00	11.00	14.00	15.00	20.00	25.00
900 cu. yd. top soil	1.00	1.30	1.25	1.00	1.50	.60	1.25	1.30
7,300 cu. yd. trailing lantana plants	.09	.25	.10	.09	.28	.08	.10	.10
195 lin. ft. 1-in. galv. stl. pipe (fr. line)	.20	.20	.21	.25	.30	.15	.30	.27
450 lin. ft. 1½" galv. stl. pipe (fr. line)	.30	.30	.31	.30	.87	.20	.40	.35
1,700 lin. ft. ¾" galv. stl. pipe with noz.	.20	.20	.39	.30	.32	.18	.30	.25
875 lin. ft. 1" galv. stl. pipe with noz.	.26	.25	.41	.35	.35	.25	.40	.30
160 lin. ft. metal plate guard railing	1.60	2.50	1.50	2.00	1.72	1.25	2.00	2.30
1 lot misc. items of work	\$1600	\$2000	\$750	\$2600	\$1017	\$2556	\$1500	\$3000

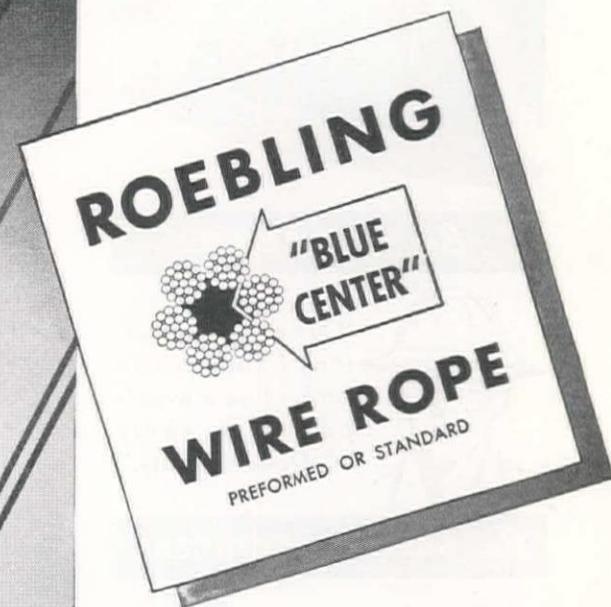
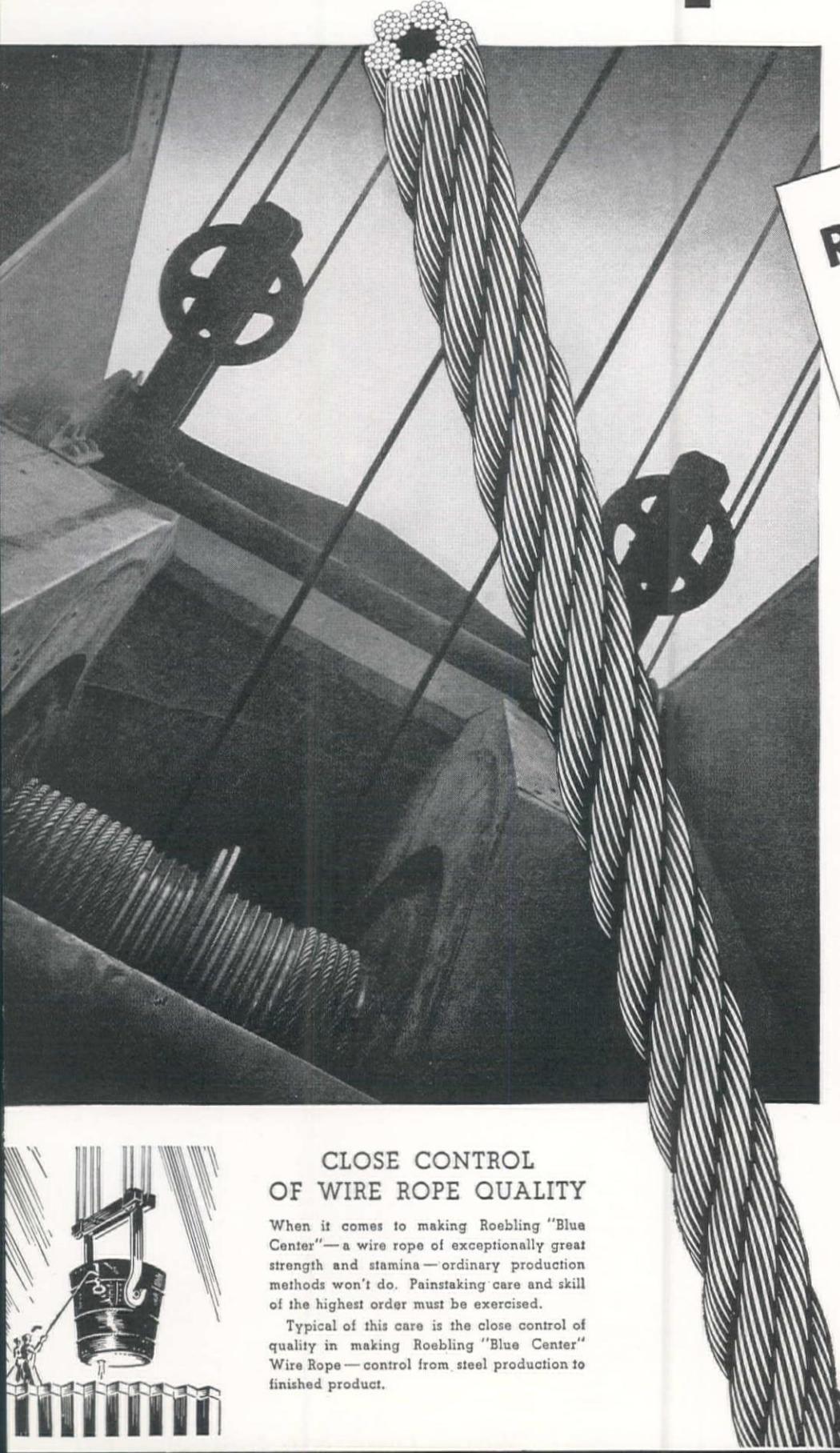
### Wyoming—Teton County—State—Repairs

Contract awarded to Charles M. Smith, Thermopolis, \$36,396, by Wyoming State Highway Commission, Cheyenne, for repairs to bridge over Jackson Lake Dam at Moran. Bids were received from the following:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	
11,700 cu. yd. excavation	.35	.20	.30	.35	.50	.30	.25
1,750 cu. yd. mi. haul	.25	.35	.12	.20	.20	.20	.20
2,300 cu. yd. sta. overhaul	.015	.015	.015	.015	.015	.015	.015
64 M. gal. watering (emb.)	3.00	1.00	.50	2.00	2.00	2.00	2.00
40 hr. Sheepfoot roller operation	6.00	3.50	2.50	4.00	5.00	10.00	5.00
60 lin. ft. 72-in. C.M.P.	15.00	19.00	16.00	20.00	13.00	15.00	17.50
64 lin. ft. installing 36-in. C.M.P. for detours	.50	3.00	1.50	3.00	.50	1.00	1.00
60 cu. yd. excavation for pipe culverts	1.25	3.00	1.00	2.00	2.00	2.00	2.00

(Continued on next page)

# How to cut rope costs . . .



Through years of planned research and development, we have continually improved the endurance of Roebling "Blue Center" Wire Rope. Today, as a result, "Blue Center"—Roebling's highest achievement in wire rope manufacture—enables you to keep your wire rope replacements at an all-time "low".

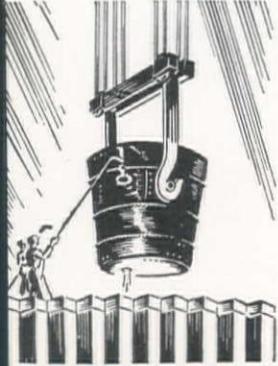
There are other important reasons for the long life and economy of "Blue Center". For example—Roebling's control of every manufacturing process from raw material to final inspection, and exceptional testing facilities.

Companies that keep accurate records report that Roebling "Blue Center" gives them lowest rope replacement cost. Therefore, we say with assurance—put Roebling "Blue Center" to the severest test—on any of your rope-rigged equipment. We are confident of the results!

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When it comes to making Roebling "Blue Center"—a wire rope of exceptionally great strength and stamina—ordinary production methods won't do. Painstaking care and skill of the highest order must be exercised.

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36 each guard fence posts.....	5.00	3.00	3.00	5.00	4.00	2.00	2.00
100 lin. ft. wire cable guard fence (2 cables).....	1.65	.70	1.10	1.50	4.00	3.00	1.50
482.7 cu. yd. class "A" concrete.....	30.00	32.00	32.00	38.00	31.00	30.00	32.50
81,930 lb. reinforcing steel.....	.0625	.09	.08	.10	.07	.065	.07
6,970 lb. structural steel.....	.25	.40	.10	.20	.30	.30	.20
40 each 12-in. diam. sheaves.....	40.00	50.00	45.00	40.00	32.00	30.00	10.00
L. S. roadway drain pipe.....							
160 lin. ft. 3-in. cast iron pipe.....	.60	.60	3.00	1.00	3.00	2.00	1.00
.81 M.F.B.M. treated timber.....							
560 cu. yd. structure excavation.....	2.00	4.00	3.00	2.00	5.00	2.50	4.00
40 hr. pneumatic tire roller operation.....	6.00	2.00	3.00	4.00	3.00	10.00	3.00
140 hr. mechanical tamping.....	2.50	3.00	4.00	3.00	3.00	3.00	3.00
L. S. removing existing concrete deck.....	4200	2800	4000	2000	1200	2500	3000
L. S. removing and replacing gate hoist.....	700	600	1000	2500	250	700	3000
L. S. remov. and repl. exist. handrail.....							
250 lin. ft. approach ear track.....	.50	1.50	250	2.50	1.00	3.00	1.00
L. S. removing existing structures.....	200	100	100	302	50.00	200	550

### California—Los Angeles County—State—Concrete

Contract awarded to J. E. Haddock, Ltd., Pasadena, \$48,516, by California Division of Highways, Sacramento, for construction of a bridge at Big Dalton Wash, and widen bridge and 0.8 mi. grade and plantmix surfacing at San Dimas Wash, betw. Cypress Avenue and Azusa, Los Angeles. Bids were received from the following:

(1) J. E. Haddock, Ltd.....	\$48,516	(4) Griffith Co.....	\$59,901
(2) Werner & Webb.....	53,875	(5) Carlo Bongiovanni.....	60,999
(3) J. S. Metzger & Son.....	56,329	(6) Dimmitt & Taylor.....	64,596

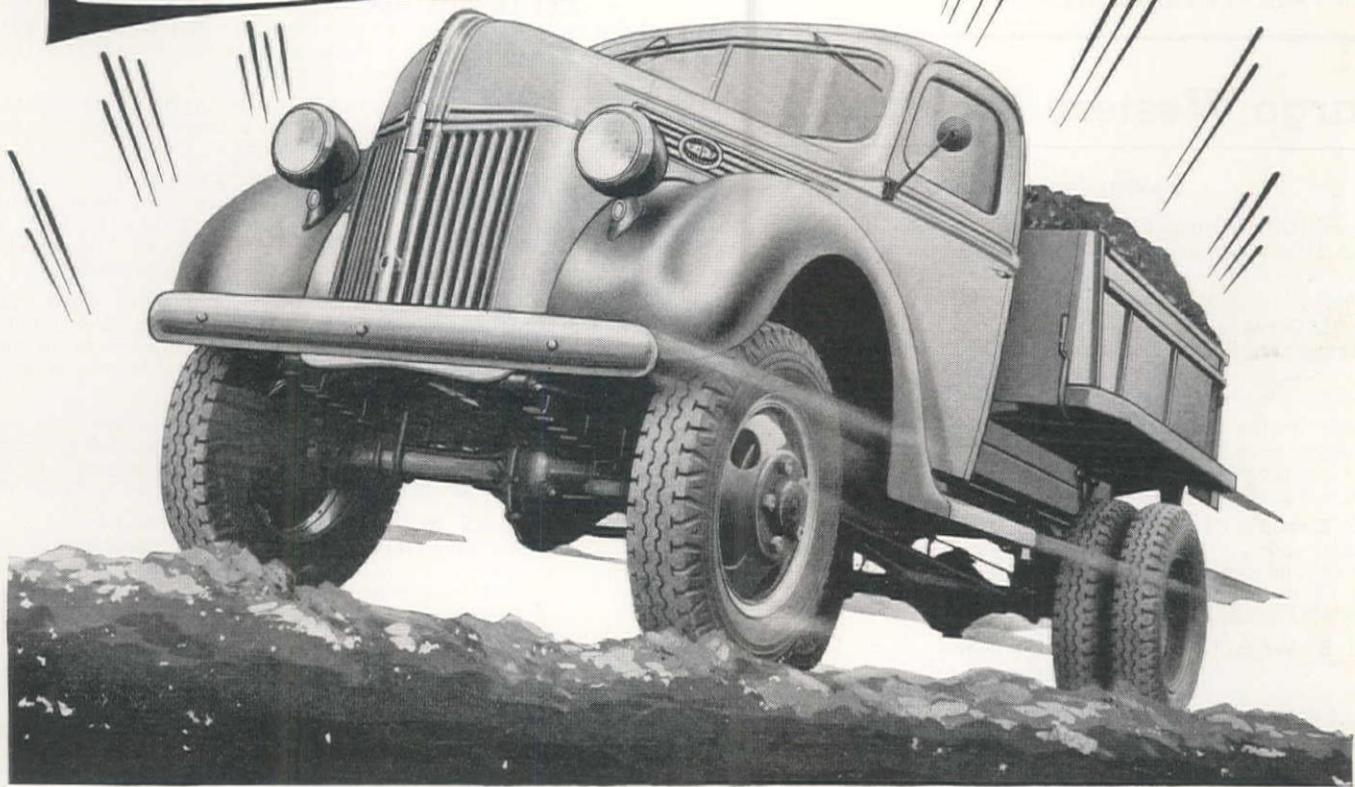
	(1)	(2)	(3)	(4)	(5)	(6)
Remove ex. bridge at Big Dalton Wash.....	600	500	1500	550	500	1000
Remov. portions of ex. br. at San Dimas Wash.....	800	300	700	400	300	350
1,300 lin. ft. remov. ex. approach guard railing.....	.20	.15	.30	.24	.20	.35
15 cu. yd. removing concrete.....	3.00	6.00	3.00	5.00	5.00	.50
67 sta. yd. clearing and grubbing.....	28.00	40.00	35.00	90.00	43.00	60.00
1,400 cu. yd. rdwy. excav. w/o class.....	.36	.60	.35	.36	.50	.80
1,170 cu. yd. structure excavation.....	1.00	1.10	1.50	3.25	2.00	1.50
100 cu. yd. ditch and channel excav.....	.75	.80	.60	.50	1.00	1.00
20,000 cu. yd. imported borrow.....	.40	.50	.45	.60	.50	.55
Develop. water supply & furn. watering equip.....	350	700	2500	800	600	550
900 M. gals. applying water.....	.60	.30	.80	.36	.40	.50
43 stas. finishing roadway.....	4.00	5.00	12.00	5.00	10.00	5.00
45 tons liq. asph. SC-2 (B.S.T.).....	7.00	6.50	8.00	7.40	10.00	7.50
3,500 sq. yd. prep., mixing & shaping surface (B.S.T.).....	.10	.12	.08	.10	.20	.12
11 ton liq. asph. SC-2 (pr. ct.).....	10.00	7.00	8.00	14.00	15.00	15.00
6,300 sq. yd. asphaltic paint binder.....	.02	.05	.04	.02	.04	.03
141 ton liq. asph., ROMC-4 or ROMC-5 (P.M.S.).....	9.50	10.50	11.00	8.70	10.00	10.80
2,610 ton min. aggr. (P.M.S.).....	1.80	2.10	2.10	1.90	2.40	2.75
5 ton liq. asph. SC-6 (sl. ct.).....	12.25	12.00	10.00	16.00	30.00	15.00
50 ton screenings (sl. ct.).....	2.00	2.20	2.00	2.00	3.00	3.00
6 M.F.B.M. treated Douglas fir timber.....	120	100	110	135	1.0	140
20 M.F.B.M. untreated Douglas fir timber.....	120	90.00	85.00	105	120	125
3 M.F.B.M. Redwood tim., DSAH str. grade.....	160	120	125	140	30.0	200
497 cu. yd. class "A" P.C.C. (structures).....	21.50	16.00	22.00	20.00	25.80	20.00
9 cu. yd. class "A" P.C.C. (railings).....	70.00	50.00	70.00	65.00	60.00	65.00
968 lin. ft. furn. conc. piles (prefcast or cast-in-place).....	.62	2.80	2.00	1.37	2.50	2.25
44 ea. driving piles.....	65.00	110	50.00	64.00	60.00	110
2 ea. culvert markers.....	3.00	5.00	3.00	4.00	5.00	2.50
130 lin. ft. 12-in. C.M.P. (16 ga.).....	1.20	1.50	1.50	1.35	1.50	1.70
330 lin. ft. 36-in. C.M.P. (12 ga.).....	4.85	5.50	5.00	5.30	5.50	6.50
250 lin. ft. salvaging exist. pipe culverts.....	.40	.60	.60	.60	1.00	.50
124,100 lb. furn. bar. reinf. steel.....	.032	.04	.034	.034	.03	.045
124,100 lb. placing bar reinf. steel.....	.007	.01	.012	.012	.01	.01
190 sq. yd. mesh reinforcement.....	.35	.50	.40	.35	.60	1.00
50 lin. ft. reconstr. revetment fence.....	6.00	2.00	8.50	5.30	5.00	5.50
Temporary guard rail.....	280	100	300	250	250	200
400 lin. ft. metal plate guard railing.....	1.50	1.50	1.25	1.60	1.72	2.00
Misc. items of work.....	700	500	700	500	1873	1200

### Arizona—Cochise County—State—Surface

Contract awarded to James S. Maffeo, Bisbee, \$87,968 (using dense graded plantmix) by Arizona State Highway Commission, Phoenix, for 7.5 mi. grade, drain, aggregate base course, and plantmix bituminous surfacing on Benson-Douglas Highway, 3 mi. west of Douglas. Bids were received from the following:

	Using Dense Grade Plantmix	Using Open Grade Plantmix
(1) James S. Maffeo.....	\$ 87,968	
(2) Phoenix-Tempe Stone Co.....	90,572	\$94,801
(3) Packard Contracting Co.....	97,895	
(4) Pearson & Dickerson Contractors, Inc.....	99,583	
(5) W. E. Hall Construction Co.....	101,448	
	(1)	(2)
2,400 sq. yd. removal of concrete pavement.....	.50	.32
7,514 mi. breaking down concrete pavement.....	\$700	\$575
6,188 mi. subgrading for coarse aggregate base course.....	\$300	\$500
6,400 cu. yd. roadway excavation (unclassified).....	.30	.25
20 cu. yd. drainage excavation (unclassified).....	1.00	.65
10 cu. yd. structural excavation (unclassified).....	1.50	1.30
3,800 sta. yd. station yard overhaul.....	.03	.01
14,454 tons coarse aggregate base course.....	.60	.65
29,949 tons fine aggregate base course.....	.75	.75
3,700 cu. yd. stripping pits.....	.20	.12
1,230 M. gal. sprinkling.....	1.30	1.30
630 hrs. rolling.....	2.50	3.00
2 cu. yd. class "A" concrete (including cement).....	30.00	32.00
64 lb. reinforcing steel (bars).....	.10	.13
50 lin. ft. resetting 24-in. C.M.P. ....	1.00	1.30
48 ea. r/w markers (type "E").....	3.00	4.00
10,894 ton plantmix (dense graded) (including haul).....	1.50	1.55
523 ton road oil (SC-6) (for plmx. & bitum. surf. trt.).....	20.00	21.00
94,968 gal. road oil (SC-2) (for pr. ct. & bitum. surf. trt.).....	.06	.065
7,741 mi. placing plantmix.....	\$200	\$225
1,335 ton screenings (seal coat).....	2.00	2.50
178 ton emulsified asphalt (class "A") seal coat.....	30.00	30.00
726 sq. yd. placing intersections.....	.30	.20
	(2)	(3)
Alternate (Open Grading)—In Lieu of Items 17, 18, 21 and 22		
10,093 ton plantmix (open graded) (including haul).....		1.80
801 ton choker screenings (C.I.P. on road).....		2.00
491 ton road oil (SC-6) (for plmx. & bitum. surf. trt.).....		21.00
1,602 ton screenings (seal coat).....		2.50
223 ton emulsified asphalt (class "A") (seal coat).....		30.00

MARMON-HERRINGTON  
All-Wheel-Drive



## An *All-Wheel-Drive* TRUCK - you can AFFORD to Buy, and CAN'T AFFORD to be without!

If you have a job where two driving wheels are not enough—and you can't afford or use a big *All-Wheel-Drive* truck—get a demonstration of a Marmon-Herrington *All-Wheel-Drive* converted Ford!

You'll be amazed how much bigger loads you can haul through loose sand, gravel, mud, dirt or snow. You'll be surprised with the number of extra trips you will make in a day. You'll be astonished at the ability of these vehicles to climb out of pits and dumps, to travel with greater safety on slippery highways, to operate under-body graders or to push snow plows through heavy drifts.

And best of all—you'll be surprised at the startlingly low price and operating cost, as compared

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For Marmon-Herrington *All-Wheel-Drive* converted Fords have all the inherent virtues and advantages of standard Fords—*plus power and traction applied through all four or all six wheels*. The result is more effective power, greater ability and greater economy of operation than you would ever believe. They incorporate the same outstanding features of design and construction which are found in Marmon-Herrington Heavy-Duty *All-Wheel-Drive* Trucks, built in the same plant by the same workmen.

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# CONSTRUCTION SUMMARY

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

**General Construction Co.**, Seattle, Wash., \$338,755, by Oregon State Highway Commission, Portland, Ore., for 1.7 mi. grade and roadbed topping, Tunnel Point-Rooster Rock Section, Columbia River Highway, Multnomah County, Oregon.

**Ben C. Gerwick, Inc.**, San Francisco, Calif., and **Healy-Tibbits Construction Co.**, San Francisco, Calif., by Moore Dry Dock Co., Oakland, Calif., for construction of four new shipways in Oakland, Alameda County, Calif.

**Pacific Bridge Co.**, San Francisco, Calif., \$2,800,000 (cost plus fixed fee basis), by Bureau of Yards & Docks, Washington, D. C., for construction of a dry dock at Destroyer Base, San Diego, San Diego County, Calif.

**S. S. Magoffin Co., Inc.**, Englewood, Colo., by Bureau of Reclamation, Denver, Colo., for excavation of Continental Divide Tunnel and construction of concrete invert in tunnel, Colorado-Big Thompson Project, located near Estes Park, Larimer County, Colo.

**Del E. Webb Construction Co.**, Phoenix, Ariz., \$350,000, by F. W. Woolworth Co., San Francisco, Calif., for construction of a reinforced concrete department store building at 30-34 East Washington St., Phoenix, Maricopa County, Arizona.

**Joshua H. Marks-Charde Co.**, Los Angeles, Calif., \$350,000, by S. H. Kress & Co., New York City, N. Y., for construction of 3-story structural steel frame store building at 400-40 "C" St., San Diego, San Diego County, Calif.

**F. J. Kirchoff Construction Co.**, Denver, Colo., \$372,000 (cost plus fixed fee basis), by Federal Works Agency, Washington, D. C., for construction of 125-unit housing project for army enlisted personnel at Lowry Field, Denver County, Colo.

**Broderick & Gordon**, Denver, Colo., \$13,206,390 (cost plus fixed fee basis), by War Department, Washington, D. C., for construction of small arms ammunition plant, on the 3,000 acres Hayden Ranch, 3 mi. west of Denver, Jefferson County, Colo.

**J. A. Terteling & Sons**, Boise, Idaho, \$2,500,000 (approximately), (cost plus fixed fee basis), by Constructing Quartermaster, Washington, D. C., for construction of 1500-unit housing project for civilian employees at Army Ordnance Depot, Hermiston, Umatilla County, Ore.

**J. C. Boespflug**, Miles City, Mont., \$2,176,000, by Seattle Housing Authority, Seattle, Wash., for construction of 690 dwellings and related buildings, Yesler Hill Project, King County, Wash.

**Western Construction Co.**, and **West Coast Construction Co.**, Seattle, Wash., \$685,758, by Bremerton Housing Authority, Bremerton, Wash., for construction of 240-unit Westpark Housing Project, Bremerton, Kitsap County, Wash.

**MacDonald Building Co.**, Tacoma, Wash., \$875,000 (cost plus fixed fee basis), by Federal Works Agency, Washington, D. C., for construction of 250-unit housing project and utilities at Ft. Lewis, Pierce County, Wash.

**Stover & Stover**, Claremont, Calif., \$300,000, by War Department, Washington, D. C., for construction of hangars, barracks, and pave and drain runways at Rankin Army Air Cadet School, Tulare, Tulare County, Calif.

**Sharp & Fellows Contracting Co.**, Los Angeles, Calif.; **L. R. Allison**, Roswell, N. Mex.; **Armstrong & Armstrong**, Albuquerque, N. Mex.; and **W. A. Smith Construction Co.**, Houston, Texas, \$10,000,000 (cost plus fixed fee basis), by War Dept., Washington, D. C., for construction railroad, roads, igloo type magazine, buildings, etc., at Ft. Wingate, McKinley County, New Mexico.

**J. A. Terteling & Sons**, Boise, Idaho, \$7,547,661 (negotiated contract), by Constructing Quartermaster, Washington, D. C., for construction of 750 igloo-type concrete storage shelters for am-

munition, 100 mi. of highway and 35 mi. of railroad serving the igloos, 4 mi. west of Hermiston, Umatilla County, Ore.

**W. C. Smith, Inc.**, Duluth, Minn., and Denver, Colo., \$1,165,897 (Sec. A), and **Jacobson-Jensen Co.**, Portland, Ore., \$177,575 (Sec. B), by U. S. Engineer Office, Portland, Ore., for const. 120 temporary buildings, including utilities at Pendleton Air Corps Cantonment, Pendleton, Umatilla County, Ore.

### PROPOSED PROJECTS

**THE CITY OF LOS ANGELES** will vote at a municipal election on a nine cent sewer tax to finance construction of a \$11,500,000 outfall sewer and disposal plant improvements in Los Angeles, Los Angeles County, Calif.

**CITY OF SAN DIEGO**, Calif., has set April 22 for the date to vote on a \$1,983,000 bond issue for a city-wide sewer system in San Diego, San Diego County, Calif.

**COUNTY FLOOD CONTROL ENGINEER**, Los Angeles, Calif., has announced plans are under way for a flood control channel extending from Redondo Blvd., and Imperial Hwy. to the ocean to protect the L. A. Municipal Airport, Los Angeles, Los Angeles County, Calif. Estimated cost is \$1,900,000.

**THE PRESIDENT** has requested Congress to appropriate \$17,674,000 for extension of the L. A. Harbor Breakwater and dredging of a ship channel from the harbor entrance to the fleet operating base at San Pedro-Long Beach, Los Angeles County, Calif.

**THE STANDARD OIL CO.**, San Francisco, Calif., has prepared plans and will award contract shortly for a catalytic cracking and refining plant to be built at the Oil Company's El Segundo refinery, Los Angeles, Calif. Estimated cost is \$4,500,000.

**LOS ANGELES BUREAU OF POWER & LIGHT**, Los Angeles, Calif., have started plans for the first unit of the Bureau's new steam plant to be built in Wilmington, Los Angeles County, Calif. It will consist of a large steel frame and concrete superstructure, two large tunnels and other substructure work and will cost about \$2,065,000.

**THE PACIFIC TELEPHONE AND TELEGRAPH CO.**, San Francisco, Calif., are completing plans and specifications for installing telephone buried cables between the western Utah state line and Sacramento, Calif., at an estimated cost of \$7,000,000.

**PLANS AND SPECIFICATIONS** are being completed by the American Telephone & Telegraph Co., New York, N. Y., for installation of telephone buried cables between Denver, and the western Utah state line at an estimated cost of \$5,000,000.

## Highway and Street . . .

### CONTRACTS AWARDED

#### California

**FRESNO AND TULARE COS.**—**Frank B. Marks & Sons**, Box 352, Newman—\$193,575 (recommended) for 19.3 mi. wid. on Rt. 1 and place bitum. treated surf. (plantmix) on Rts. 1 and 2 of Kings Canyon Natl. Park; Sec. B (Por.) of the Kings Canyon-Sequoia Park Appr. Rd.—by Public Roads Administration, San Francisco.

**KERN CO.**—**Lovrich & Konjevod**, 2835 Newell St., Los Angeles—\$12,422 for furnish mats. and supervision for const. sidewalks, curbs and gutters, Shafter—by City Council, Shafter.

**LOS ANGELES CO.**—**Sully Miller Contracting Co.**, 1500 W. 7th St., Long Beach—\$42,930 for improve Pico St., betw. Seaside Blvd. and 3rd Ave. and portions of other streets in Long Beach—by Port Manager, Long Beach.

**LOS ANGELES CO.**—**Osborn Co.**, 1570 San Pasqual, Pasadena, for street improvmts. in Singing Wood and other streets in Tract 12560, Arcadia—by Title Insurance & Trust Co., Arcadia.

**SACRAMENTO CO.**—**McGillivray Construction Co.**, P. O. Box 873, Sacramento—\$12,445 for grade, pave and const. sewers on various Sts. bounding McKinley Blvd., Tract No. 4, Sacramento—by City Council, Sacramento.

**SAN DIEGO CO.**—**R. E. Hazard & Sons**, P. O. Box 1510, San Diego—\$12,103 for improvement of Dickens and Emerson Sts., San Diego—by City Council, San Diego.

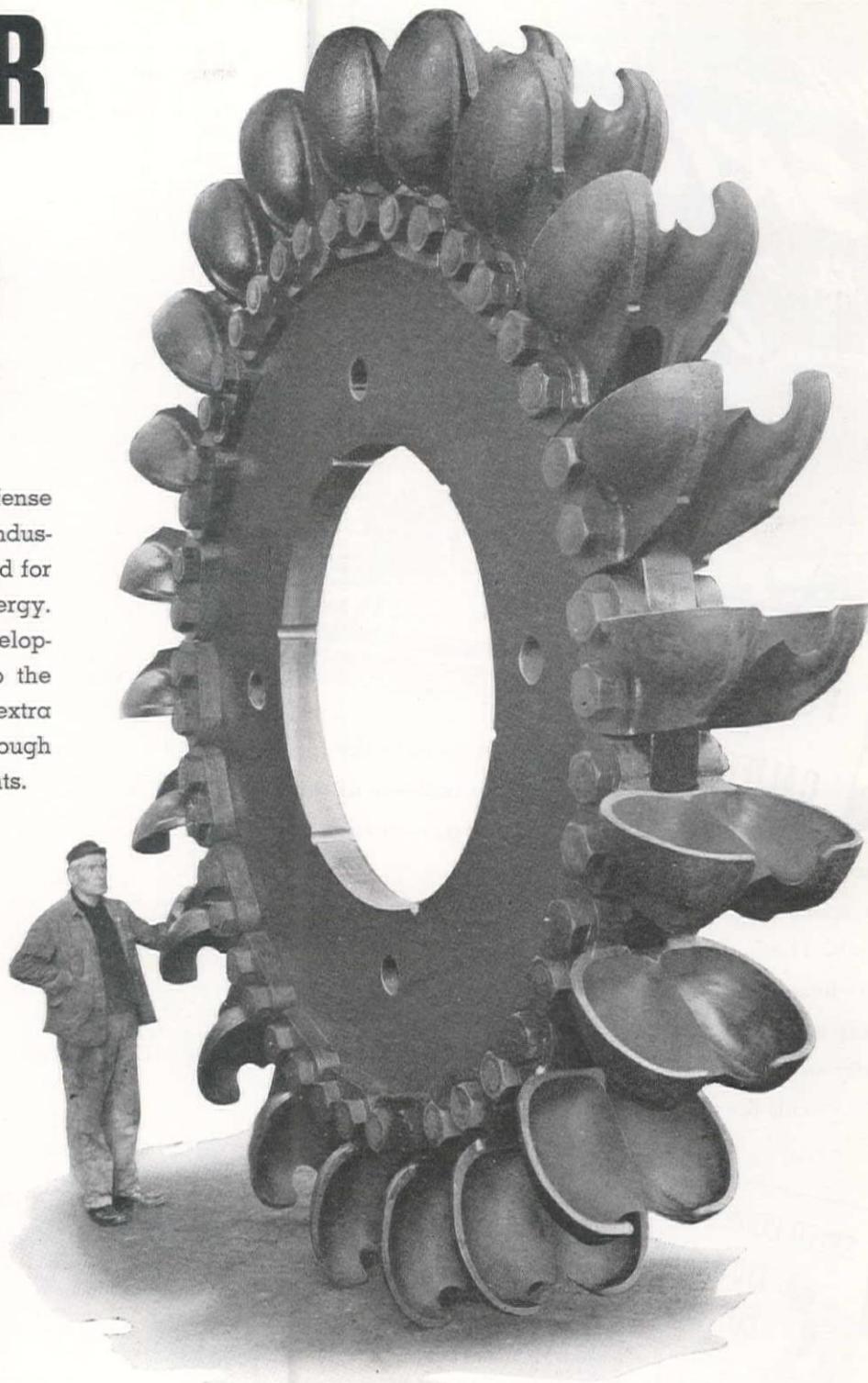
**SAN DIEGO CO.**—**V. R. Dennis Construction Co.**, Box F, Hillcrest Station, San Diego—\$9,472 for grade and pave 44th St., San Diego—by City council, San Diego.

**SAN FRANCISCO CO.**—**C. W. Caletti & Co.**, 28 Francisco Blvd., San Rafael—\$67,675 for const. protection wall along

# POWER for the WHEELS of INDUSTRY

Increasing needs for national defense with increasing demands upon industry at large bring with it the need for greater output of electrical energy. Indications are that power development facilities will be taxed to the utmost, with a market for the extra power most readily available through rehabilitation of the older plants.

*Impulse runner for a Pelton double-overhung unit. Detachable ring type of construction saves cost and outage time when replacement buckets are desired.*



## The Pelton Water Wheel Company

*Hydraulic Engineers*

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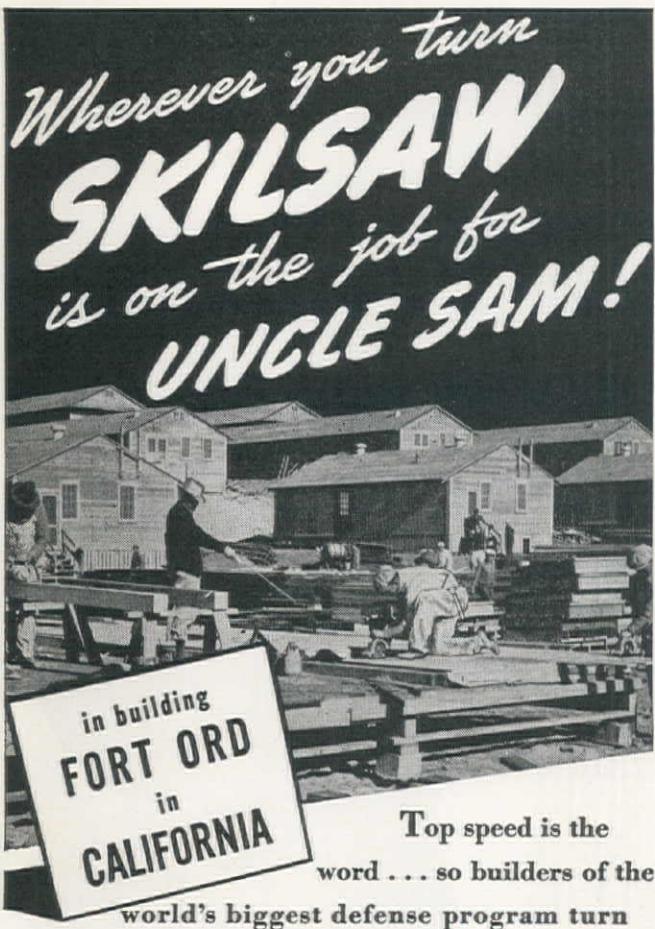
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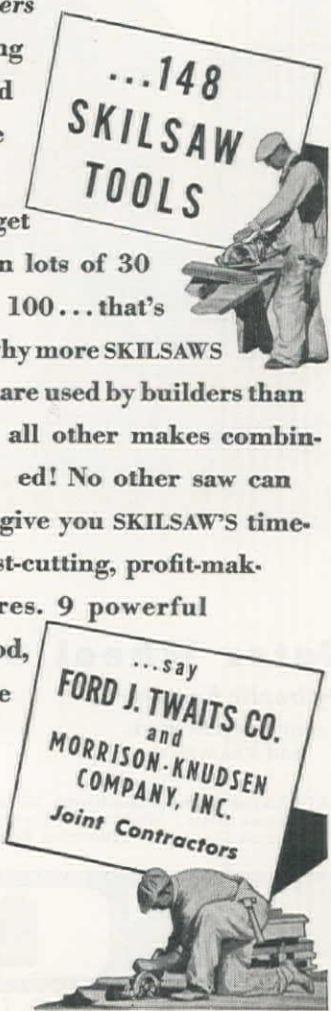
to 100 . . . that's why more SKILSAWS are used by builders than all other makes combined! No other saw can give you SKILSAW'S time-saving, cost-cutting, profit-making features. 9 powerful

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WESTERN OFFICES:

1253 S. Flower St., Los Angeles—2065 Webster St., Oakland—2124 Main St., Dallas—Hendrie & Bolhoff Mfg. & Supply Company, Denver—Industrial Supply Company, Salt Lake City—Mine & Smelter Supply Co., El Paso—Smith Booth Usher Company, Phoenix.



Great Hwy., San Francisco—by Department of Public Works, San Francisco.

**SANTA CLARA CO.**—A. Teichert & Sons, Inc., 1846 37th St., Sacramento—\$17,210 for changes to Permanente Creek channel and relocate county road at magnesium plant west of Mountain View—by Permanente Corporation, Oakland.

**SANTA CLARA CO.**—Piombo Bros., 1571 Turk St., San Francisco—\$115,590 (approx.) for grade at fabrication plant area and entrance road at the Permanente magnesium plant west of Mountain View—by Permanente Corporation, Oakland.

#### Colorado

**BOULDER CO.**—Larson Construction Co., 2811 Walnut St., Denver—\$46,802 (official) for 1 mi. grade, structs., etc., Boulder-Idaho Sprgs. For. Hwy. Rt., within Roosevelt Natl. For.—by Public Roads Administration, Denver.

**GUNNISON CO.**—Switzer & Horner, 822 University Bldg., Denver—\$112,904 for 3 mi. grav. surf. located east and west from Sapinero, on SH No. 6—by State Highway Engineer, Denver.

**LOGAN CO.**—Steinwald & Watts, 2729 Jackson St., Denver—\$28,846 for 3 mi. gravel surf. betw. Akron and Atwood on SH No. 63—by State Highway Engineer, Denver.

**POWER CO.**—Charles B. Owen, 1375 Monaco Blvd., Denver—\$60,826 for 7 mi. grav. surf. betw. Granada & Holly, on SH No. 6—by State Highway Engineer, Denver.

#### Idaho

**BONNER CO.**—D. A. Sullivan & Co., Inc., Parkwater, Wash.—\$55,312 for 4 mi. grade, drain and surf. with cr. grav. on Colburn-Culver Road from Grouse Creek south—by Commissioner of Public Works, Boise.

#### Montana

**FLATHEAD CO.**—Kirkpatrick Bros., Kalispell—\$29,171 (official), for 1 mi. const. or improve the Columbia Falls-Glacier Park Hwy., Flathead Natl. Forest—by Public Roads Administration, Missoula.

#### Nevada

**CLARK CO.**—A. Teichert & Son. Inc., 1846 37th St., Sacramento—\$263,839 (official) for 8 mi. grade, const. drain structs. and place bitum. treat. surf., Sec. B, Rt. 2, Hemenway Wash-Las Vegas Wash, Boulder Dam Natl. Recreational Area—by Public Roads Administration, San Francisco, Calif.

**PERSHING CO.**—Hoops Construction Co., Twin Falls, Idaho—\$217,213 for 13.4 mi. grade, surf., etc., from Mill City to a point about 0.3 mi. SW of Pershing-Humboldt Co. Line, Rt. 1, Sec. D and E—by Directors of Dept. of Highways, Carson City.

#### Oregon

**CLATSOP CO.**—Parker-Schramm Co., Couch Bldg., Portland—\$13,400 for grade and pave at Ft. Stevens—by War Dept., Washington, D. C.

**COLUMBIA CO.**—Roy L. Houck, Salem—\$17,188 for 0.5 mi. grade and 0.6 mi. pave, St. Helens Sec., Columbia River Hwy.—by Oregon State Highway Commission, Portland.

**CROOK CO.**—Norris Brothers, Burlington, Wash.—\$28,429 for 2 mi. grade and const. two composite type pile trestle bridges, Ochoco Creek Sec., Madras-Prineville Sec. Hwy.—by Oregon State Highway Commission, Portland.

**DESCHUTES CO.**—Babler Bros., 2407 NW 28th Ave., Portland—\$39,549 for 1 mi. grade, 7 mi. roadbed shaping, 7 mi. surf., and 10 mi. oiling, Bend-Forest Bdry. Sec. of Century Drive Secondary Hwy.—by Oregon State Highway Commission, Portland.

**DESCHUTES & KLAMATH COS.**—Chester T. Lackey, Ontario—\$17,700 for furnish about 12,000 cu. yd. cr. grav. in stockpiles, Lapine Rock Prod. Proj., The Dalles-California and Fremont Hwy.—by Oregon State Highway Commission, Portland.

**DOUGLAS CO.**—A. S. Wallace, Roseburg—\$16,000 for furn. about 10,000 cu. yd. cr. rock or cr. grav. in stockpile, Bear Creek-Coos Jct. Rock Prod. Proj., Coos Bay-Roseburg Hwy.—Oregon State Highway Commission, Portland.

**GILLIAM CO.**—Leonard & Slate, Multnomah—\$85,031 for 3.1 mi. grade and bitum. macadam surf.; also const. reinf. conc. bridge, Ramsay-Blalock Sec., Columbia Riv. Hwy.—by Oregon State Highway Commission, Portland.

**GILLIAM CO.**—Leonard & Slate, Multnomah—\$73,972 for 2.2 mi. grade and bitum. macadam surf.; also widen conc. bridge, Quinton-Ramsay Sec., Columbia Riv. Hwy.—by Oregon State Highway Commission, Portland.



## TEN YARDS IN TOUGH GOING ↑

No ordinary bucket could stand the gaff, so the contractors are using **esco** manganese steel dragline buckets exclusively. A 10-yard and a 6-yard are excavating aggregate from the river to supply a 1500 ton per hour processing plant. Tough going, and to make matters tougher, operations are being carried on below water table level. Performance which enables us to say for—

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LOS ANGELES

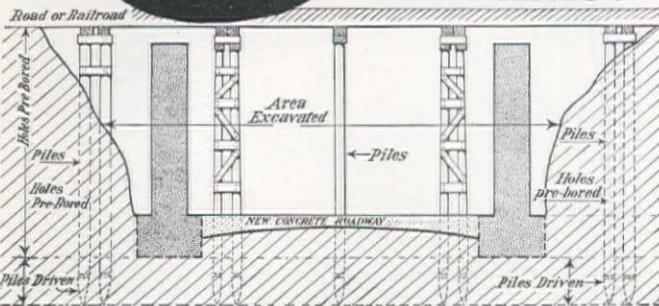
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Phone Jefferson 4191

HONOLULU

814 Kapiolani Blvd.  
Phone 6486

AGENTS: Harron, Rickard & McCone Co., San Francisco and Los Angeles; Neil B. McGinnis Co., Phoenix, Arizona; Contractors Equip. & Supply Co., Albuquerque, N. M.; Arnold Machinery Co., Salt Lake City, Utah; Intermountain Equip. Co., Boise, Idaho; F. W. McCoy, Denver, Colo.; Tri-State Equip. Co., El Paso, Texas; Shovel Supply Co., Dallas, Texas.

# USE BUDA EARTH DRILLS TO PRE-BORE FOR PILING!



THE diagram above shows the Buda-Hubron Earth Drill method for building temporary structures for highway or railroad underpass jobs. By using this pre-boring method there is no creep to the piles, perfect alignment is secured, pile damage is eliminated, earth is not disturbed, and piles can be put down where it would be economically impossible by other methods.

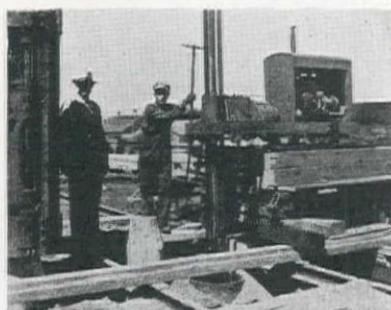
Get the complete story on Buda-Hubron Earth Drills before you figure on your next job.

**THE BUDA CO. • Dept. G • Harvey ( Chicago Suburb ) III.**

C. H. Bull Co., San Francisco, Cal.  
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Brown-Bevis Equip. Co., Phoenix, Ariz.

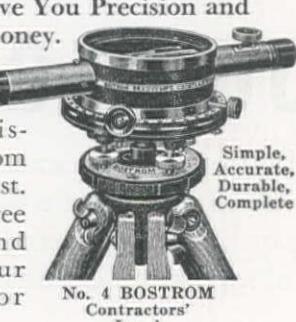
Clyde Equip. Co., Portland, Ore., Seattle, Wash.  
Arnold Machy. Co., Inc., Salt Lake City, Utah  
Ray Carson Machy. Co., Denver, Colo.

Shown directly above is a typical Buda-Hubron Earth Drill in service on a railroad underpass job. Drilling through hard gravel conglomerate, this unit supplemented pile driver and helped set piles accurately, with complete penetration assured.



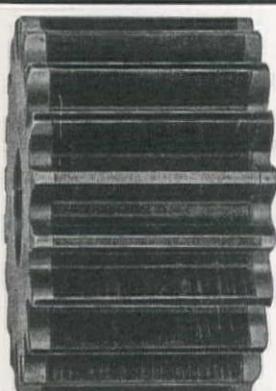
## USE BOSTROM LEVELS

They Satisfy, Give You Precision and Save You Money.



Carried in stock by distributors from coast to coast. Write for free booklet and name of our distributor near you.

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### FABROIL - RAWHIDE AND PHENOLIC

Non-Metallic Gears are a specialty with J G experience. The J G plant is equipped to furnish your every need in non-metallic gears for smooth, quiet and economical machine performance.

Consult us about your needs



**JOHNSON GEAR & MANUFACTURING CO., Ltd.**  
MAIN OFFICE AND WORKS: BERKELEY, CALIFORNIA

**JACKSON CO.**—E. L. Gates, Trail—\$25,909 for 1 mi. grade and const. of reinf. conc. bridge on the Lake Creek-Hanley ranch Sec., Little Butte Secondary Hwy.—by Oregon State Highway Commission, Portland.

**KLAMATH CO.**—Clifford A. Dunn, Box 431, Klamath Falls—\$19,370 for 0.5 mi. grade, surf. and road mix oil, Henley Sec., Klamath Falls-Malin Hwy.—by Oregon State Highway Commission, Portland.

**LANE CO.**—M. L. O'Neill & Son, John Day—\$13,294 for Florence rock production proj. nr. Oregon Coast and Siuslaw Hwys.—by Oregon State Highway Commission, Portland.

**MULTNOMAH CO.**—General Construction Co., 3840 Iowa Ave., Seattle, Wash.—\$338,755 for 1.7 mi. grade and roadbed topping, Tunnel Point-Rooster Rock Sec., Columbia Riv. Hwy.—by Oregon State Highway Commission, Portland.

**YAMHILL CO.**—Berke Bros., Inc., 7923 N.E. Halsey St., Portland—\$107,457 for 2.1 mi. grade and pave; also const. 150-ft. conc. bridge, Deer Creek, Bellevue Sec., Salmon River Hwy.—by Oregon State Highway Commission, Portland.

## Washington

**DOUGLAS CO.**—F. R. Hewett, 420 W. 22nd Ave., Spokane, Wash.—\$166,455 for 2.5 mi. clear, grade, drain, surf. and const. light bitum. surf. treat. on Primary St. Hwy. No 10, Trinidad vicinity—by Director of Highways, Olympia.

## Territories

**CANAL ZONE**—N. P. Severin Co., Chicago—\$195,000 for const. conc. runway aprons, taxi strips, etc., at Howard Field—by Constructing Quartermaster, Washington, D. C.

## PROPOSED PROJECTS

### California

**LOS ANGELES CO.**—The Los Angeles City Council has reported that the cost of improving Western Ave. from Torrance Blvd. to Lomita Blvd. in Lomita will cost about \$181,000.

**SAN BERNARDINO CO.**—Bids received by California Division of Highways, Los Angeles, for 1.2 mi. grade and apply bitum. treat. surf. and const. reinf. conc. bridge betw. Power House and 1 mi. E., have been rejected.

### Nevada

**WASHOE CO.**—Award to Isbell Construction Co., Reno—\$134,292 for 3.1 mi. grade, surf., etc., from  $\frac{1}{2}$  mi. E. of Calif.-Nev. St. Line to 1 mi. E. of Verdi has been rescinded by the Nevada State Hwy. Engineer, Carson City, due to an adverse court decision about right-of-way.

### Oregon

**LANE CO.**—Bids will be called by the U. S. Engineer Office, Portland, after approval by U. S. Engineers Office, Washington, D. C., for const. of two 5-mi. roads around Cottage Grove Dam.

**LINN CO.**—Bids received by the Oregon State Highway Commission, Portland, for 10.4 mi. surf., Foster-Cascadia Sec. of Santiam Hwy. have been rejected.

## Washington

**SPOKANE CO.**—Plans for the 6-mi. short cut from Ft. George Wright to Sunset airport will be completed soon and const. started by the end of March, it was announced by the County Engineer.

## Bridge & Grade Separation...

### CONTRACTS AWARDED

#### Arizona

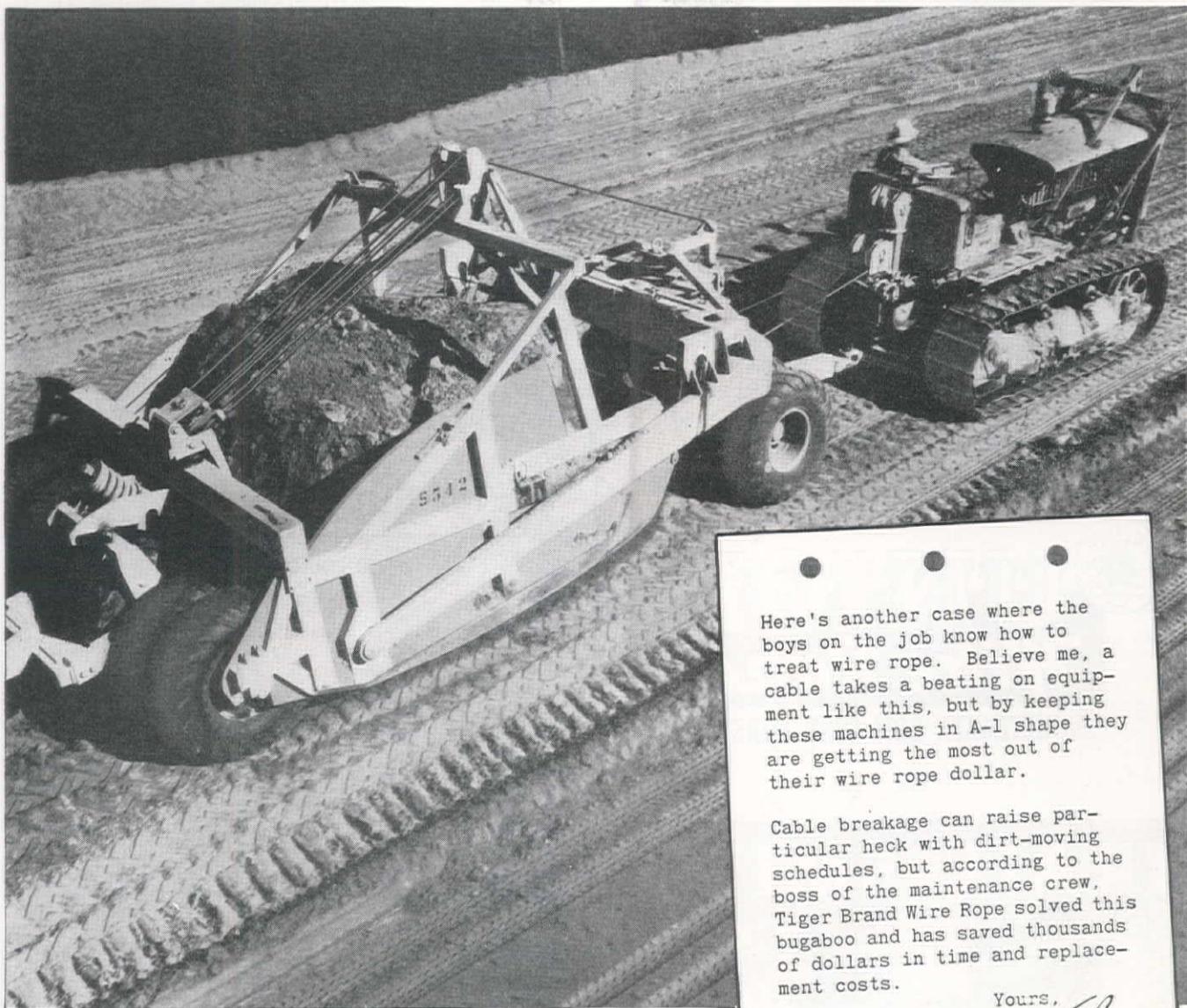
**COCHISE CO.**—Pearson & Dickerson, Box 471, Prescott—\$212,129 for const. highway underpass and reconst. of junction of three hwy., Benson-Steins Pass Hwy.; Benson-Vail Hwy.; and Benson-Douglas Hwy. The work is loc. in and adj. to City of Benson—by Arizona State Highway Commission, Phoenix.

**COCHISE CO.**—James S. Maffeo, Box 39, Bisbee—\$12,936 for reconst. exist. underpass on U. S. Rt. 80, under S. P. RR. Denn Spur track, Benson-Douglas Hwy.—by Arizona State Highway Commission, Phoenix.

#### California

**CONTRA COSTA CO.**—M. A. Jenkins, 3560 Broadway, Sac-

# A WIRE ROPE ENGINEER REPORTS TO HIS BOSS



Here's another case where the boys on the job know how to treat wire rope. Believe me, a cable takes a beating on equipment like this, but by keeping these machines in A-1 shape they are getting the most out of their wire rope dollar.

Cable breakage can raise particular heck with dirt-moving schedules, but according to the boss of the maintenance crew, Tiger Brand Wire Rope solved this bugaboo and has saved thousands of dollars in time and replacement costs.

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**EXCELLAY**  
*Preformed*  
**WIRE ROPE**

THE plus values of American Tiger Brand Wire Rope show up quickly in installations like the one pictured above. There are many types of heavier jobs being handled by this long-lasting, serviceable wire rope, but none where the battle against abrasion is so constant, few where so many wearing conditions exist all at the same time.

That's why manufacturers and operators of equipment in the construction field enthusiastically endorse American Tiger Brand Wire

Rope, and the consultation service of the Tiger Brand Wire Rope Engineer.

And what these men accomplish is no mystery to the thousands of wire rope users they contact every year. They know your problems and they talk your language. They will help you select the best wire rope for a particular job, and help you get a full dollar's worth of performance out of every dollar you invest. For specific recommendations, for advice of any nature, write or call us.



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THE BOULDER DAM MIXERS

Compact, lightweight trailer mixer. Tows behind car or truck at fast driving speed. Husky, "able-to-take-it" construction. Famous end-to-center mixing action. Write for descriptive bulletin.

**THE T. L. SMITH COMPANY**  
2871 North 32nd St. Milwaukee, Wisconsin

ramento—\$26,976 for repair bridge fenders and dolphins at San Joaquin Riv., 5 mi. north of Antioch—by California Division of Highways, Sacramento.

**IMPERIAL CO.**—Morrison-Knudsen Co., and M. H. Hasler, 411 West 5th St., Los Angeles—\$32,002 for const. S. P. RR. bridge and canal escav. at Coachella Canal, All-American canal syst., Boulder Canyon proj., Ariz.-Calif.-Nev.—by Bureau of Reclamation, Yuma, Ariz.

**KERN CO.**—Fred Fredenburg, Box 373, South San Francisco—\$96,233 for const. two bridges at Bakersfield, one acr. Kern Riv., and one acr. Kern Riv. overflow—by California Division of Highways, Sacramento.

**SAN LUIS OBISPO CO.**—F. H. Gates, Box 247, Santa Maria—\$109,018 for const. two reinf. conc. bridge and 1.6 mi. grade, and apply bitum. treat. surf. to roadways at Toro Creek and at Old Creek—by California Division of Highways, Sacramento.

### PROPOSED PROJECTS

#### California

**LOS ANGELES CO.**—Bids received by City Purchasing Agent, Los Angeles, for driving steel shells and placing reinf. steel and conc. in shells for Piers 26 and 27 and abutment 28 of E. appr. to Aliso St. viaduct, have been rejected.

## Water Supply . . .

### CONTRACTS AWARDED

#### California

**ALAMEDA CO.**—A. Granzotto, P.O. Box 224, Walnut Creek—\$36,422 for install C. I. water mains in Pleasant Hill distrib. syst., Oakland—by East Bay Municipal Utilities District, Oakland.

**KERN CO.**—Radich & Brown, 3000 Empire Ave., Burbank—\$25,276 for const. water supply syst. and pumping station at Muroc Lake—by U. S. Engineer Office, Los Angeles.

**LOS ANGELES CO.**—Fire Protection Engineering Co., 369 Pine St., San Francisco—\$10,321 for const. new underground water mains at Union Terminal, Hollywood Way and Van Owens Ave., Burbank—by Lockheed Aircraft Corporation, Burbank.

**LOS ANGELES CO.**—Hood Construction Co., 3326 E. Florence Ave., Huntington Park—\$11,438 for const. welded steel pipeline in Manchester Blvd. betw. Prairie Ave. and 12th St., Inglewood.

**LOS ANGELES CO.**—Roscoe-Moss Co., 4360 Worth St., Los Angeles—\$5,653 (1st 500 ft.); \$1,105 (501-700 ft.); \$64 ft. (allow for casing); \$300 (testing well); and \$3 hr. (overtime charge over 30 hrs.), for drill 20-in. water well in Arcadia—by City Council, Arcadia.

**LOS ANGELES CO.**—Roscoe-Moss Co., 4360 Worth St., Los Angeles—\$2,078 for drill water well No. 26, Inglewood—by City Council, Inglewood.

**RIVERSIDE CO.**—L. P. Scherer, P. O. Box 423, Redlands—\$22,992 for const. reservoir, pump plant and appurts. facil. at intersection of Markham St. and Perris Blvd., about 4½ mi. SE of March Field—by U. S. Engineer Office, Los Angeles.

**SAN FRANCISCO CO.**—W. J. Tobin, 5708 Glenbrook Drive, Oakland—\$2,538 for lay 6-in. and 8-in. mains in Hahn St. betw. Visitacion and Blythdale Aves., San Francisco—by Public Utilities Commission, San Francisco.

**SAN FRANCISCO CO.**—W. J. Tobin, 5708 Glenbrook Drive, Oakland—\$4,805 for lay 6-in. and 8-in. mains in Army, Ulloa Sts. and 45th and 46th Aves., San Francisco—by Public Utilities Commission, San Francisco.

**SAN JOAQUIN CO.**—Miller-Hays Plumbing Co., 742 E. Weber Ave., Stockton—\$9,176 for const. extens. to and alterations of water syst. at Deep Water Terminal of the Stockton Port Dist., Stockton—by Stockton Port District, Stockton.

**SAN MATEO CO.**—Western Well Drilling Co., Ltd., 522 W. Santa Clara St., San Jose—\$27,188 for drill and test two gravel wall wells at the Golden Gate Natl. Cemetery, San Bruno—by War Dept., Washington, D. C.

### Utah

**WEBER CO.**—Niels Fugal, Pleasant Grove—\$52,517 for installation of water lines at the 37 mm. shell loading plant at Ogden—by Constructing Quartermaster, Hill Field, Ogden.



Model DI with hydraulic-drive loader.



Whether it's hoisting heavy lifts with a loader, shaping shoulders with a grader, or any of the dozens of jobs you have to handle with special equipment, the progress you make and the economy you achieve depend on fast, unfaltering, easy-to-handle power.

In a Case tractor you get a clutch that picks up the load as promptly and as gently as a bird dog, an engine that hangs on like a bull-dog. You get transmission gears that stand the gaff for years, steering gears that make turns in seconds, running gears that form stable foundations for all manner of mounted equipment. You get amazing adaptability to diverse duties, gratifying economies in the total of fuel consumption, operating labor, upkeep expense and investment charge.

Let your Case distributor survey your power and equipment needs. He may show you the way to get ahead with your program and with your budget. Write for latest tractor literature and specifications. **J. I. CASE CO., Oakland and Los Angeles**

- ★ Model VI and Case-Detroit highway mower, with power lift and self-relocking cutterbar.
- ★ The "VI" equipped for sweeping yards, platforms, drives, skating rinks, etc. Brush is readily removable.
- ★ Model RI with cold-weather cab and snow-plow, available in several street and sidewalk styles.
- ★ Model LI heavy-duty 4-speed special with grader, adaptable to varied maintenance and light construction work from fence to fence.



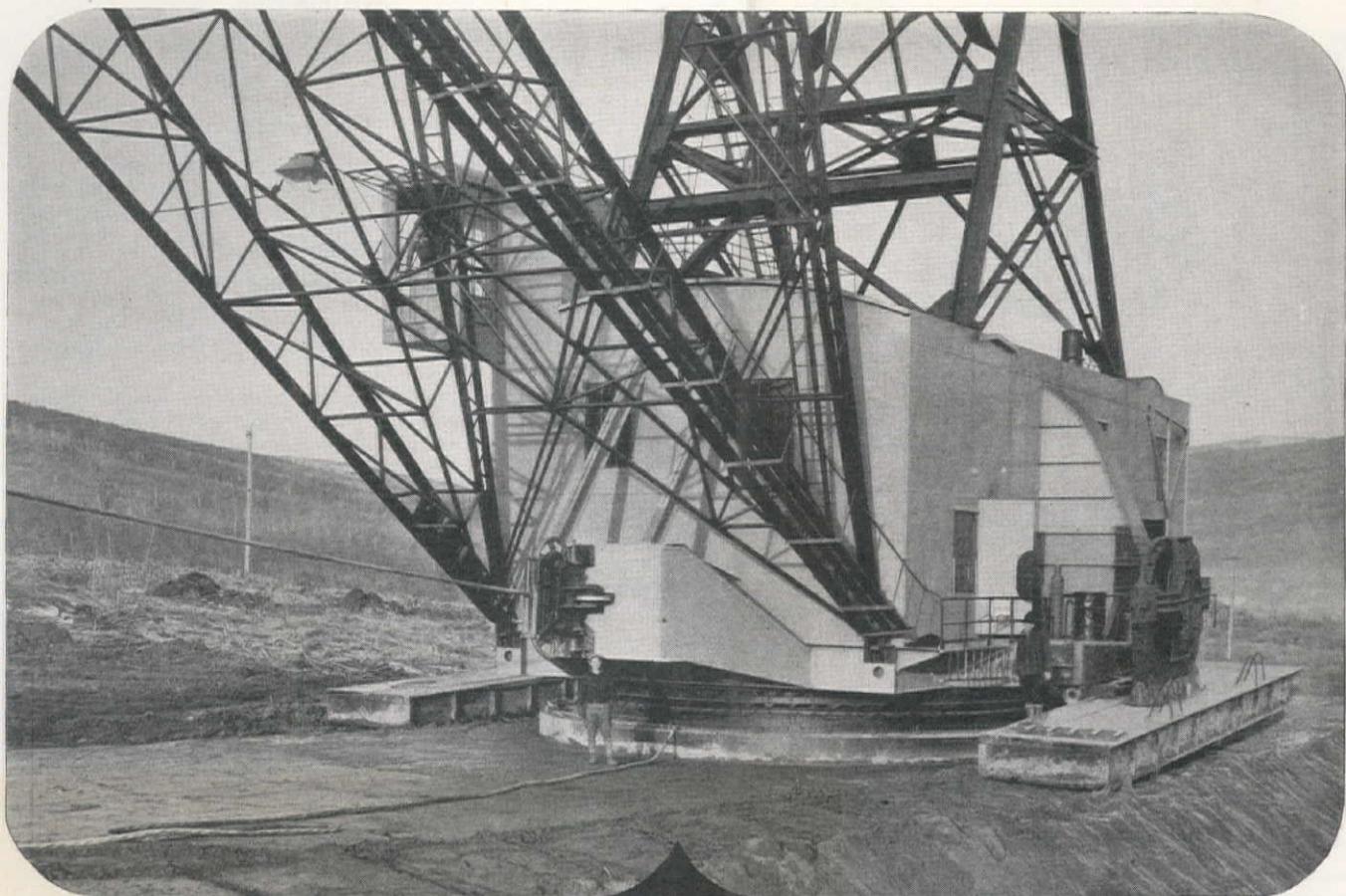
**4 Models**  
for  
Every-Month  
Maintenance



The four basic sizes of Case industrial tractors are furnished with a wide choice of wheel and tire equipment, affording an unbroken range of weights from 2400 to more than 11,000 pounds. Thus they can be closely matched to maximum traction requirements as well as to power and speed range. All are available with mounted equipment designed especially for them by foremost manufacturers.

# CASE





## IT CUSHIONS DOWN

Ride the cab of a Bucyrus-Monighan dragline when it's walking. Notice the smooth, sure action that puts the machine where you want it without waste time. Notice how gently the base comes down at the end of each step. There are no jars, bumps or hops to put destructive stresses in the machine. The million-pound walker shown in this picture, cushions down its weight evenly and gently. The exclusive Bucyrus-Monighan Rolling Cam is the reason. With the smoothness possible only to

a wheel rolling in a circular rail, the Rolling Cam gives a positive, fully controlled action that distributes over a wide area the forces set up in walking. Simple, field proven, the Bucyrus-Monighan walks as surely and dependably as it digs. It's a dragline that really steps around, and keeps stepping around. You can get it with booms from 60 to 250 feet, with buckets from 2 to 20 yards. Large or small, each one of these draglines walks with a "cushion action" that means worry-free moving.

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MONIGHAN**

Sold by

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SOUTH MILWAUKEE, WISCONSIN

*It pays to use...*

**TAMPRITE**  
replaceable  
tamper feet

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**... Drive Another ON  
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CANTON, OHIO

AVAILABLE IN TWO TYPES  
Standard Interlock

## Washington

KING CO.—Valley Construction Co., Seattle—\$27,235 for const. intercepting sewer, etc., Rainier Ave. and 54th Ave., South, Seattle—by Board of Public Works, Seattle.

## Territories

HAWAII—Walker Moody Construction Co., Honolulu—\$59,172 for const. sewage disposal plant at Schofield Barracks, T. H.—by Constructing Quartermaster, Hickam Field.

## PROPOSED PROJECTS

### California

FRESNO CO.—Bonds totaling \$14,000 were voted by City of Kingsburg to finance const. of storm and sanitary sewer extensions.

FRESNO CO.—Plans and spec. have been completed by City Engineer and protest will be heard by City Council, City Hall, Fresno, for the sewerage of portions of Clinton Terrace, Block 1 of Zapp's Park No. 2, and Block 20 of Kearney Blvd. Heights, Fresno. Est. cost is \$4,500.

LOS ANGELES CO.—On April 1 at a municipal election, the City of Los Angeles will vote on a nine cent sewer tax to finance const. of a \$11,500,000 outfall sewer and sewage disposal plant improvements.

LOS ANGELES CO.—The City of Pasadena will vote on a proposal to issue \$440,000 in bonds to finance const. of enlargement to municipal sewage treatment plant, Pasadena.

MONTEREY CO.—A bond election was held Mar. 1, to vote \$170,000 in bonds to finance const. of a complete sewerage system in East Salinas, by the Alisal Sanitary Dist., East Salinas. Estimated cost of the entire project is \$286,000.

SACRAMENTO CO.—Plans and specifications have been completed by the City Engineer and protests will be heard by the City Council, Sacramento, for const. vitr. iron pipe sewer in "Monte Vista Village," Sacramento.

SACRAMENTO CO.—Bonds in the amount of \$200,000 will be voted by Hagginswood Sanitary Dist., North Sacramento, to finance purchase of mats. for const. sewerage syst. and sewage disposal plant in the District's 2,300 acres in North Sacramento, Ben Ali & Del Paso Heights. Total estimated cost is \$600,000.

SAN DIEGO CO.—April 22 has been set as the date for the election to vote on a \$1,983,000 bond issue for a city-wide sewer system.

SOLANO CO.—Protests against formation of the Greater Vallejo Sanitation Dist. will be heard Mar. 3, by Solano Co. Bd. of Supervisors, Fairfield. The Dist. will be in unincorporated territory east of City of Vallejo and proposes to const. trunk line sewers and extens. and pumping and clarifying plant at an estimated cost of \$125,000.

## Waterway Improvement...

### CONTRACTS AWARDED

#### California

ALAMEDA CO.—Ben C. Gerwick, Inc., Santa Marina Bldg., San Francisco, and Healy Tibbitts Construction Co., 1100 Evans Ave., San Francisco, for const. four new shipways, Oakland—by Moore Dry Dock Co., Oakland.

SAN DIEGO CO.—Pacific Bridge Co., 333 Kearny St., San Francisco—\$2,800,000 (cost plus fixed fee) for const. dry dock at Destroyer Base, San Diego—by Bureau of Yards & Docks, Washington, D. C.

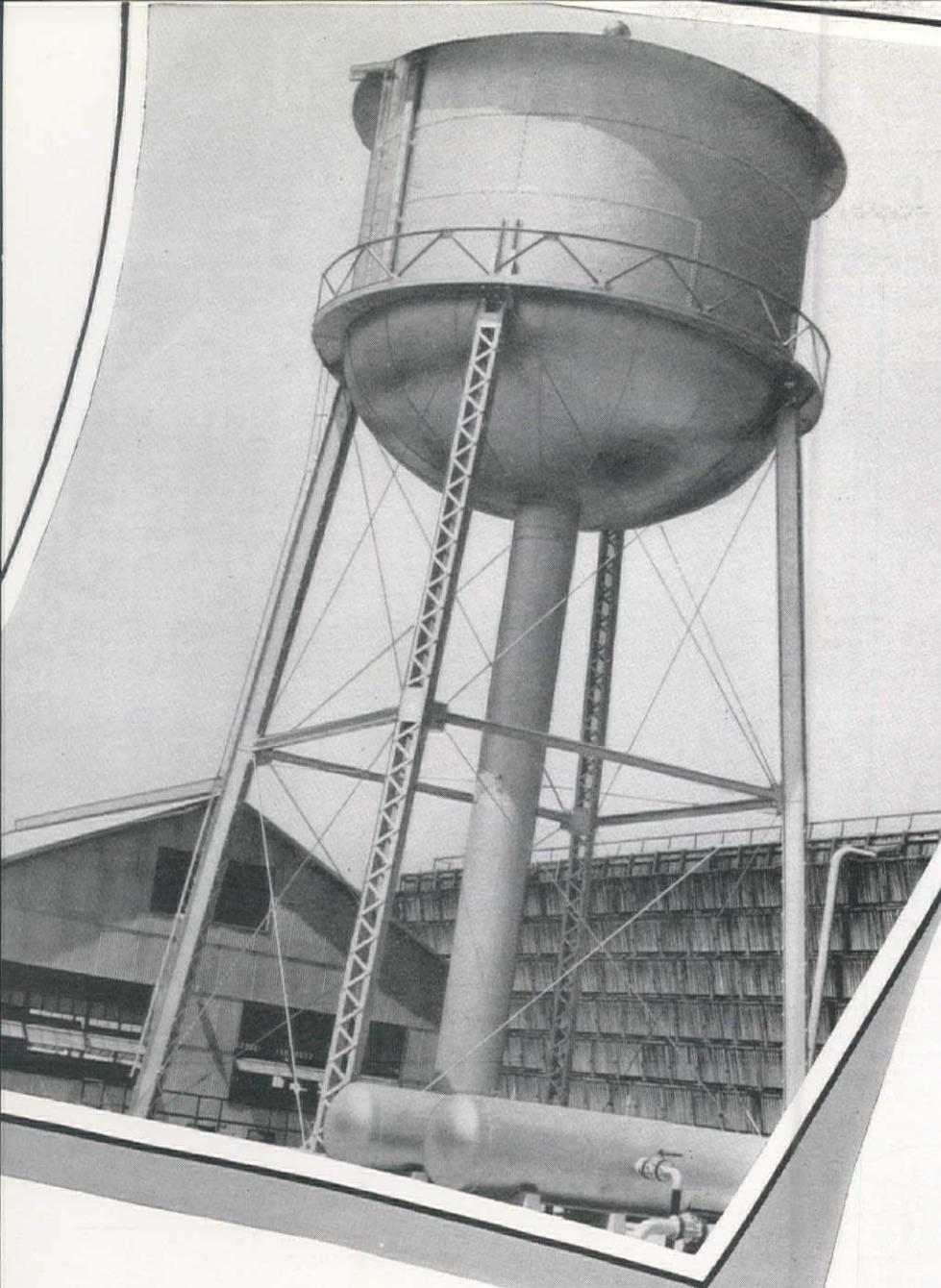
SAN FRANCISCO CO.—Heafey-Moore Co. and Fredrickson & Watson Construction Co., 873 81st Ave., Oakland—\$107,681 for removal and disposal of exist. Ft. Scott torpedo wharf and boathouse, and const. reinf. conc. abut. and wharf at Ft. Scott, San Francisco—by U. S. Engineer Office, San Francisco.

#### Oregon

COOS CO.—Port of Astoria, Astoria—\$31,350 (only bid) (recommended), for 210,000 cu. yd. dredge and dispose of matl. from the channel and turning basin betw. mi. 13.5 and mi. 15 in Coos Bay—by U. S. Engineer Office, Portland.

## Washington

KING CO.—Puget Sound Bridge and Dredging Co., Seattle—



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an  
Extension?*

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\$61,512 for dredge slip at Seattle Port of Embarkation, Seattle—by Engineering Corp., Washington, D. C.

**Territories**

**HAWAII**—Raymond Concrete Pile Co., Turner Construction Co., Hawaiian Dredging Co., J. H. Pomeroy Co. and Morrison-Knudsen Co., Naval Air Station, Alameda, Calif.—\$2,000,000 for deepen and widen channel into Wake Island at N. A. S., Wake Island—by Bureau of Yards & Docks, Washington, D. C.

**PROPOSED PROJECTS**

**California**

**LOS ANGELES CO.**—The County Flood Control Engineer has announced plans are under way for a flood control channel extending from Redondo Blvd. and Imperial Hwy. to the ocean to protect the L. A. Municipal Airport. Estimated cost is \$1,900,000.

**LOS ANGELES CO.**—The President has requested Congress to appropriate \$17,674,000 for extension of the L. A. Harbor Breakwater and dredging of a ship channel from the harbor entrance to the fleet operating base at San Pedro-Long Beach.

**LOS ANGELES CO.**—Bids will be received until March 27, by U. S. Engineer Office, Los Angeles, for L. A. River Improvement, Sec. V, Fourth St. to Aliso St., Los Angeles.

**SAN MATEO CO.**—On March 25, 1941, a bond election will be held at Redwood City, to vote \$150,000 to finance const. of improvements and extensions to city port facilities.

**Dam . . .**

**PROPOSED PROJECTS**

**California**

**SAN DIEGO CO.**—Bids to March 24, by Carlsbad Mutual Water Dist., Carlsbad, for const. an earth embankment 60 ft. high containing 85,000 cu. yd. fill matl., and also const. of a reinf. conc. outlet tower, pipeline, overflow spillway, and appurtenant work.

**Irrigation . . .**

**CONTRACTS AWARDED**

**Oregon**

**DESCHUTES CO.**—Sam Orino, Ft. of S.W. Porter St., Portland—\$100,589 for const. earthwork and structs., North Unit main canal, Deschutes proj. Work is loc. at Bend—by Bureau of Reclamation, Bend.

**Tunnel . . .**

**CONTRACTS AWARDED**

**Colorado**

**LARIMER CO.**—S. S. Magoffin Co., Inc., Santa Fe and West Oxford, Englewood—\$784,711 for excav. of Continental Divide tunnel and const. of conc. invert in tunnel, Colorado-Big Thompson proj., located nr. Estes Park—by Bureau of Reclamation, Denver.

**Montana**

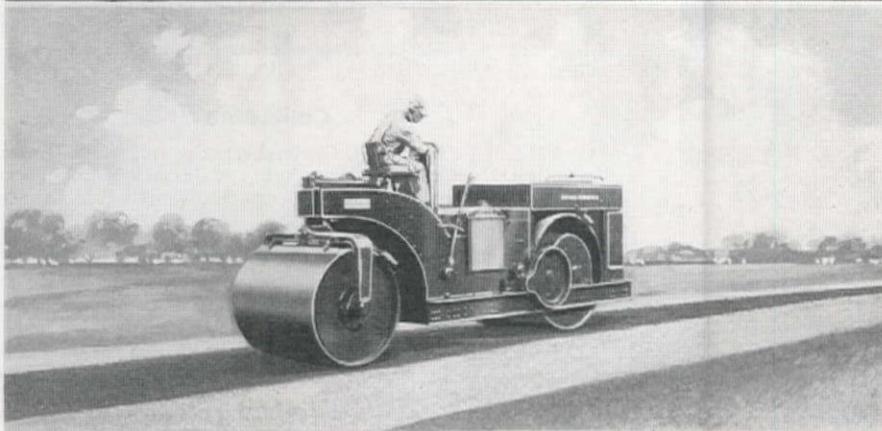
**GLACIER CO.**—Elmer Genger & Son, Fairfield—\$57,990 (official) for tunnel lining, pave and portals, at Glacier Natl. Park, Transmountain Hwy.—by Public Roads Administration, Portland, Ore.

**PROPOSED PROJECTS**

**Oregon**

**JOSEPHINE CO.**—The Oregon State Highway Dept., Portland, has selected the Stagecoach pass route, making use of a 1,000-ft. tunnel, for projected realignment of the Pacific Hwy. betw. Wolf Creek and Oak Station. Estimated cost of the tunnel alone is \$256,000.

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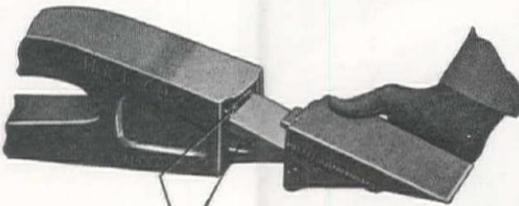
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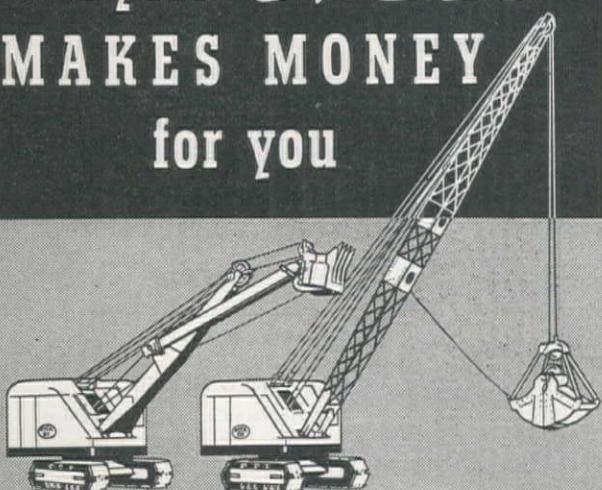


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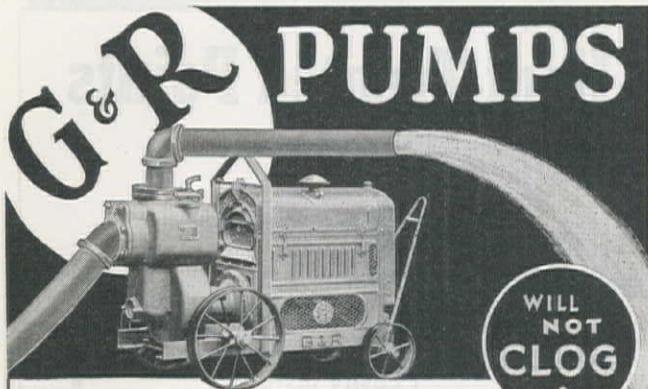
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The most DEPENDABLE Pump for The Least Money.

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## Buildings...

### CONTRACTS AWARDED

#### Arizona

MARICOPA CO.—Del E. Webb Construction Co., 1633 Jefferson St., Phoenix—\$350,000 for const. of a reinf. conc. dept. store bldg. at 30-34 E. Washington St., Phoenix—by F. W. Woolworth Co., San Francisco, Calif.

#### California

ALAMEDA CO.—H. J. Christensen Co. and W. E. Lyons Construction Co., 2009 Pacific Ave., Alameda—\$60,000 for const. 1-story machine shop, Alameda—by General Engineering & Drydock Co., Alameda.

LOS ANGELES CO.—Campbell Construction Co., 5388 Alhambra Ave., Los Angeles—\$105,800 for const. reinf. conc. 1-story structure at California Ave. and Firestone Blvd., South Gate—by City Council, South Gate.

LOS ANGELES CO.—MacDonald & Kahn Co., Ltd., 308 Union Oil Bldg., Los Angeles—\$400,000 for modernization of interior of upper floors of the Union Oil Bldg., the 12-story, Class A store and office struct. at NE corner of 7th and Hope Sts., Los Angeles—by the Namleh Corporation, San Francisco.

MONTEREY CO.—Ford J. Twaits & Morrison-Knudsen Co., Ft. Ord—\$67,370 for const. one std. ordnance shop, Type D, at Ft. Ord, Monterey—by Constructing Quartermaster, Ft. Ord.

MONTEREY CO.—F. C. Stolte Co., Pacific Grove—\$55,950 for const. misc. bldgs. and util. at Presidio of Monterey, Monterey—by Constructing Quartermaster, Ft. Ord, Monterey.

SACRAMENTO CO.—Trewhitt, Shields & Fisher, Pacific Southwest Bldg., Fresno—\$107,900 for const. 2-story reinf. conc. store and office Bldg. at NW corner of 13th and "K" Sts., Sacramento—by Joseph Cronan, San Francisco.

SAN DIEGO CO.—Walter Trepte, 631 9th Ave., San Diego—\$200,000 for const. addition to factory office and to paint shop at the Ryan Aeronautical Co.'s plant at Lindbergh Field, San Diego—by Ryan Aeronautical Co., San Diego.

SAN DIEGO CO.—Joshua H. Marks-Charde Co., 816 W. 5th St., Los Angeles—\$350,000 for const. 3-story struct. steel frame store bldg. at 400-40 "C" St., San Diego—by S. H. Kress & Co., New York City, N. Y.

SAN FRANCISCO CO.—Louis C. Dunn, 424 Monadnock Bldg., San Francisco—\$75,000 for const. 2-story Class C warehouse on NE 17th and De Haro Sts., San Francisco—by John A. Roeblings Sons Co., San Francisco.

#### Colorado

DENVER CO.—F. J. Kirchoff Construction Co., 700 Lawrence St., Denver—\$372,000 (cost plus fixed fee) for const. 125-unit housing proj. for army enlisted personnel at Lowry Field—by Federal Works Agency, Washington, D. C.

JEFFERSON CO.—Broderick & Gordon, 1900 31st Ave., Denver—\$13,206,390 (cost plus fixed fee basis) for const. small arms ammunition plant, on the 3,000 acre Hayden Ranch, 3 mi. W. of Denver—by War Department, Washington, D. C.

#### Oregon

UMATILLA CO.—J. A. Terteling & Sons, 2223 Fairview Ave., Boise, Ida.—\$2,500,000 (approx.), (cost plus fixed fee), for const. 1500-unit housing proj. for civilian employees, Army Ordnance Depot, Hermiston—by Constructing Quartermaster, Washington, D. C.

#### Washington

KING CO.—J. C. Boespflug, Miles City, Mont.—\$2,176,000 for const. 690 dwellings and related bldgs., Yesler Hill proj.—by Seattle Housing Authority, Seattle.

KITSAP CO.—Western Construction Co., and West Coast Construction Co., Lloyd Bldg., Seattle—\$685,758 for const. 240-unit Westpark Housing proj., Bremerton—by Bremerton Housing Authority, Bremerton.

PIERCE CO.—J. W. Bailey Construction Co., 228 9th Ave. N.W., Seattle—\$89,220 for const. of 30 recreation bldgs., at Ft. Lewis—by War Dept., Washington, D. C.

PIERCE CO.—MacDonald Building Co., 1517 So. Tacoma Way, Tacoma—\$875,000 (cost plus fixed fee) for const. 250-unit hous-

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**Stock pile loading**

**Handling bulk materials such as slag, cinders, coal, coke**

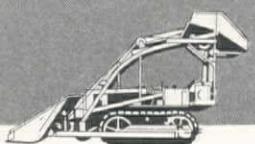
**Salvaging road surface materials**

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**General cleanup work**

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**Loading out old street and road surface materials**



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*Stock pile loading—20-foot haul from pile to truck—at 120 cubic yards per hour.*

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Here's new speed — new capacity — new economy for a wide variety of loading jobs. The Athey Mobi-Loader fits any new or old "Caterpillar" D-4 or R-4 tractor—requires no tractor alterations. Below are some of the advantages of this fast, multiple-purpose loader:

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5. MobiLoader travels quickly from pile to pile—permits quick, selective loading or mixing.
6. Picks up load and puts it down exactly *when and where* you want it—no lost time—no high loading cost.

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MORROW & COMPANY  
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A. C. HAAG & CO.  
Portland, Ore. & Spokane, Wash.

ing proj. and util. at Ft. Lewis—by Federal Works Agency, Washington, D. C.

### Territories

ALASKA—Siems-Spokane Co. and Associates, 2929 16th Ave., S.W., Seattle—\$5,193,840 for const. cantonments includ. facil. at Sitka, Kodiak and Unalaska—by U. S. Navy Dept., Washington, D. C.

HAWAII—Raymond Concrete Pile Co., Turner Construction Co., Hawaiian Dredging Co., J. H. Pomeroy Co. and Morrison-Knudsen., Naval Air Station, Alameda, Calif.—\$3,500,000 for const. 1,000 dwelling units and util. at Pearl Harbor, T. H.—by Bureau of Yards & Docks, Washington, D. C.

HAWAII—Hansen & Strauser, 417-A Olopano St., Honolulu—\$361,500 (recommended) for const. 140-unit Kalakaua Housing Proj., Honolulu—by Hawaiian Housing Authority, Honolulu.

HAWAII—E. E. Black, James W. Glover, and Ralph E. Woolley, Honolulu—\$400,000 for const. 1400 dormitory units and util. at Pearl Harbor, T. H.—by Bureau of Yards & Docks, Washington, D. C.

### PROPOSED PROJECTS

#### California

ALAMEDA CO.—Bids will be received until April 4 by the Federal Works Agency, Washington, D. C., for const. Barracks No. 2, at Govt. Island Marine Service Training Station, Alameda, at an estimated cost of \$103,000.

CONTRA COSTA—Preliminary plans are being prepared for a proposed housing project to be built in Richmond for the Housing Authority of the City of Richmond at an estimated cost of \$1,000,000.

KERN CO.—Bids will be received sometime in March by the Kern County Union High School Dist., Bakersfield, for const. of an auditorium bldg. at Kern County High School, Bakersfield, at an estimated cost of \$520,000.

LOS ANGELES CO.—The Standard Oil Co., San Francisco, has prepared plans and will award contract shortly for a catalytic cracking and reforming plant to be built at the company's El Segundo refinery. Estimated cost is \$4,500,000.

LOS ANGELES CO.—L. A. Bureau of Power & Light, L. A., have started plans for the first unit of the Bureau's new steam plant to be built in Wilmington. It will consist of a large steel frame and conc. superstruct., two large tunnels and other sub-struct. work and will cost about \$2,065,000.

MARIN CO.—The bid call by the Constructing Quartermaster, Ft. Mason, San Francisco, for const. hospital buildings at Ft. Baker has been cancelled.

MARIN CO.—Bids were received until Mar. 14, by Constructing Quartermaster, Ft. Mason, San Francisco, for const. one 63-men barracks and one warehouse at Ft. Baker.

SAN BERNARDINO CO.—Preliminary plans are being prepared by the Upland Housing Authority, Upland, for the proposed housing project to be built in Upland at an estimated cost of \$500,000.

### Miscellaneous . . .

#### CONTRACTS AWARDED

#### Arizona

PIMA CO.—Bailey & McCoy, 1130 Lowell Ave., Tucson—\$65,000 for private airport improvements at Prince Rd. and Casa Grande Hwy., Tucson—by Gilpin Airlines, Tucson.

#### California

ALAMEDA CO.—Raymond Concrete Pile Co., 333 Montgomery St., San Francisco—\$11,858 for pile for foundations for new Terminal Bldg. at Outer Harbor, Oakland—by Oakland Port Commission, Oakland.

CONTRA COSTA CO.—Engineer's Ltd., Standard Oil Bldg., San Francisco, for const. foundations for substation for Dow Chemical Corp., Pittsburg—by Pacific Gas & Electric Co., San Francisco.

KERN CO.—R. A. Wattson, 1026 N. McCadden Place, Los Angeles—\$23,188 for const. an overhead elect. distrib. syst. at Muroc Lake—by U. S. Engineer Office, Los Angeles.

KERN CO.—Williams & Van Valkenburgh, 8609 San Vincente.



## IT'S THE *Cost per Ton* THAT COUNTS!

IS YOUR present method of handling material eating into your profits? Then you'll find an answer to your problem in S-A Conveyors—they come any length and any size, as part of the large line of S-A Material Handling Equipment. S-A is staffed with capable engineers of long experience; men who cooperate with contractors and plant men in designing individual Conveyors, Elevators and allied lines, or complete plants. Write us for detailed recommendations without obligation.

### STEPHENS - ADAMSON MFG. CO.

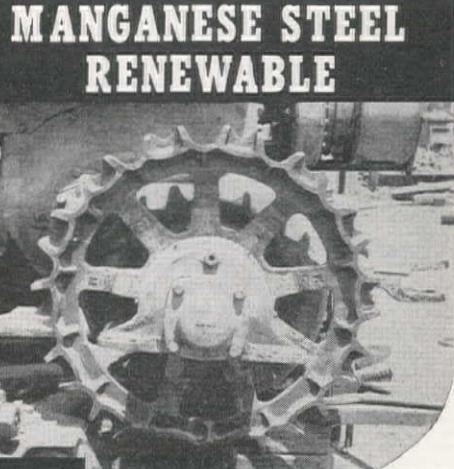
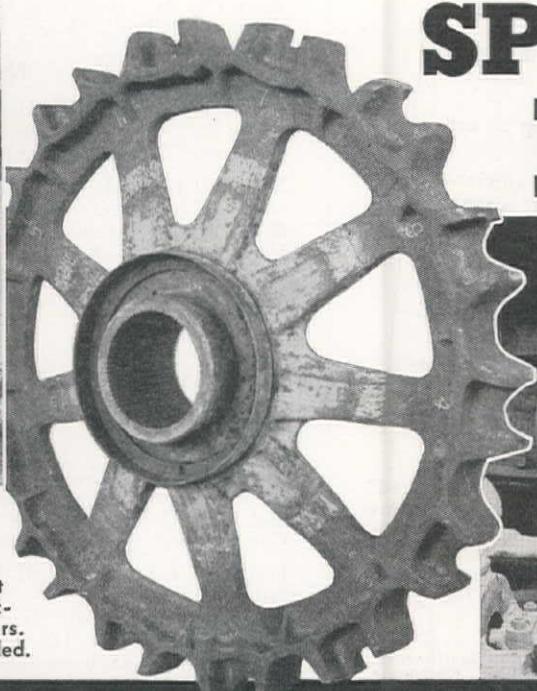
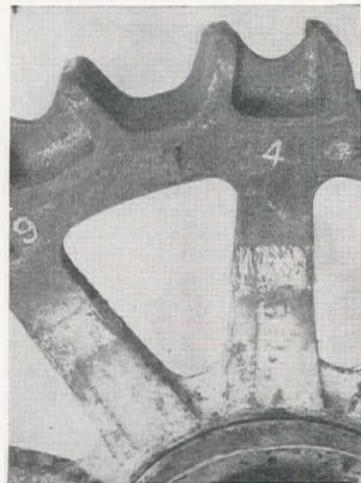
WEST COAST OFFICES: Los Angeles, Calif., 2227 E. 37th Street; San Francisco, Calif., 85 Second Street; Portland, Ore., 668 N. Tillamook Street; Seattle, Wash., 1203 Western Ave.

# STEPHENS-ADAMSON

### STEPHENS-ADAMSON MANUFACTURES:

Bearing Units (SEAL-MASTER) • Belt Conveyors • Boat Loading and Unloading Equipment • Box Car Loaders • Bucket Elevators • Car Pullers • Crushers • Feeders • Gears, Sprockets, Pulleys • Grizzlies • Loading Booms • Portable Conveyors • Pivoted Bucket Carriers • REDLER Conveyor-Elevators • Screens • Skip Hoists • Speed Reducers (SACO) • Storage Controls • Transmission Equipment • Variable Speed Reducers (JFS) • Weighing Laries • Winches and Hoists

Catalog sent upon request



Save those worn drive sprockets with renewable Alloy-Manganese steel rims. Heat-treated for long service with just the right toughness to guard from breakage. For Caterpillar Tractors. Stock shipments. Easily welded.

## SPROCKET RIMS

MANGANESE STEEL  
RENEWABLE

## ALLOY STEEL & METALS CO.

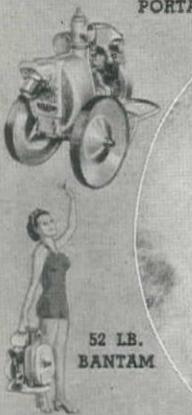
1862 E. 55TH ST., LOS ANGELES, CALIF.

Mfrs. of PACIFIC JAW CRUSHERS  
Alloy-Manganese Steel CRUSHER  
JAWS and MILL LINERS • PACIFIC  
SLUSHING SCRAPERS and SHEAVE  
BLOCKS • PACIFIC ROCK BIT  
GRINDERS • CRAWLER SHOES and  
dependable Machinery Wearing Parts

## Give Longer Life to Tractor Sprockets

# WORLD'S MOST COMPLETE LINE- TO HANDLE WATER AT LOW COST!

2" TO 6"  
PORTABLES

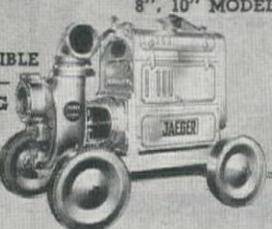


52 LB.  
BANTAM

HEAVY DUTY  
8", 10" MODELS

CONVERTIBLE  
JETTING —  
DEWATERING  
PUMPS

CENTRIFUGALS TO 240,000 G.P.H.  
CAPACITY. HI-HEAD CAISSON  
PUMPS. ROAD PUMPS. DIAPHRAGM  
PUMPS. WELL POINT SYSTEMS



And You Get All These Advantages in a  
Pump EXACTLY SUITED TO YOUR JOB!

- UP TO 5 TIMES FASTER PRIMING with Jaeger "Priming Jet" — No adjustments, no need to "gun" engine.
- POSITIVE RE-CIRCULATION CUT-OFF — controlled by flow, not pressure.
- FULL-RANGE IMPELLER for high efficiency under all conditions (all-steel in 4" to 8" sizes).
- LONG-LIFE SEAL — accessible for inspection.
- SELF-CLEANING SHELL — non-clogging, accessible — a patented Jaeger feature.
- THOUSANDS OF EXTRA HOURS OF SERVICE — result of higher type construction.
- INDIVIDUALLY TESTED — for capacity and pressure before leaving factory.

Contractors use more Jaeger "Factory Tested" Pumps than any other make because Jaeger developed the modern self-primer — made it prime faster, pump unfailingly, deliver thousands of extra hours of service — and builds it in the most complete range of types, capacities and prices to fit your need. Send for Jaeger Catalog and prices. The pump you're looking for is there.

Jaeger Equipment distributed by Edward R. Bacon Co., San Francisco; Smith Booth Usher Co., Los Angeles; C. H. Jones Co., Salt Lake City; H. W. Moore Equipment Co., Denver; Smith Booth Usher Co., Phoenix, Ariz.; R. L. Harrison Co., Inc., Albuquerque, N. M.; Petrie Tractor & Equipment Co., Billings and Great Falls, Mont.; A. H. Cox & Co., Seattle, Wash.; General Machinery Co., Spokane, Wash.; Andrews Equipment Service, Portland, Ore.; Wilson Equipment & Supply Co., Cheyenne, Wyo.

"SURE-PRIME" PUMPS

# JAEGER

MIXERS 3 1/2 TO 565 • HOISTS 6 TO 100 H.P. • TOWERS 30 TO 500 FT.  
CONCRETE AND BITUMINOUS PAVING EQUIPMENT • TRUCK MIXERS

South Gate—\$21,675 for const. sewer, gas and irrigation sys. at Muroc Lake—by U. S. Engineer Office, Los Angeles.

LOS ANGELES CO.—E. C. Nickel, 1401 Rancho Road, Arcadia—\$143,300 for const. 25,384 ft. 7-duct conduit line in Los Angeles—by Purchasing Agent, Dept. of Water & Power, Los Angeles.

LOS ANGELES CO.—Raymond Concrete Pile Co., 311 South Spring St., Los Angeles—\$10,135 for casting in place 123 each conc. piles at 4735 Cahuenga Blvd., Los Angeles—by Dept. of Water & Power, Los Angeles.

LOS ANGELES CO.—Southwest Paving Co., 11403 Tuxford Ave., Roscoe, for grade, pave and improve Lockheed Air Terminal at Burbank—by United Airports Co. of Calif., Ltd., Burbank.

LOS ANGELES CO.—R. E. Ziebarth, P. O. Box 569, Long Beach—\$23,999 for const. ornamental street light syst. on El Embarcadero and adj. Sts. betw. Pico Ave. and Channel Way, Long Beach—by Long Beach Harbor Dept., Long Beach.

LOS ANGELES CO.—C. C. Moore & Co., 555 South Flower, Los Angeles—\$82,982 for const. one steam geno. unit for the Burbank steam electric generating plant, Burbank—by City Manager, Burbank.

LOS ANGELES CO.—Calowell Construction Co., 1835 E. Wardlow, Long Beach—\$250,000 (approx.), for grad. and asph. conc. pave for an airport at the Hughes Aircraft plant under const. in Inglewood—by Hughes Aircraft Co., Burbank.

MONTEREY CO.—Aqua Systems, New York City, N. Y.—\$30,893 for AC gasoline fuel syst. at Salinas Municipal Airport, Salinas—by Constructing Quartermaster, Ft. Ord, Monterey.

SUTTER CO.—T. C. Buck, 349 Wyandotte St., Stockton—\$14,341 for const. camp additions at Yuba City Unit of Calif. Farm Workers' Camps and Homes Proj.—by Farm Security Administration, San Francisco.

TULARE CO.—Stover & Stover, 116 Alexander Ave., Claremont—\$300,000 for const. hangars, barracks, and pave and drain runways at Rankin Army Air Cadet School, Tulare—by War Department, Washington, D. C.

## Nevada

MINERAL CO.—William P. Neil, Hawthorne—\$164,400 for const. 50 low cost housing units in 25 separate bldgs., includ. roads, sidewalks and gradings, at Naval Ammunition Depot, Hawthorne—by Public Works Office, San Francisco.

## New Mexico

MCKINLEY CO.—R. H. Morrison, Gallup—\$27,000 for 1 mi. grade for new track to be laid at McCune, adj. to Ft. Wingate Ordnance Depot—by Santa Fe Railway, Los Angeles, Calif.

MCKINLEY CO.—Sharp & Fellows Contracting Co., 108 West 6th St., Los Angeles, Calif.; L. R. Allison, Roswell; Armstrong & Armstrong, Albuquerque; and W. A. Smith Construction Co., Houston, Texas—\$10,000,000 (cost plus fixed fee) for const. railroad, roads, igloo type magazines, bldgs., etc., at Ft. Wingate—by Constructing Quartermaster, Washington, D. C.

## Oregon

CLACKAMAS CO.—Wayman & Huenergard, Couch Bldg., Portland—\$45,359 for const. 5.6 mi. trans. line—by Northeast Clackamas Electric Cooperative, Sandy.

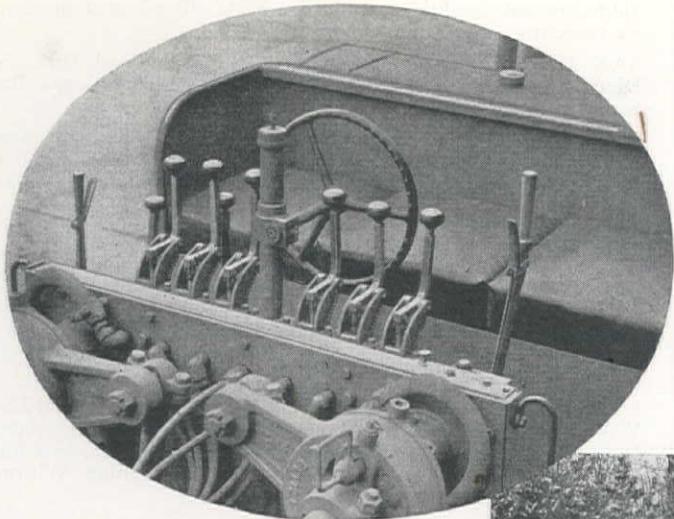
UMATILLA CO.—J. A. Terteling & Sons, 2223 Fairview Ave., Boise, Idaho—\$7,547,661 (negotiated contract) for const. 750 igloo-type conc. storage shelter for ammunition, 100 mi. of hwy., and 35 mi. RR serving the igloos, 4 mi. west of Hermiston—by Constructing Quartermaster, Washington, D. C.

UMATILLA CO.—W. C. Smith, Inc., Builders' Exchange, Duluth, Minn., and Box 116, Denver, Colo.—\$1,165,897 (Sec. A) and Jacobson-Jensen Co., 517 N.E. Stanton St., Portland—\$177,575 (Sec. B) for const. 120 temp. bldgs., includ. grade Sts., const. storm sewers, sanitary sewers, water system, and elect. power lines at Pendleton Air Corps Cantonment, Pendleton—by U. S. Engineer Office, Portland.

## Utah

SALT LAKE CO.—Central California Construction Co., Inc., 115 Burrows St., San Francisco, Calif.—\$139,990 for const. AC gasoline fueling syst. at Salt Lake City Municipal Airport, Salt Lake—by War Dept., Washington, D. C.

WEBER CO.—Halvorson Co., Ogden—\$77,200 for furn. and const. underground steam, condensate and air dist. syst., at 37 mm. Shell Loading Plant, Arsenal, Ogden—by Constructing Quartermaster, Ogden.



Other features are: full revolving circle, double drive, box-type frame, wide range of blade adjustment, wide front axle, leaning front wheels, diesel or gasoline engine.

•  
Galion also builds a complete line of road rollers—3-wheel, tandem, portable, trench, and sheepfoot; full graders; spreaders and grader blades. Send for data.

**The Galion Iron Works & Mfg. Co.**  
GALION, OHIO

Brown-Bevis Equipment Co., Phoenix, Arizona; F. Ronstadt Hardware Co., Tucson, Arizona; Brown-Bevis Equipment Co., Los Angeles, California; The Western Tractor Co., San Francisco, California; H. W. Moore Equipment Co., Denver, Colorado; Feeney Machinery Co., Boise, Idaho;



Here we show how all of the hard work is taken out of Galion motor grader operation. At the touch of a lever (see photo left) all adjustments are made instantly and quickly. Note also the wheel which controls the hydraulic steering mechanism, giving the operator a break on tough maintenance. Note, too, the 3-passenger seat. Investigate this salient feature on Galion 101 - 201 motor graders.

**CLEYELANDS** are Preferred

### Equipment for Gas Trenching

Because:—They exactly meet conditions, whether it's a cross-country transmission line or a short service extension in the city.

... they are fast, flexible and mobile—exceedingly easy to operate and transport.

... they are compact, requiring less working-room.

... their well-balanced design and mechanical excellence assure long life, low cost operation and a superior measure of dependability.

... you take no chance on "Cleveland" for they are sold on a guaranteed satisfaction basis. Write today for details.



Another important reason why "Clevelands" are preferred is illustrated below—Truck speed transportation on special trailers. They load and unload in 10 to 15 minutes.



**THE CLEVELAND TRENCHER COMPANY**  
"Pioneer of the Small Trencher"

20100 ST. CLAIR AVENUE

CLEVELAND, OHIO

Distributed by EDWARD R. BACON CO., 17th at Folsom St., San Francisco, Calif.; SMITH BOOTH USHER CO., 2001 Santa Fe Ave., Los Angeles, Calif.; CRAMER MACHINERY CO., 414 Lewis Building, Portland, Oregon.

WEBER CO.—Ogden Electric Co. and Cache Valley Electric Co., Ogden and Logan respectively—\$331,771 for furn. and install electrical dist. and bldg. syst., etc., at 37 mm. Shell Loading Plant, Arsenal, Ogden—by Constructing Quartermaster, Ogden.

### Washington

COWLITZ CO.—Yakima Electric Co., Yakima—\$49,615 for const. 52 mi. trans. line—by Public Utilities District No. 1 of Cowlitz County, Longview.

PIERCE CO.—NePage Electric Co., 806 6th Ave., South, Seattle—\$27,840 for const. night lighting syst. at McChord Field—by War Dept., Washington, D. C.

### PROPOSED PROJECTS

#### California

FRESNO CO.—War Dept., Washington, D. C., has abandoned Chandler Field, Fresno, as the site for an AC base and will establish the base on a 960-acre tract of land 10 mi. SW of Fresno. The sum allocated for the base is \$1,587,000.

SACRAMENTO CO.—The Pacific Telephone and Telegraph Co., San Francisco, is completing plans and specifications for installing telephone buried cables betw. the western Utah state line and Sacramento, at an estimated cost of \$7,000,000.

SACRAMENTO CO.—Bids were received until March 17, by U. S. Engineer Office, Sacramento, for const. 169 temporary

bldgs., includ. facilities, at Mather Field, 10 mi. east of city of Sacramento.

SAN DIEGO CO.—Bids received by 11th Naval Dist., San Diego, for power plant improvements at Marine Corps Base, San Diego, have been rejected.

SAN FRANCISCO CO.—The Navy Dept., Bureau of Yards and Docks, Washington, D. C., is seeking a suitable site in the San Francisco area for a dirigible base to cost about \$5,000,000.

#### Colorado

DENVER CO.—Plans and specifications are being completed by the American Telephone & Telegraph Co., New York, N. Y., for the installation of telephone buried cables betw. Denver and the western Utah state line at an estimated cost of \$5,000,000.

#### Idaho

LEWIS, NEZ PERCE, CLEARWATER, LATAH & BENEWAH COS.—Clearwater Valley Light & Power Association, Inc., Lewiston, have been allotted \$128,000 by REA, Washington, D. C., for const. 131 mi. trans. line including Whitman County, Washington.

#### Territories

CANAL ZONE—Call for bids will be issued soon by General Purchasing Officer, Panama Canal, Washington, D. C., for furnishing 5,000,000 bbls. Portland Cement to be used on construction of third set of locks at Panama Canal.

## FAST, POSITIVE ACTION

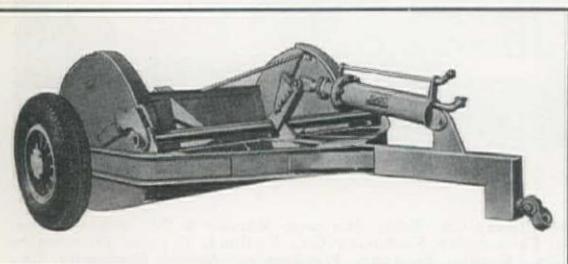
• SIMPLE IN OPERATION — one hydraulic cylinder mounted on the frame handles all three actions — raising or lowering cutting blade, closing load, dumping and spreading.

No special equipment — this unit takes any standard hydraulic pump of 30 gal. capacity or greater. It will load, haul and dump any material a tractor will pull through. Write for illustrated literature and complete details.

DAVENPORT MANUFACTURING COMPANY, Inc.

8660 ATLANTIC BOULEVARD

SOUTH GATE, CALIFORNIA



## BAKERS Are There!

Baker Equipment is there when ground is broken on big defense projects — when there's a huge job to be done in a few precious hours.

You can depend on Baker Hydraulic Bulldozers and Gradebuilders to deliver in emergencies. Easy control, balanced hydraulic system, simple direct lift and great stamina fit them for the toughest jobs.

Baker Hydraulic Scrapers, with their easy loading features, speed up grading jobs. Baker Road Rooters tear up old roads. Baker Road Maintainers and Road Discs keep highways near defense projects in shape and Baker Snow Plows keep them clear in winter. Bakers are always on the job — never A. W. O. L.!

THE BAKER MFG. CO.

542 Stanford Avenue  
Springfield, Illinois

BULLDOZERS  
GRADEBUILDERS  
ROAD ROOTERS  
ROAD DISCS  
MAINTAINERS  
SNOW PLOWS

• Wire or Write for  
Latest Bulletins •

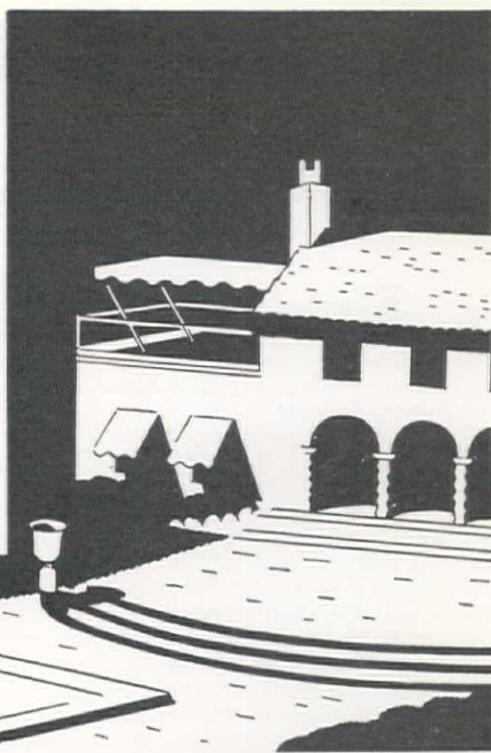
# • BAKER TRACTOR EQUIPMENT •

## WATERPROOF PLASTIC CEMENT

"Monolith" has much higher waterproof and plastic qualities from a special patented process of manufacture...not the result of admixtures. Easier to work under trowel or in forms. No broken corners. No ragged edges. In tensile, compressive and adhesive strength, it tests substantially higher. Withstands abrasive wear...offers real resistance to cracks. Yet it costs you no more!



*Low Magnesia*

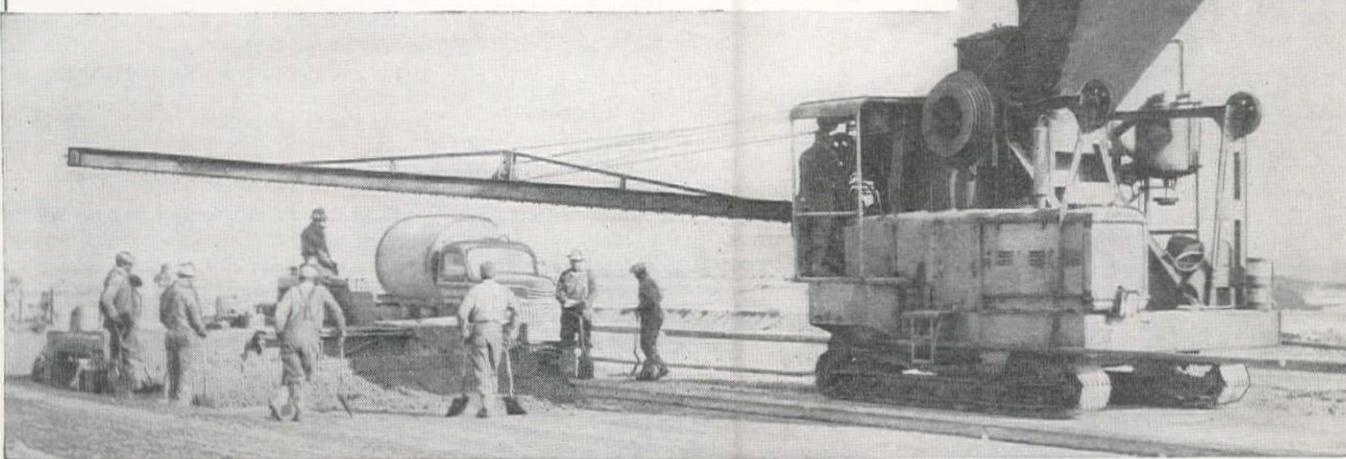
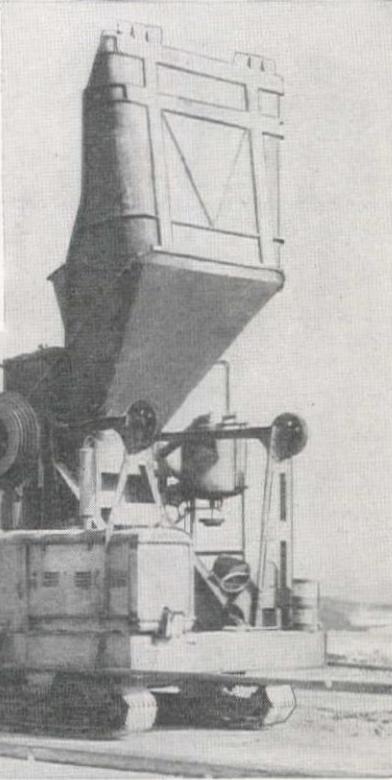


# MONOLITH CEMENT

MONOLITH PORTLAND CEMENT COMPANY • 215 WEST SEVENTH STREET, LOS ANGELES, CALIFORNIA  
MONOLITH PORTLAND MIDWEST COMPANY • 2139 BLAKE STREET, DENVER, COLORADO

*Ransome*

## 34E "SINGLE DRUM" PAVERS



A foremost contractor (owner of the paver shown above) writes "This machine is fast and very efficient"—"We heartily endorse this paver".

This letter is in our files. Get all the facts on this up-to-the-minute paver. Modern from boom-tip to skip...efficient and built to last.

**RANSOME CONCRETE MACHINERY COMPANY**

DUNELLEN, NEW JERSEY



# TRADE WINDS

## News of Men Who Sell to the Construction West

**E**RNEST C. LOW, manager of the San Francisco branch of *John A. Roebling's Sons Co.* from 1930 to 1940, and since that time president and general manager of the *John A. Roebling's Sons Co. of California*, has been transferred from San Francisco, Calif., to Trenton, N. J., where he will assume the duties of general manager of sales for the *John A. Roebling's Sons Co.* Low has been associated with the organization since 1908, being then employed at Los Angeles, Calif., and later transferred to San Francisco. In 1920 he was transferred to Spokane, Wash., as resident salesman, and four years later returned to San Francisco as chief clerk to the president of the California corporation.

**Willard G. Marks**, since 1935 sales manager of the Los Angeles branch, will succeed Low as president of the California organization, having been elected to that office on Feb. 17. Marks has been associated with *John A. Roebling's Sons Co.* since 1907, starting at Trenton, N. J. In 1910 he was transferred to the Denver office, and in 1918 to the Los Angeles office. After a year in the Los Angeles location, he was appointed resident agent at El Paso, Texas, where he spent four years until his return to Los Angeles in 1923.

\* \* \* \*

**H. C. Maginn** has been elected vice president of the *Calaveras Cement Co.*, San Francisco, Calif., and will have charge of the sales and traffic departments. He has been with the company since 1926, and prior to that time was connected with another leading cement company in California.

\* \* \* \*

**Charles A. Dostal**, Pacific Coast district manager for the *Westinghouse Electric Supply Co.*, has announced the purchase of land in San Francisco for the erection of a new plant. The building will probably include more than 100,000 sq. ft. of floor space, consolidating all Westinghouse and subsidiary company activities in San Francisco. Plans will probably be completed, and the building started late in 1941. The manufacturing, assembling and servicing activities carried on at the Emeryville plant will not be affected by the new plans.

\* \* \* \*

**J. W. Williams**, secretary of the *California Redwood Association*, has been transferred from the San Francisco office to the Los Angeles office, with headquarters in the Architects Building. His new position will consist of liaison work with southern California retailers and Redwood sales representatives.

\* \* \* \*

Awards in the seventh annual Merit Club contest of the *Ford Motor Co.* were made to parts and service managers at a dinner held

recently at the Bal Tabarin Cafe in San Francisco, Calif. In place of trips to various points of interest in the country given previously, cash bonuses were distributed on a basis of the effectiveness of the parts and service managers' work, the cleanliness of their departments, their sales volume, and their courtesy. The Ford Motor Co. was represented by **C. R. Mullan**, manager of the Ford Motor Co. Richmond branch; **Jack Schwer**, assistant manager; **Dean Lippi**, sales manager; **L. B. Cooper**, service supervisor; and **C. P. Pratt**, assistant service supervisor. Those who received awards at the San Francisco dinner were: **Kenneth Short** of Fred Kruz Motors, Fresno; **Adolph Lazzareschi** of Doherty Bros., San Francisco; **A. Cahors** of Towne Motor Co., Redwood City; **Clarence Snygg** of Sanderson Motor Co., Petaluma; **Charles Ennis**, Balsiger Motor Co., Klamath Falls; **H. E. York** of Richardson-Lovelock, Inc., Reno, Nev.; **Fred Merriman** of Eymann-Suderman Motor Co., Sanger; **B. A. Spicer** of Tiffany Motor Co., Hollister; **Gene Ensele** of Crater Lake Motors, Medford; **Kenneth Colbern** of the John M. Olney Co., Berkeley; **Gerald De Merse** of the Bill Wood Co., Oakland; **Harry Day** of McDermond Sales and Service, Walnut Creek; **E. W. Torello** of S & C Motors, San Francisco; and **Joe Brush** of Mendocino Motor Sales, Ukiah.

\* \* \* \*

**Stewart J. Hieronymus** has been appointed sales engineer for the San Francisco office of the *Lincoln Electric Co.* Prior to his appointment, he was associated with Cutler Hammer, Inc., and has had broad experience in the industrial field, which will assist him in serving users of arc welding equipment.

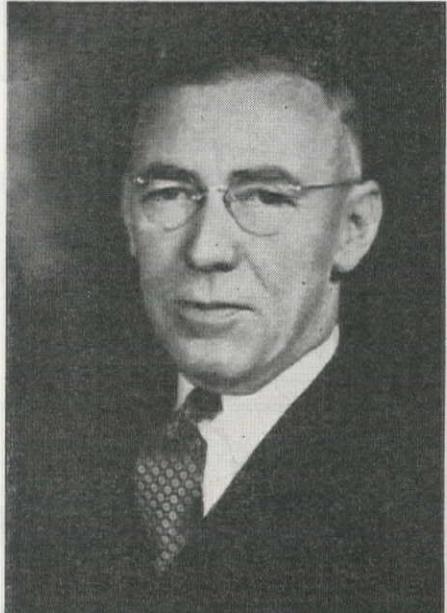
\* \* \* \*

**LeRoi-Rix Machinery Co.**, Los Angeles, Calif., has been appointed to handle the *Buckeye Traction Ditcher Co.* line of rotary wheel and boom type trenching machines, vacuum control Buckeye clipper shovels, cranes, trench hoes, draglines, material spreaders, front-end tractor equipment, rippers, highway widening machines, trailers, G-L-T tractor equipment power control units, and other construction equipment of the manufacturer. The LeRoi-Rix Co. also acts as distributor of R-B fine-graders.

\* \* \* \*

**Dan C. Peet**, superintendent of refineries of the *Seaside Oil Co.*, with headquarters at Santa Barbara, Calif., died suddenly at his home in Ventura on Jan. 6 from a heart attack. For the past 27 years, Mr. Peet has been active in the Pacific Coast Petroleum Industry, the last 17 of which have been with the Seaside Oil Co. He was born in Chicago, Ill., in 1893, and came to California in 1897.

**B. Stockfleth**, formerly with the *Soulé Steel Co.* of San Francisco, has been appointed assistant to the president of the *Enter-*



ERNEST C. LOW, W. G. MARKS (upper).

**Russell E. Lloyd** has joined the sales organization of *Bert B. Fornaciari*, Los Angeles, Calif., in the distribution and service of the Barco portable gasoline powered hammers, Buda Hu-Bron earth drills and Buda jacks.

\* \* \* \*

**F. H. Lindus**, formerly Los Angeles, Calif. branch manager of the service sales division of the *Timken Roller Bearing Co.*, has been transferred to the home office at Canton, Ohio, where he is engaged in general sales promotional work. He is succeeded by **L. J. Halderman**, formerly branch manager of the sales service division of the Chicago office. **Joe Jesseph**, resident salesman for the company in the Portland, Ore. branch has been appointed manager of the Detroit sales service division to succeed Jack Gelomb, who replaces Halderman at Detroit.

\* \* \* \*

prise Engine and Foundry Co. of San Francisco.

\* \* \* \*

Horace L. Niles has been appointed district manager for the Pacific Northwest of the *Link-Belt Speeder Corp.* For the past several years, he has represented another shovel manufacturer in the same territory. He is making his headquarters at the *Howard-Cooper Corp.*, East Third and Hawthorne, Portland, Ore.

\* \* \* \*

K. R. Harberg, Portland, Ore., a brother of V. W. Harberg of the *Rainier Equipment Co.* of Seattle, Wash., has joined the staff of the Rainier Equipment Co. at Seattle.

\* \* \* \*

Victor E. Rabel, vice president and treasurer of the *Star Machinery Co.*, Seattle, Wash., has been named chairman of the Gifts' Committee of the Red Cross roll-call in Seattle.

\* \* \* \*

The *Loggers' and Contractors' Machinery Co.*, Portland, Ore., has organized an equipment rental department which will specialize in the rental of earthmoving equipment, and will carry a large assortment of roadbuilding and general builders' machinery. G. O. Howard will be the manager of the new department.

\* \* \* \*

E. W. Foley of Phoenix, Ariz., has purchased the *McSweeney Tractor Co.* of Colfax, Wash., distributor of Caterpillar tractors and allied lines. In the future, the business will be operated under the name of the *Foley Tractor and Implement Co.*

\* \* \* \*

The hoist and body division of *Gar Wood Industries, Inc.*, has announced the appointment of two new western distributors for hoists and bodies: *Oden Equipment Co.*, 312 N. 4th St., Albuquerque, will represent the manufacturer in New Mexico, and the *Fruehauf Trailer and Equipment Co.*, 1943 - 4th Ave. So., Seattle, Wash., and 906 N.E. 3rd Ave., Portland, Ore., will represent the manufacturer in the Pacific Northwest.

\* \* \* \*

*J. I. Case Co.* recently celebrated the opening of a new factory branch in Salt Lake City, Utah. Douglas E. Adams, a veteran of the Case organization, will be manager of the new branch.

\* \* \* \*

The *Tractor Equipment Co.*, Sidney, Mont., has been appointed distributor of the Hercules "Ironeroller" in the eastern counties of the state by the *Hercules Co.* of Marion, Ohio.

\* \* \* \*

N. H. Boardman, factory representative for the *Novo Engine Co.*, is making his headquarters with the *Industrial Equipment Co.*, at the Outer Harbor, Oakland, Calif.

*Western Traction Co.*, which recently moved its headquarters to a new office and warehouse at 450 Bay Shore Blvd., San Francisco, Calif., has been appointed distributor in northern California for the *Galion Iron Works and Manufacturing Co.* line of rollers, motor graders, tampers and spreaders. Homer Knox, recently of the *Knox-Hale Machinery Co.*, San Francisco, is managing owner of the Western Traction Co., which also distributes the *Marmon-Herrington* line of all wheel drive trucks.

\* \* \* \*

F. B. Ridley, for the past 16 years associated with the *Chicago Pneumatic Tool Co.* in Michigan, Indiana and Ohio, has been trans-

ferred from Cleveland, Ohio, to San Francisco, Calif., as district manager, with headquarters at 855 Bryant Street.

\* \* \* \*

L. A. Hanson, formerly sales promotion man for the *International Harvester Co.* branch at Denver, Colo., has been appointed assistant branch manager at Hutchinson, Kans.

\* \* \* \*

H. R. Dodd, who was formerly sales promotion man at the Salt Lake City, Utah, branch of the *International Harvester Co.*, has been appointed assistant branch manager at Salina, Kans.

The advertisement features a black and white photograph of a worker wearing a hard hat and safety glasses, operating a piece of heavy machinery. In the foreground, a large industrial engine is shown in detail, with a circular badge on the side that reads "CONTINENTAL MOTORS" and "POWERFUL FOR THE NATION". Below the badge, the text "AMERICA'S STANDARD" is visible. The word "On the Job" is written in a stylized, cursive font across the bottom left of the engine. The background is a plain, light color.

Continental Red Seal industrial engines and power units incorporate the latest refinements which have been proved in field service. They are engineered for uninterrupted service and have provision for standard type accessories.

The Red Seal line is complete, starting as low as 69 cubic inch displacement. Each size is built to give dependable, long-lived performance with low operating and maintenance cost. Always remember that dependable Continental Red Seal Power is always on the job.

CHARLES W. CARTER COMPANY

Distributors in

SAN FRANCISCO, LOS ANGELES, SACRAMENTO, OAKLAND and FRESNO

**Continental Motors Corporation**  
MUSKEGON, MICHIGAN

# NEW EQUIPMENT

## Natural Gas Engine

*Manufacturer:* Caterpillar Tractor Co., Peoria, Ill.

*Equipment:* Models of heavy-duty natural gas engines.

*Features claimed:* The engines are built in two cylinder sizes—six and four. Both engines have a bore of  $4\frac{3}{4}$  in., and a stroke of  $5\frac{1}{2}$  in., developing 74 and 48 h.p., respectively, at 1,600 maximum governed r.p.m. Model 4600G is a 6-cylinder unit, and 4400G is 4-cylinder. A small four, Model 3400G, has a bore and stroke of  $3\frac{3}{4}$  in. x 5 in., and develops 34 h.p. at 1,650 r.p.m. The three valve-in-head engines are designed for heavy-duty work with a minimum of maintenance. All models are provided with heat resistant alloy valve seat inserts, and have superfinished crankshafts with "Hi-Electro" hardened journals. The lubricating system provides filtering and full pressure lubrication to all working parts, and there is an additional upper-cylinder lubricator to provide valve lubrication with the dry natural gas fuel. A combination gas-gasoline carburetor is standard equipment. The engine will burn gasoline satisfactorily for short periods, but the fuel system is set for the most efficient combustion of natural gas. The system contains a filter to clean the gas with a regulator to handle gas pressures as high as 150 lb. All three models are available fan to flywheel, or as a complete power unit package with enclosed clutch and radiator. Electric sets, incorporating each of the engines coupled to a self-regulating generator, are available.

## Belt Sander

*Manufacturer:* Skilsaw, Inc., Chicago, Ill.

*Equipment:*  $2\frac{1}{4}$ -in. belt sander.

*Features claimed:* The "Zephyrplane Junior" is a small compact and efficient machine, designed particularly for clean-up work, which features include a die-cast aluminum frame, ball bearing construction, and a universal motor. It has a bakelite handle, trigger type monetary switch, and a patented "touch control" lever, permitting the quick-changing of belts. The belt travels at a speed of 600 surface feet per minute, and is kept uniformly taut by a coil spring which can be centered by a simple adjustment.

## Geared Pump Head

*Manufacturer:* Peerless Pump Co., Los Angeles, Calif.

*Equipment:* Geared heads for deep well turbine pumps.

*Features claimed:* 1941 models have been improved by a change in bearing application. The take-off shaft is designed to carry increased loads by a double row of ball bearing supports, carrying the horizontal and vertical shafts and placed adjacent to the spiral leveled gears. An extra heavy duty thrust bearing supports the lower end of the geared shaft sleeve, while an additional thrust bearing supports the outer end of the horizontal drive shaft. All four bearings are lubricated by oil pressure system circulating cooled oil from the outer bearings and gears. Leakage of oil from the

outer bearing on the take-off shaft is prevented by an oil seal on the end of the bearing housing. Annealed semi-steel castings are used to insure against distortion and misalignment of gears and other moving parts. Gears are heat-treated, hardened and ground nickel alloy and lapped for specific operating tooth capacities. Four standard speed ratios from 1 to 1 to 2 to 1 are provided.

## Concrete Pump

*Manufacturer:* Rotogate Pump Corp., Chicago, Ill.

*Equipment:* Rotogate pump for concrete.

*Features claimed:* The Rotogate is a slow-motion rotary pump intended for placing concrete and other semi-fluid materials. The machine has only two moving parts that contact the materials—a pocketed rotor and a gate, or cleaning device. In operation, material is placed in the hopper, picked up by the pockets of a rotor, carried through the pump casing, and forced out through the discharge throat by the gate, where it is directed by pipe line to its final destination in the forms. Discharge is positive and continuous, whether at one revolution per hour or ten per minute, and capacity is the same for each revolution. The pump is available in 3 sizes—20, 40 and 60 cu. yd. per hr.—and is mounted either on skids or wheels. All pumps are supplied with gasoline engine as standard equipment, but may be had with either electric or diesel. Straight or curved pipe in 6, 8 or 10-in. sizes, with quick-coupling joints are available. Pumps ranging in size from small plaster and grouting units to large central feed distributing pumps with capacities of 100 to 250 cu. yd. per hr. can be built to order.

## Stabilization Mixer

*Manufacturer:* Seaman Motors, Milwaukee, Wis.

*Equipment:* Pulvi-mixer.

*Features claimed:* The design is a new tool for mix-in-place operations, and particularly stabilized highway bases. This unit is intended to replace the method of using blade graders and other equipment. The mixer operates on a rotary principle with 12 times per foot of width which are driven at high speed and will mix bituminous materials, such as oil and gravel, asphalt emulsion, soil and cement, or other materials where thorough mixing is required on the grade. It can also be used in reconstructing oil mats or mixing stockpile windrows. The unit is made in widths from 3 to 12 ft., and can be driven either by tractor with a power take-off, or by its own motor. The standard machine is mounted on two pneumatic tired wheels. Smith Booth Usher Co. of Los Angeles, Calif., is the representative for the Pulvi-Mixer in southern California and Arizona.

## Small Trencher

*Manufacturer:* Cleveland Trencher Co., Cleveland, Ohio.

*Equipment:* Model 75 Service Digger.

*Features claimed:* This machine was intro-

duced to meet the demand for a small compact machine especially adapted to laying small diameter pipe lines and cables. It is capable of digging trenches 8 to 12 in. wide, and up to  $3\frac{1}{2}$  ft. deep. A multi-speed crawler transmission provides a wide selection of digger speeds, and 16 special steel buckets mounted on the wheel handle the dirt, discharging it on to a short conveyor which throws spoil to either side of the machine, and requires no shifting. The unit is powered with a 4-cylinder engine, which develops 27 h.p. at 1,000 r.p.m., and includes a self-starter and oil bath cleaner. Some of the other features included in the machine are unit type construction; hydraulic control of digging wheel; modern alloy steels; enclosed gears running in oil baths; anti-friction bearings; and differential type steering. The machine is only 45 in. wide and weighs 7,000 lb.

## Large Gear Motors

*Manufacturer:* U. S. Electrical Motors, Inc., Los Angeles, Calif.

*Equipment:* Double and triple reduction geared motors.

*Features claimed:* These new additions to the Syncogear line provide up to 30 h.p. at 91 r.p.m. The larger unit incorporates the pyramidal gear pedestal design, providing ample support to withstand extra torsional strains. Motors are normalized, assuring permanent alignment of bearings by a removal of internal stress. Both primary and secondary gears dip in a large oil reservoir in the base of the motor. This design provides an ample oil supply to all bearings and gears without submerging any rotating parts.

## Double Bucket Carryall

*Manufacturer:* R. G. LeTourneau, Inc., Peoria, Ill.

*Equipment:* Model LU 19-cu. yd. scraper.

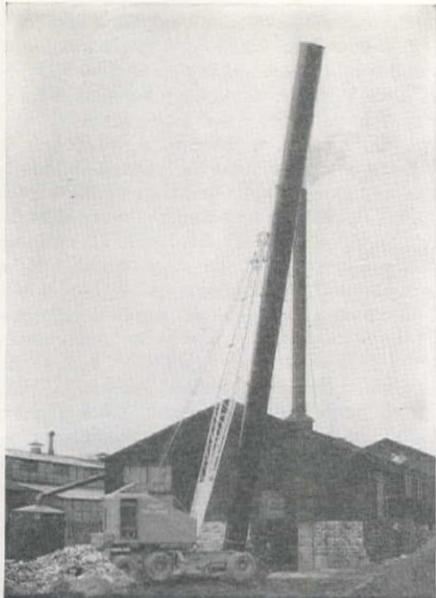
*Features claimed:* The Model LU, with a struck capacity of 15 and a heaped capacity of 19 cu. yd., has been designed to give increased yardage with D8 tractor power. A patented double-bucket feature which is incorporated in this model gives the effect of loading two small Carryalls successively. In spite of the large bowl capacity, the cutting edge is only  $8\frac{1}{2}$  ft. wide, which gives an increased power to each lineal foot of blade. A new apron design increases capacity, reduces overflow and facilitates loading by reducing entrance friction. The bowl is completely emptied and spread is controlled by the positive ejective tailgate. A single dead-ended cable on either side of the bowl pulls the tailgate from the vertical load center. The cable is dead-ended on the apron and a sliding block sheave assembly is mounted on springpipe to keep the sheave free of dirt. A goose-neck yoke gives increased clearance when working over uneven ground, and with a special yoke assembly, the Model LU can be converted from a tractor drawn unit to a Tournapull unit.

## One-Man Truck Crane

*Manufacturer:* Osgood Co., Marion, Ohio.

*Equipment:* Mobil-Crane.

*Features claimed:* This unit is mounted on a pneumatic tired truck frame for operation by one man, and is powered with one motor. It has four speeds forward and backward, and



will lift and carry loads up to 15 tons. Speeds as high as 5 mi. per hr. with load can be obtained. The load can be swung in a full circle. Booms of 45, 50 and 55 ft. are standard equipment, but longer booms can be furnished for special requirements. It can be equipped to load or unload any type of material, with hook, sling, magnet, or clamshell bucket. Screw jacks relieve the tires when making heavy lifts, and hydraulic jacks are available. Outriggers with screw jacks give the machine greater stability when working over the side. Steering is accomplished by hydraulic control, with a turning radius of 50 ft. Both front and rear wheels have air brakes of the internal expanding type. The tandem rear wheel assembly is mounted in a large bearing bolted to the frame, with a knee-action effect for travel over obstacles.

### Quarry Trukbukit

**Manufacturer:** Pioneering Engineering Works, Minneapolis, Minn.

**Equipment:** Trukbukit for handling quarry material.

**Features claimed:** The unit consists of a hoisting unit, buckets and transport body. The hoisting unit is of the mechanical type with a power take-off for the truck, and has two disc-type clutches, with all controls in the cab. The cables are 7/16-in. improved plow steel, and sheaves have a 6 3/4-in. pitch diameter, with Oilit bearings. The standard cable length permits working depth 12 ft. below grade. The hoisting clutch has an automatic release. Buckets are of one-piece tilt type, all welded and water tight. A tapered design permits nesting by removing legs. Two sizes are available —2 cu. yd. and 1 1/2 cu. yd. The equipment is designed to reduce the number of trucks required where hand labor is used for loading rock from the quarry to the crusher.

### Light Weight Centrifugal Pump

**Manufacturer:** Chain Belt Co., Milwaukee, Wis.

**Equipment:** Rex Junior 1 1/2-in. pump.

**Features claimed:** This 54-lb. pump has a capacity of 3,000 g.p.h. on a 1 1/2-in. line. It

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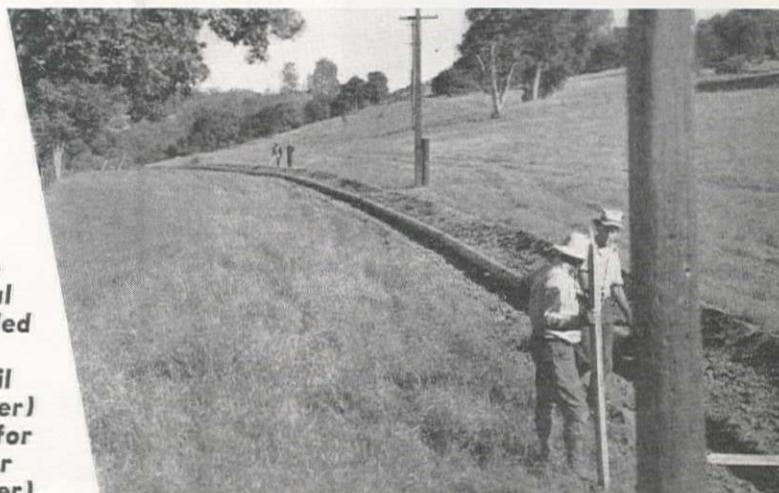
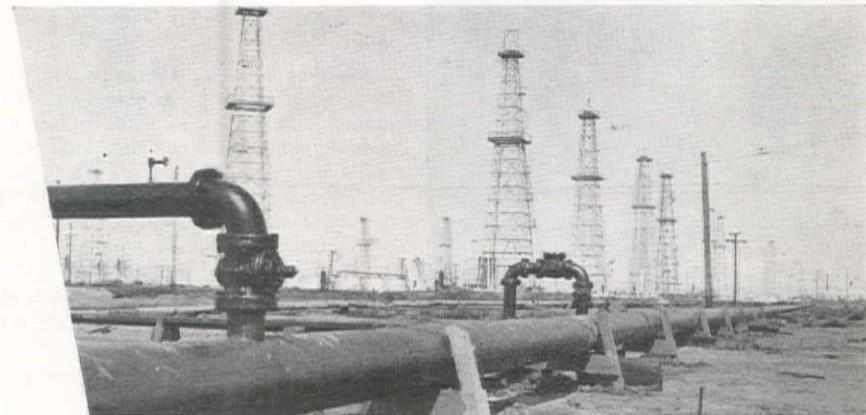
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includes all the engineering features of the standard Rex line of centrifugal pumps, including the patented "peeler." It has a large semi-steel recirculating water chamber equipped with an aluminum cap, and is powered by a single cylinder, air cooled engine of 3/4 to one horsepower. The engine has an automatic governor which speeds up the motor when the pump catches its prime. The pump was designed chiefly for contractors, to be used in dewatering excavations. Overall dimensions are 15½ in. long by 11¾ in. high, and has a weight of 54 lb.

**Features claimed:** The 9-cu. yd. dump body of this unit is mounted on a single axle, dual wheel semi-trailer, and is operated by a single axle, dual wheel tractor equipped with a locking mechanism which is vacuum actuated from the tractor cab. The dump trailers reduce side skidding and tire wear on curves, having a shorter turning radius and the flexibility of a trailer. Brakes are large, and have equal braking on drive and trailer axles. The dump trailer backs up in the same manner as a 3-axle truck. Specifications of the Model No. 2, designed for California highway use, include a 9-cu. yd. body; 15-ton hydraulic hoist; 3 x 4½-in. Fruehauf axle; 16 x 6 x 3½-in. two-line Fruehauf vacuum brakes; U.S.S. Corten high tension pressed steel frame; 10.00 x 20 dual standard tires; and 28-in. rubber mounted fifth wheel. The tractor unit may be detached from the trailer and used for other operations.

### Truck Crane

**Manufacturer:** Northwest Engineering Co., Chicago, Ill.

**Equipment:** 15-ton truck crane.

**Features claimed:** The Northwest Model 20 crane has now been made available as a truck crane, with a capacity of 15 tons, completing the truck crane line of four machines, ranging in capacity from 4½ to 18 tons. The model 20 is equipped with all standard Northwest features, including the "feather-touch" clutch control, shifting the clutches through the power of the engine, yet retaining the feel of the load. Swing clutches are of the Northwest standard uniform pressure type, as are the cushion clutches. It can be equipped with power-up and power-down boom hoist—an independent functioning in raising or lowering the boom, either free or under load. A single lever is used to control the functions of the boom. An engine throttle control is also provided, allowing the engine to be slowed down over a wide range.

### Snow Plow

**Manufacturer:** Caterpillar Tractor Co., Peoria, Ill.

**Equipment:** Snow plows for motor graders.

**Features claimed:** Newly designed snow plows for all models of Caterpillar motor graders have been announced. The new plows feature a special alloy steel in the moldboards to give a greater strength in proportion to weight. Other features include extensive welded reinforcements, and crank-type lifts, which provide a down pressure on the plows. Mast-type snow wings and reversible one-way plows are also available.

**6-Drum P.C.U.**  
Manufacturer: Wooldridge Manufacturing Co., Sunnyvale, Calif.  
Equipment: WH6 6-drum power control unit.

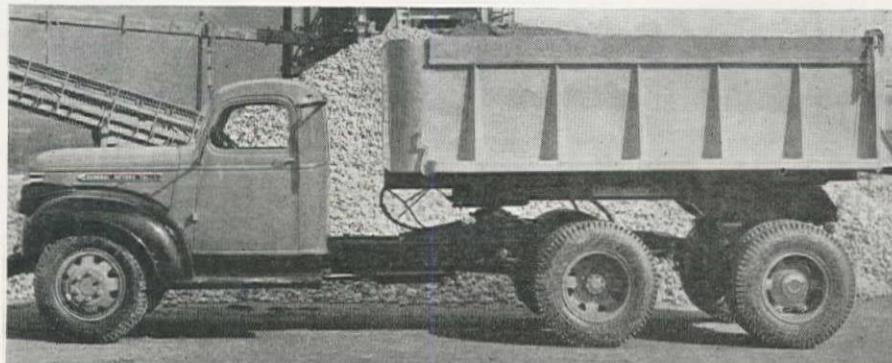
**Features claimed:** Designed for use with tandem operations of large scrapers, the manufacturer has introduced this 3-lever, 6-drum power control unit. The diameter of the drums is 7½ in., with a capacity of 175 ft. of ½-in. cable on the top drum, and 195 ft. on the bottom drum. The bare drum has a line speed of 227 ft. per min., and a pull of 7,270 lb. The unit is particularly intended for use on the Wooldridge 3-line independent hoist, ejector, and apron control when heavy-duty scrapers are used in tandem.

### Dump Trailer

**Manufacturer:** Fruehauf Trailer Co. of California, Los Angeles, Calif.

**Equipment:** Dump body on semi-trailer.

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## LITERATURE . . .

**Harnischfeger Corp.**, Milwaukee, Wis.—Bulletin X-71 describing new P&H 255-A excavator. The machine is a  $\frac{3}{4}$ -yd. with hydraulic controls, and is illustrated with photographs and diagrams in the bulletin.

**J. I. Case Co.**, Racine, Wis.—Form A-11540-L, a folder on snow plows for Case industrial tractors, including data and dimensions for one and two-way sidewalk plows.

**Chicago Pneumatic Tool Co.**, New York, N. Y.—Bulletin No. 726 presenting improvements in several details of construction of Chicago Pneumatic 2-stage compressors which are available in capacities of 350 to 10,000 cu. ft. per minute for pressures of 80 to 125 lb. The compressors are motor-driven, horizontal-duplex of classes O-CE and O-DE.

**Airoil Burner Co., Inc.**, West New York, N. J.—Catalog "A", a complete catalog of winter heating equipment for contractors, and listing equipment for heating concrete, water, air, for furnishing live steam, thawing torches, and winter trench digging.

**Worthington Pump and Machinery Co.**, Harrison, N. J.—Bulletin L-611-B11A on single horizontal 2-stage compressors in both steam and motor driven types; Bulletin L-611-B12B on single horizontal 3-stage compressors in both steam and motor driven types; Bulletin C-1100-B12 on centrifugal refrigeration for air conditioning and industrial applications; Bulletin H-1200-B12A covering the WSD-85 sheeting driver and the WB-85 pavement breaker.

**B. F. Goodrich Co.**, Akron, Ohio—An illustrated booklet covering construction details and varied types of operation on cord conveyor belt which employs the same principle of cord construction as is used in present day automobile tires.

**Black & Decker Mfg. Co.**, Towson, Md.—The 1941 catalog illustrating the complete line of 132 portable electric tools.

**Hewitt Rubber Corp.**, Buffalo, N. Y.—A catalog of rubber products for industry covering hoses of all types, couplings and packings. Tables of iron pipe sizes, of ma-

terials affecting rubber, and properties of saturated steam are included.

**Harnischfeger Corp.**, Milwaukee, Wis.—Bulletin X-78 dealing exclusively with crawler cranes from 5 to 60-ton capacity, with supplementary material on truck cranes, switcher cranes, and other specialized equipment.

**J. D. Adams Co.**, Indianapolis, Ind.—A specification sheet on the No. 201 motor grader equipped with 31 h.p. gasoline engine.

**R. G. LeTourneau, Inc.**, Peoria, Ill.—Catalog A-11 presents the entire LeTourneau line of power control units, including Scrapers, Tournapulls, Angledozers, Bulldozers, Rooters, Cranes, Sheep's Foot Rollers, Tournatrailers, Tournacar Welders, and scraper and dozer blades, with brief specifications for each model of the various types of equipment.

**Hercules Motors Corporation**, Canton, Ohio—Power Unit Catalog and Application Field Book. In addition to complete factual data covering the Hercules 6, 4 and 2-cylinder gasoline and diesel power units, the book contains much information of interest and value to all power unit users. The Hercules power units are covered by dimensional views, power curves, working load tables, and complete specifications. Distribution of the book is restricted to firms and persons actively interested in the use and purchase of power units.

**Cummins Engine Co.**, Columbus, Ind.—Bulletin 5179 covering the 600 Class of Cummins diesel engines designed for use in truck fleets. The book is complete with power curves, illustrations and specifications. Also Bulletin 5182, devoted to heavy-duty industrial engines, and covering all models from the A-400 to the VL-1200, and accessories.

**Chain Belt Co.**, Milwaukee, Wis.—Bulletin 378 is the 1941 catalog of concrete pavers, and includes descriptions and specifications for the Rex 34-E Duomatic and the Rex 27-E Pavemaster.

**Chain Belt Co.**, Milwaukee, Wis.—Bulletin 329 covering high capacity, low rate, trickling filters utilizing the Halvorson-Smith Process of sewage treatment. Flow diagrams and operating data answer all questions about the process.

**Fiske Brothers Refining Co.**, Newark, N. J.—Lubriplate Film No. 12-40 is a bulletin covering the general subject of oils and greases, and the selection of proper lubricants in arresting progressive wear of bearing surfaces, eliminating rust and corrosion and preventing contamination and damage to product. Four general types of lubricant from fluid to heavy greases, and miscellaneous products are covered.

**Caterpillar Tractor Co.**, Peoria, Ill.—Form 6425 is a condensed catalog listing more than 50 products manufactured by the company. Sections of the catalog are devoted to track laying tractors, motor graders, pull graders, elevating graders, engines—including gas, gasoline and diesel—and electric sets.

**R. G. LeTourneau, Inc.**, Peoria, Ill.—Form No. A-13-1-41 illustrates the use of earthmoving equipment on airport, roadway, water power, irrigation, and housing projects.

**Ransome Concrete Machinery Co.**, Dunderlin, N. J.—Bulletin No. 175 is devoted to truck mixers and agitators which are available in from 2 to  $7\frac{1}{2}$ -cu. yd. sizes.

**Armco Drainage Products Association**, Middletown, Ohio—A folder describing the advantages of airport drainage with perforated metal pipe, and illustrating a number of installations.

**The Trundle Engineering Co.**, Cleveland, Ohio—Booklet No. 34, entitled "Job Evaluation." The problem of job analysis, methods and results is discussed, and services of the Trundle organization listed.

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# INDEX TO ADVERTISERS

## \* IN THIS ISSUE \*

Adams Co., J. D.	4th Cover
Allis-Chalmers Mfg. Co.	22-23
Alloy Steel & Metals Co.	79
American Cable Division of the American Chain & Cable Co.	3rd Cover
American Hoist & Derrick Co.	50-51
Athey Truss Wheel Co.	74
Atlas Powder Co.	26
Austin-Western Road Machinery Co.	44
Baker Mfg. Co.	82
Barber-Greene Co.	19-20
Beall Pipe & Tank Corp.	58
Beebe Bros., Inc.	58
Bethlehem Steel Co.	41
Blaw-Knox Co.	74
Bostram-Brady Mfg. Co.	66
Buckeye Traction Ditcher Co.	33
Bucyrus-Erie Co.	14, 71
Buda Co., The	66
Buffalo-Springfield Roller Co.	75
Bullard Co., E. D.	46
Byers Machine Co.	76
California Corrugated Culvert Co.	87
Case Co., J. I.	69
Caterpillar Tractor Co.	16-17
Chain Belt Company	15
Chapman Valve Mfg. Co.	18
Chicago Bridge & Iron Co.	42
Cleveland Rock Drill Co.	35
Cleveland Trencher Co.	81
Concrete Surfacing Machinery Co.	48
Continental Motors Corp.	85
Crocker First National Bank	54
Cummins Engine Company	49
Davenport Mfg. Co., Inc.	82
Electric Steel Foundry Co.	65
El Oro Mining Co.	88
Euclid Road Machinery Co.	4
Fiske Bros. Refining Co.	70
Foote Company	40
Ford Motor Company	32
Galion Manufacturing Co.	81
Garlinghouse Bros.	46
Goodyear Tire & Rubber Co.	21
Gorman-Rupp Company	76
H. & L. Company	75
Hanks, Abbott	89
Harnischfeger Corporation	39
Heil Company, The	78
Huber Manufacturing Co.	28
Hunt, Robert	89
Independent Pneumatic Tool Co.	11
Ingersoll-Rand Co.	37, 38
International Harvester Co.	6-7
Jaeger Machine Co.	80
Johns-Manville Corp.	27
Johnson Gear & Mfg. Co.	66
Kay-Brunner Steel Co.	89
Koehring Company	8
Leschen & Sons Rope Co., A.	103
LeTourneau, Inc., R. G.	12
Lima Locomotive Works, Inc.	10
Lincoln Electric Co.	47
Linde Air Products Co.	36
Link-Belt Speeder Corp.	30
Los Angeles Steel Casting Co.	72
Mall Tool Company	74
Marion Steam Shovel Co.	29
Marmon-Herrington Co., Inc.	61
McDonald Co., B. F.	60
Monolith Portland Cement Co.	83
Northwest Engineering Co.	3
Owen Bucket Co.	90
Pelton Water Wheel Co.	63
Pittsburgh-Des Moines Steel Co.	73
Ransome Concrete Machinery Co.	83
Roebling's Sons Co., John A.	59
Selander, Edw.	88
Shell Oil Co., Inc.	13
Skilsaw, Inc.	64
Smith Co., The T. L.	68
Smith Engineering Works	34
Standard Oil Co. of Calif.	31
Texas Company, The	2nd Cover
Thew Shovel Company	45
Timber Engineering Co.	56
Timken Roller Bearing Co.	24
Trackson Co., The	9
Union Metal Mfg. Co.	52, 72
Union Wire Rope Corp.	68
U. S. Pipe & Foundry Co.	55
U. S. Spring & Bumper Co.	48
U. S. Steel Corp., Subsidiaries	53, 67
Victor Equipment Co.	25
Winslow Engineering Co.	54
Wooldridge Co.	59
Young Machinery Co., A. L.	88



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