WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

PUBLISHED MONTHLY
VOLUME XXIV, No. 6

JUNE 15 • 1949

35 CENTS A COPY
$4.00 PER YEAR

HIGHWAYS OF THE WEST

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"Ditch" HIGH MAINTENANCE COSTS

Keep your engines clean by lubricating with Texaco Ursa Oil X**

GIVE your heavy-duty gasoline and Diesel engines the protection of *Texaco Ursa Oil X★★*, and they'll give you many extra hours of trouble-free, full-powered operation between overhauls . . . extra savings in fuel and maintenance.

Texaco Ursa Oil X★★ is a fully detergent and dispersive oil with unusually high resistance to oxidation. It keeps engines *clean*, rings free and valves active. It protects bearings against corrosion — protects all parts against wear. Use it to increase operating efficiency and economy of *all* engines in service.

To assure additional maintenance savings, lubricate chassis parts of all your construction equipment with long-lasting *Texaco Marfak* . . . use *Texaco Marfak Heavy Duty* in wheel bearings . . . and protect crawler track mechanisms with famous *Texaco Track Roll Lubricant*.

Let a Texaco Lubrication Engineer show you how Texaco Products and the Texaco Simplified Lubrication Plan can help you cut costs on every job. Call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

REG. T.M.

TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

WHAT

CRANE
SHOVEL
DRAGLINE
PULLSHOVEL

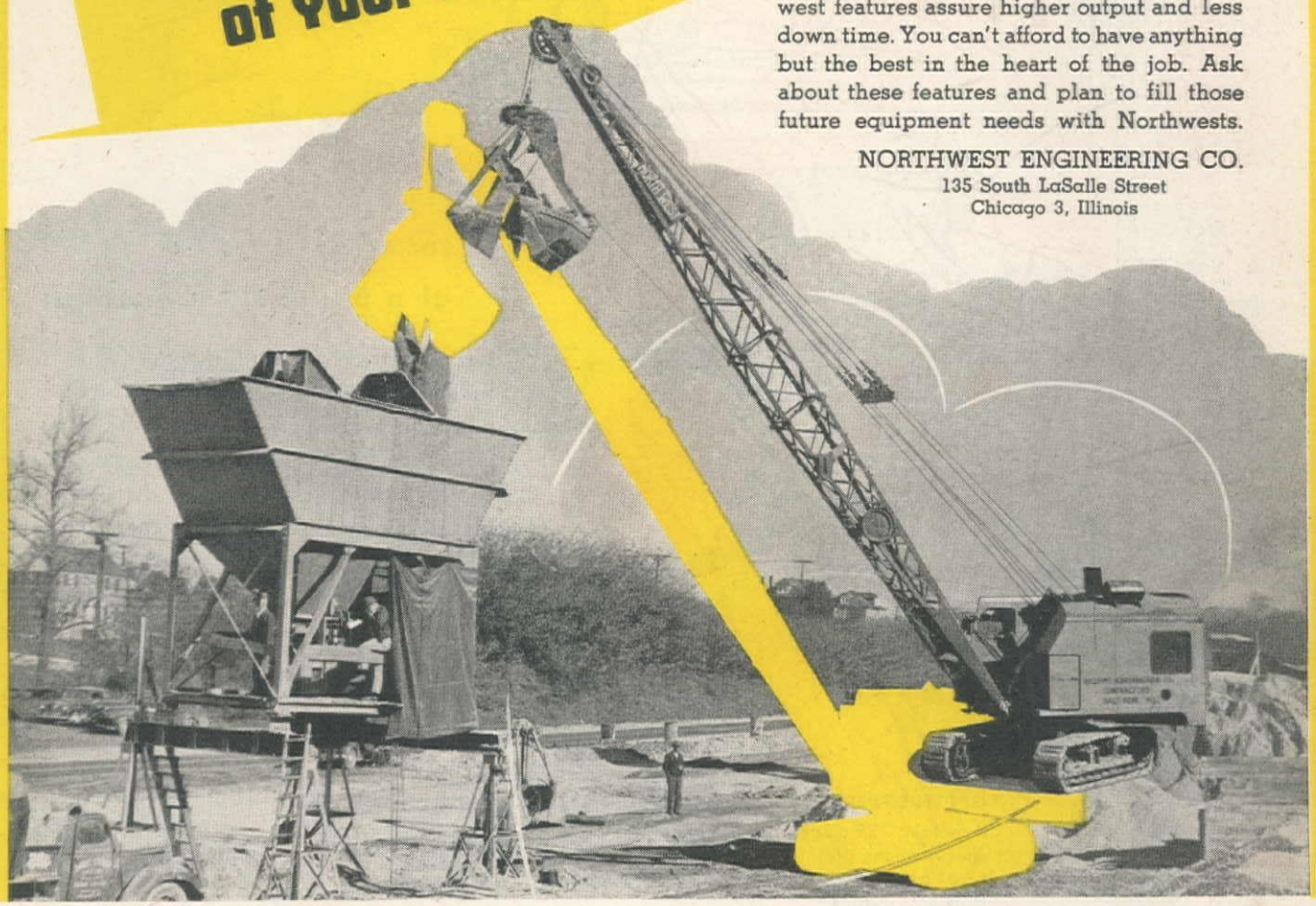
are you going to buy for the Heart of Your Job?

YOU have jobs coming up ahead of you—jobs you haven't even figured on yet and you are going to have *holes* to fill in your equipment setup.

Some of these holes are going to be in the *Key Spots*, spots where the profit begins, spots like this batch plant job where the whole setup stops when the Crane stops.

Northwest Cranes, Shovels, Draglines and Pullshovels bring you features that keep the job running smoother and faster. Such advantages as the "Feather-Touch" Clutch Control, Uniform Pressure Swing Clutches, the Cushion Clutch, Northwest Simplicity of Design, Northwest Steering, Northwest Dual Independent Crowd and other Northwest features assure higher output and less down time. You can't afford to have anything but the best in the heart of the job. Ask about these features and plan to fill those future equipment needs with Northwests.

NORTHWEST ENGINEERING CO.
135 South LaSalle Street
Chicago 3, Illinois



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Planners... who no longer need reminding that aluminum saves weight, are urged to consider the implications of this fact...

in terms of a BRIDGE, for example

Granted there are still improvements to be made in bridge design. But one direction in which major improvement can be expected is in release from costly maintenance. The engineer who leads in that direction will inevitably lead in the direction of aluminum.

This kind of planning should start now, with the kind of help our Development Division is equipped to give. Help based on sixty years of knowledge of alloys, fabricating methods, of thousands of tests that permit us to say "Alcoa Aluminum Lasts" —and mean it. Your first step is to write for the Alcoa Structural Handbook. ALUMINUM COMPANY OF AMERICA, 1811 Gulf Building, Pittsburgh 19, Pennsylvania.

GET THIS *FREE* ENGINEER'S HANDBOOK
It contains 229 pages of design information, specifications and technical data on structural aluminum products; plus available structural shapes.

ALCOA

FIRST IN ALUMINUM
THE METAL THAT LASTS

ALCOA ALUMINUM

INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS
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WESTERN CONSTRUCTION NEWS

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Volume 24 **JUNE 15 • 1949** Number 6

TABLE OF CONTENTS

Covering Construction in the Western Half of the United States

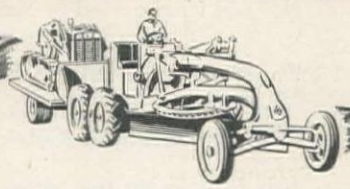
HD-5 TRACTOR

HD-5 TRACTOR with Tracto-Shovel and its interchangeable attachments—1 cu. yd. standard bucket, ¾ cu. yd. narrow bucket, 2 cu. yd. snow loader bucket, 1 cu. yd. rock bucket, bucket teeth, heavy-duty bulldozer blades, V-type snowplow.

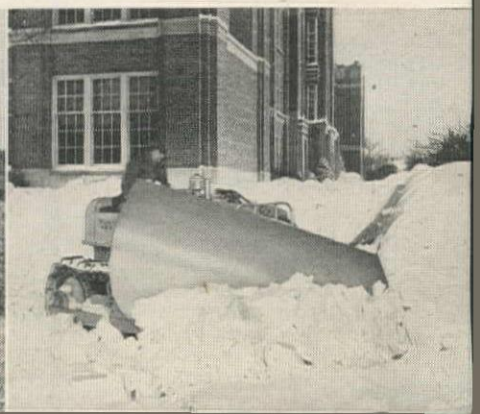
Wrap up

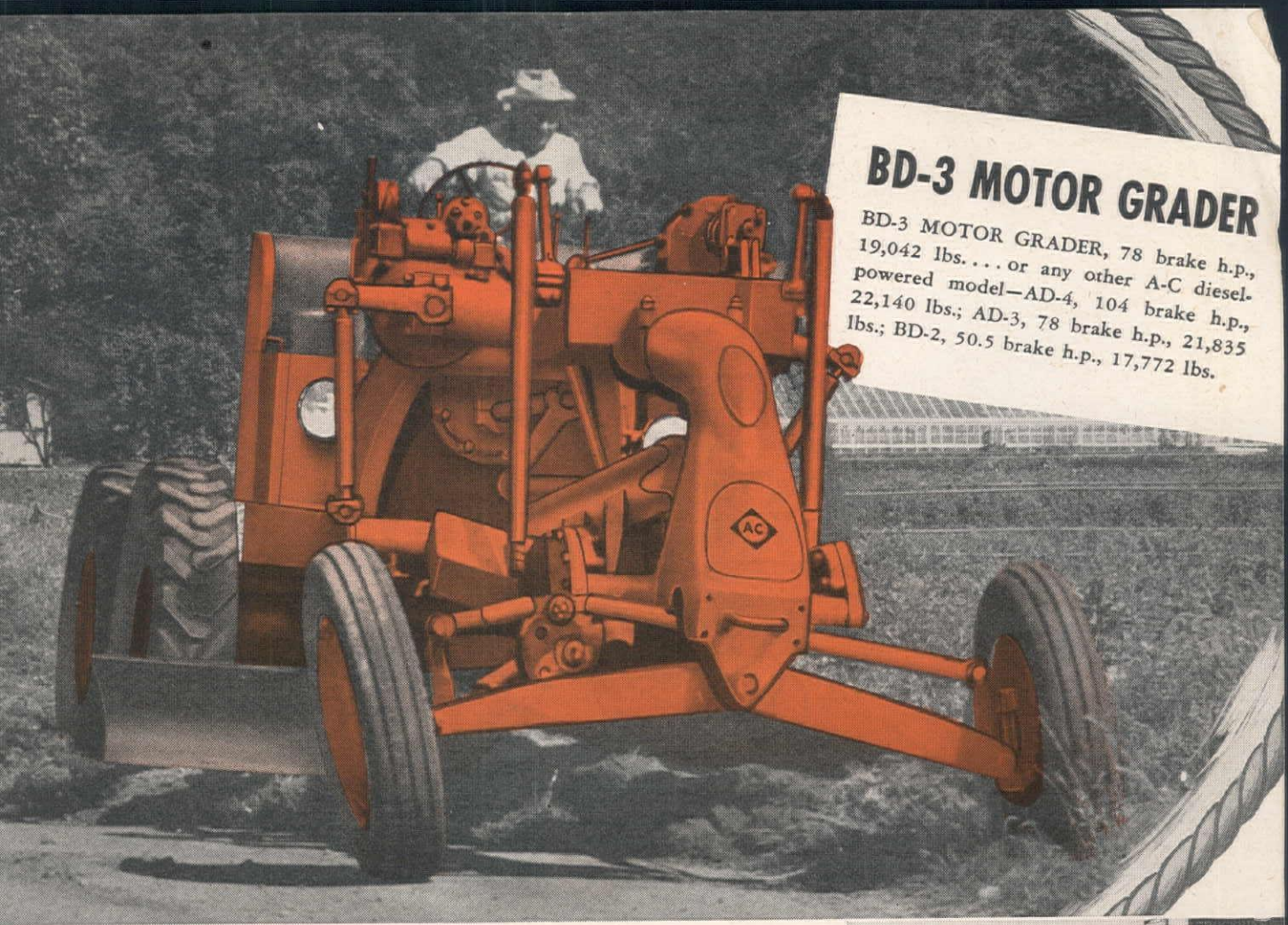
YOUR YEAR 'ROUND PROBLEMS *with this*

EQUIPMENT PACKAGE



Reduce your equipment investment with this equipment package. No need to have a number of specialized machines for various jobs. Any maintenance work . . . and much of your construction . . . material handling . . . snow removal and loading are quickly, efficiently done with this versatile combination—AT BIG SAVINGS. Let your Allis-Chalmers dealer tell you all about this LOW COST, BUDGET STRETCHING PLAN . . . NOW!





BD-3 MOTOR GRADER

BD-3 MOTOR GRADER, 78 brake h.p., 19,042 lbs. . . . or any other A-C diesel-powered model—AD-4, 104 brake h.p., 22,140 lbs.; AD-3, 78 brake h.p., 21,835 lbs.; BD-2, 50.5 brake h.p., 17,772 lbs.

OME OF THE JOBS YOU CAN DO VITH JUST THESE TWO MACHINES

- Clean and shape-up ditches
- Cut and smooth backslopes
- Handle regular maintenance
- Widen and reshape roads
- Make driveways and bridge approaches
- Build berms
- Scarify roads and streets
- Backfill pipe, culverts, bridges
- Take out cuts
- Remove and load sod
- Load surplus dirt from shoulders and ditches
- Remove and load topsoil
- Make fills
- Handle bulldozing
- Make channel changes
- Plow, move and load snow from roads and streets, alleys, parking lots, cemeteries, institutions
- Skid trees
- Load rocks and stumps
- Dig and load dirt
- Load sand, gravel and other material
- Mix black-top
- Do crane work
- Handle all types of hauling or pulling
- Straighten out curves
- Open and rebuild alleys and streets
- Build parking lots
- Cut away embankments obstructing sight

SEE YOUR ALLIS-CHALMERS DEALER

RIZONA
HOENIX—Neil B. McGinnis

ORTHERN CALIFORNIA
AKLAND—Buran Equipment Company
ACRAMENTO—Capitol Tractor & Equipment Co.
ODESTO—J. M. Equipment Company
RESNO—Food Machinery and Chemical Corp.
ASO ROBLES—E. C. Livingston Company
TOCKTON—Moore Equipment Company, Inc.
OUNTAIN VIEW—Redwine Tractor Company
ISALIA—Tulare County Tractor Company

OUTHERN CALIFORNIA
AKERSFIELD—Kern Tractor & Equipment Co.
OS ANGELES—Shaw Sales & Service Company

IDAHO
BOISE—Olson Manufacturing Company
IDAHO FALLS—Southern Idaho Equipment Co.

MONTANA
MISSOULA—Mountain Tractor Company
SIDNEY—Northland Machinery Company
BILLINGS—Seitz Machinery Company, Inc.

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RENO—Dennison Tractor & Supply Company
ELKO—C. W. Paul Hardware and Machinery

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EUGENE—Farm and Industrial Equipment Co.
THE DALLES—Mid-Columbia Supply & Equipment Company
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PORTLAND—Wood Tractor Company

UTAH
SALT LAKE CITY—Cate Equipment Co., Inc.

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SEATTLE—A. H. Cox & Company
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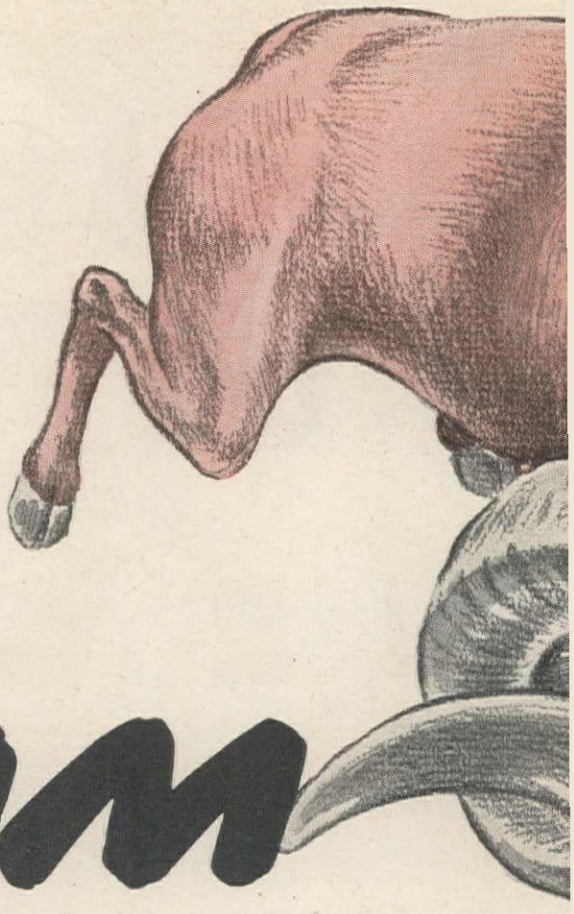
YAKIMA—Wikstrom Motors, Inc.

WYOMING
CASPER—Studer Tractor & Equipment Co.



RAM

Land clearing—or any 'dozer work—is a pushover for International Diesel Crawlers. International diesels have the power and stamina to ram jobs through to completion at low cost and in minimum time.

International Power, geared to the ground by earth-grabbing tracks, puts maximum pull or push into the work for efficient earthmoving.

Get these International diesel advantages: advanced design fuel combustion, simplified fuel injection, positive all-weather starting, sensitive speed governing with torque control that increases engine torque as much as 15% when the load demands it, and the many other operating and construction features which International crawlers provide. They assure *superior performance, matchless operating economy* and *low maintenance;* benefits which spell PROFITS for International owners everywhere.

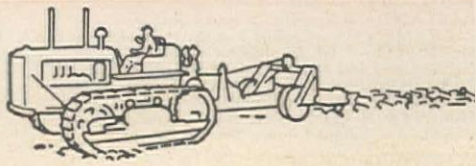
See *your* International Industrial Power Distributor or write for folder describing the International TD-18 Diesel Crawler.

INTERNATIONAL HARVESTER COMPANY · Chicago

Listen to James Melton and "Harvest of Stars" every Sunday, NBC.

Standardize on Power that Pays

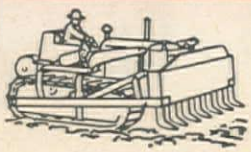
CRAWLER TRACTORS • WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS

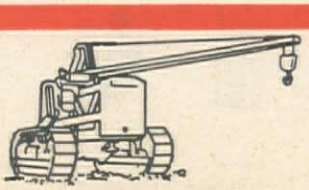


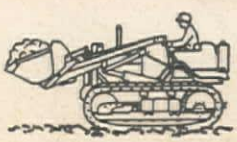
The International TD-18 Diesel Crawler, below, with matched bulldozer, clears stumps from land for a Seattle suburb. Its owner, W. H. Kamp of Des Moines, Washington, has worked this tractor for 4½ years without any trouble or repairs. It puts in seven day weeks of 24-hour days at long stretches. It has built as much as 7,000 feet of streets in twenty days, including opening and clearing land during extremely wet conditions, removing rocks as large as five tons and stumps of 10-ft. diameter. "The tractor is just as true today as a new machine," he says, "not sprung in the least and has never been off the tracks!" Quite a record for more than 10,000 hours of operation!

INTERNATIONAL HARVESTER

INTERNATIONAL
INDUSTRIAL POWER

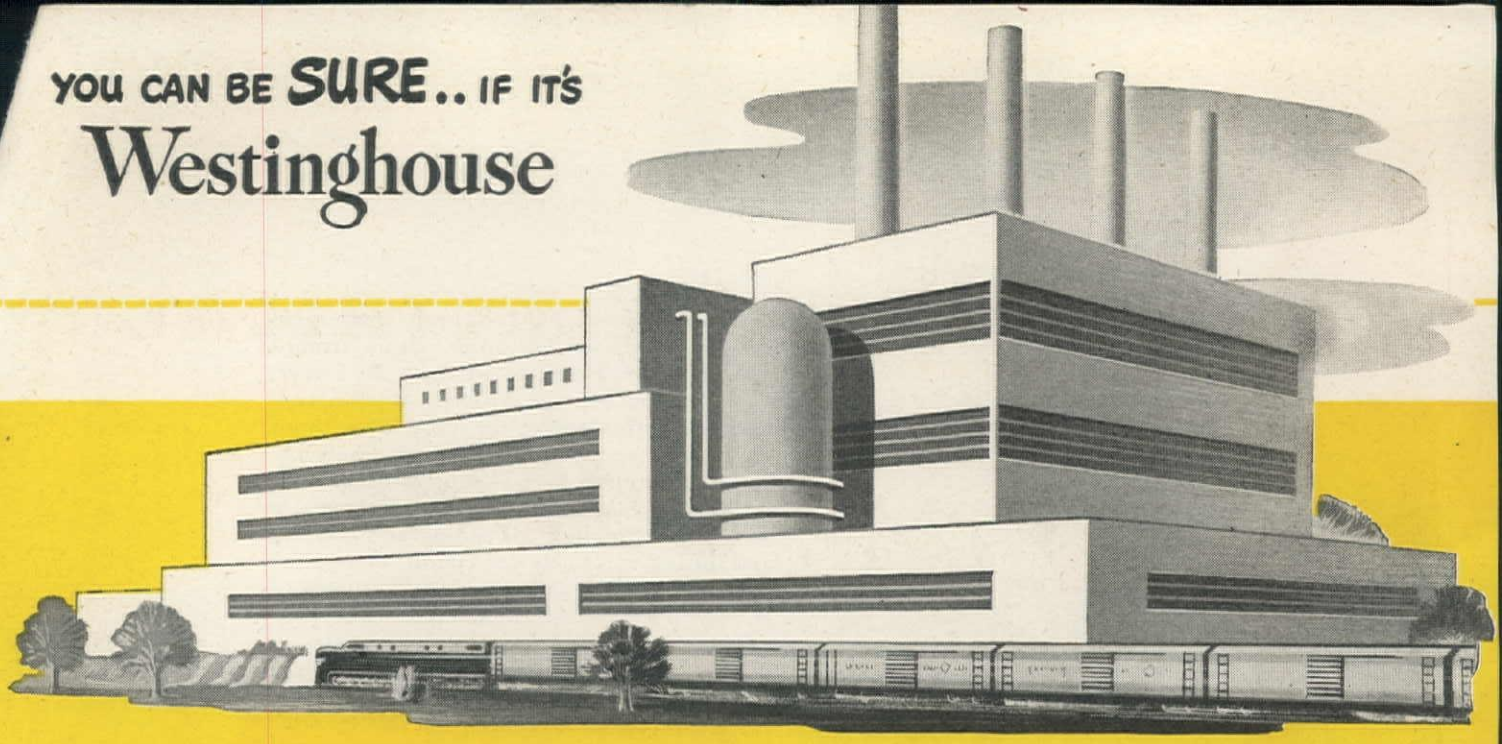






YOU CAN BE **SURE**.. IF IT'S

Westinghouse



Construction and Building Equipment


Welding Equipment


Floodlighting


Freight Elevators


Motors and Control


Water Coolers


Passenger Elevators

Heating and Ventilating Equipment


Air Conditioning Equipment


Forced Fans


Fly Ash Control


Compressors


Fume Exhaust Systems


Speed Heaters


Air Blenders


Roof Vane Ventilators


Unit Heaters


Precipitron*


Unitaires


Industrial Heating


Induced Fans


Ventilating Fans


Stokers

Lighting Equipment


Office Lighting Equipment


Vapor-tight and Dust-tight Luminaires


High Bay Luminaires


Industrial Lighting Equipment

Power Distribution Equipment


Unit Substations


Panelboards


Meters and Instruments


Ignitron Unit Substations


Safety Switches


Control Centers


Dry Type Transformers


Power Centers


Load Centers


Bus Duct


Silvered Bowl Diffusers


Lamps


Street Lighting


Power Transformers


Capacitors


Mechanical Drive Turbines


AB-1 Circuit Breakers

*Reg. U. S. Trademark

Everything ELECTRICAL

FROM ONE SOURCE

For industrial construction projects, Westinghouse offers one source—one responsibility—for everything electrical. No matter what your part in the project may be, you can benefit from this fact.

Architects and engineers: We can help you develop the most efficient ways to distribute, control and utilize electric power. Our engineering specialists have broad experience covering all types of applications.

Contractors and builders: Simplify your buying procedures by ordering all electrical equipment and supplies from Westinghouse. Our organization is geared to give you prompt delivery for integrated installation.

Owners and operators: You get top performance from our electrical equipment because we co-ordinate the design and manufacture of related apparatus. And our nationwide chains of Renewal Parts Warehouses and Manufacturing and Repair Plants provide unmatched maintenance service.

When you have CONSTRUCTION AHEAD . . . whether industrial, commercial or residential . . . call your nearest Westinghouse District Office or Distributor for full information. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-94794

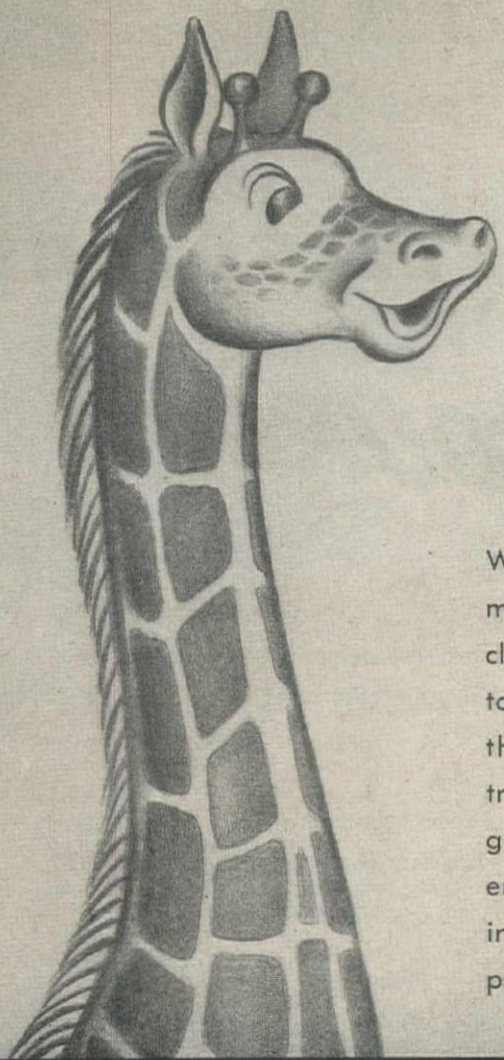
Practical, Easy-to-Use Buying Data

This 362-page book contains detailed information on Westinghouse products for the Construction Industry. It was designed specifically to meet the requirements outlined by Architects and Engineers themselves.

Industry-wide distribution has already been made. If you do not already have your copy, ask your nearest Westinghouse District Office to send you B-2161-D.

Westinghouse

FOR THE TALL JOBS



built for the job

When it comes to tallness, the giraffe has all other living animals far outclassed . . . just as Kenworth trucks are in a class by themselves when it comes to accomplishing those tall jobs — taking those tough assignments in stride, getting the job done against odds. Men who operate Kenworth trucks know they can eliminate waste and assure themselves greater profits by specifying trucks built for the job. Custom engineering means efficiency. Kenworth is interested in learning about your specialized transportation problems . . . in proving to you that *there's more* **WORTH** *in* **KENWORTH.**

KENWORTH

TRUCKS ★ BUSES

FACTORY AND HOME OFFICE: SEATTLE, U. S. A., DISTRIBUTORS IN THE UNITED STATES AND MOST FOREIGN COUNTRIES

Kenworth's policy of building the right truck for the job pays off in the construction field, where flexibility of applications, speed and short turning radius are of importance. Kenworth trucks, such as this Model 585, perform with maximum efficiency on all types of construction projects.

for BIG loads at LOW cost!

Here's the work tire that's unequaled for rolling yardage — on schedule at rock-bottom cost. Notice the large diamond pattern — it distributes the load evenly, carries maximum loads over all kinds of terrain. This Goodyear-designed tread reduces cutting and snagging — gives maximum flotation in soft going, and economical wear on firm-surface roads.

That's why Earth Mover All-Weather tires — like *all* Goodyear work tires — are first choice with users everywhere. They stay first choice year after year, because they keep delivering low-cost, long-life performance. Remember, always BUY and SPECIFY Goodyear—it pays!

A right tire for each job!

EARTH MOVER ALL-WEATHER
for drawn vehicles and general traction

EARTH MOVER SURE-GRIP
for maximum traction on drive wheels

HARD ROCK LUG
for super-stamina in all rock work

All-Weather, Sure-Grip—T.M.'s The Goodyear Tire & Rubber Company

GOODYEAR

MORE YARDS ARE MOVED ON GOODYEAR OFF-THE-ROAD TIRES THAN ON ANY OTHER KIND

No body-hoist maintenance

- DUMPTORS HAVE NO BODY HOISTS
- DUMP IN ONE SECOND
- HAUL EXTRA YARDAGE EVERY SHIFT

KOEHRING DUMPTORS cut hauling costs and deliver extra yardage every shift because they have no slow-working body hoists. You trip the release lever and gravity dumps the load in one second. It's as simple as that! No complicated mechanical hoists to slow up haul cycles . . . no expensive replacement parts, costly hoist maintenance or down-time to eat into your profits. And gravity dump is instantaneous and trouble-free in all temperature extremes . . . never wears out.

No costly spring maintenance is another money-saving advantage you get with Koehring Dumptors. There is just one big, double-coil chassis spring on steering axle . . . none on drive axle. Big, shock-absorbing 16:00 x 24 tires eliminate need for more. You save spring maintenance time and replacement costs.

Check your body hoist and spring maintenance costs for a year . . . see how much you'll save by using Dumptors. What's more, Dumptor's no-turn, shuttle haul, and constant-mesh transmission for 3-speed travel forward and reverse, increase your production . . . and your profits.

DUMPTOR — Trademark Reg. U. S. Pat. Off. CK814

KOEHRING HEAVY DUTY

GET COMPLETE DUMPTOR FACTS FROM YOUR KOEHRING DISTRIBUTOR

Bay Cities Equipment, Inc., *Oakland*
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Harron, Rickard & McCone Co.
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Kimball Equipment Co., *Salt Lake City*
McKelvy Machinery Co., *Denver*
Moore Equipment Co., *Stockton*
Neil B. McGinnis Co., *Phoenix*
Pacific Hoist & Derrick Co., *Seattle*
The Harry Cornelius Co., *Albuquerque*
Western Machinery Co., *Spokane*

KOEHRING HEAVY-DUTY DUMPTORS

PARSONS rugged, deep-digging 310 TRENCHLINER*

● You can dig trenches up to 15' deep . . . 54" wide with this big Parsons 310 Trenchliner. Extra-heavy-duty in every detail, it has 45 digging speeds, from 8" to 186" per minute. Telescopic boom is easily adjusted for depth . . . and shifts across full machine width, to cut within 14" of side obstructions. Power shifts arc-type spoil conveyor. 4 smaller Trenchliners also available. Write for additional information.

*Trademark Reg. U. S. Pat. Off.

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Kimball Equipment Company	Salt Lake City
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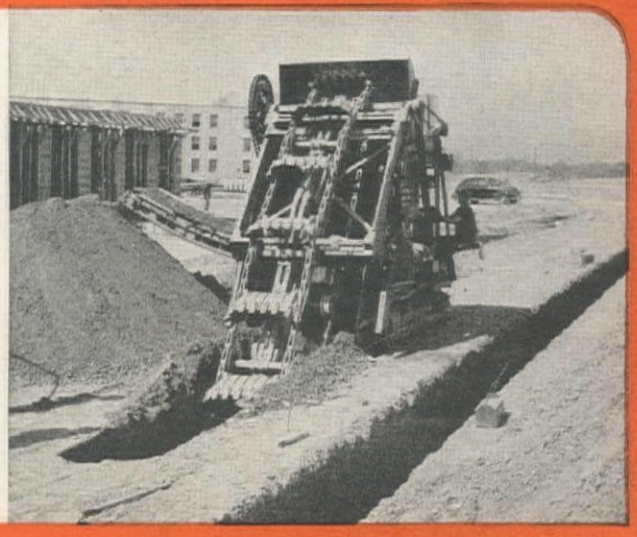

JOHNSON all-purpose ROADBUILDERS BATCHERS

● For more speed in shipping and assembly, greater handling ease and faster batching, check these Johnson Roadbuilders All-Purpose Bin features: Easy-to-charge 11' bin width, extra-wide batcher fill and discharge valve openings, steep 50° bottom slopes for fast flow. Furnished with 2, 3 or 4 bin compartments in 50 to 125 cu. yd. capacities. Steel frame mat assemblies eliminate concrete footings for temporary set-ups. All-Purpose Bin with Hi-Speed Batcher shown.

Cramer Machinery Company	Portland
Edward R. Bacon Company	San Francisco
Harron, Rickard & McCone Co. of So. Calif.	Los Angeles
McKelvy Machinery Company	Denver
Neil B. McGinnis Company	Phoenix
Pacific Hoist & Derrick Company	Seattle
The Harry Cornelius Company	Albuquerque
Western Machinery Company	Spokane
Western Machinery Company	Salt Lake City

KWIK-MIX labor-saving BITUMINOUS MIXERS

● A versatile, mobile bituminous mixer to fit any production problem. Special tower attachment discharges 14 cu. ft. batch above ground level for stockpiling or into trucks. Powered by mixer engine, hoist is mounted within mixer frame with single lever control on operators platform. Tower easily collapsed and positioned for ample road clearance. Other KWIK-MIX units: 4 sizes DANDIE concrete mixers, 6-P plaster-mortar mixer.

Bay Cities Equipment, Inc.	Oakland
Columbia Equipment Company	Portland, Boise
Harron, Rickard & McCone Co. of So. Calif.	Los Angeles
Kimball Equipment Company	Salt Lake City
McKelvy Machinery Company	Denver
Moore Equipment Company	Stockton
Neil B. McGinnis Company	Phoenix
Pacific Hoist & Derrick Company	Seattle
The Harry Cornelius Company	Albuquerque
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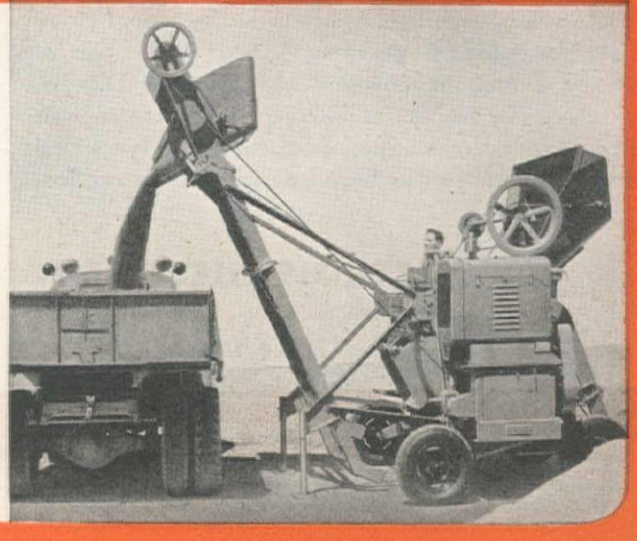
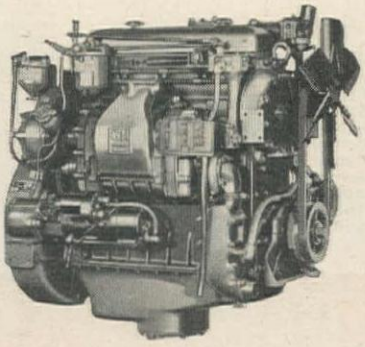


"They don't come any better."

Says Master Mechanic Ralph Stinson of Missouri Valley Construction Co.



MEN who really know—men, like Ralph Stinson, who have seen General Motors Series 71 Diesels at work—offer proof of their performance: "They hold up better and are easier to maintain than any other Diesel engine in the same horsepower range. They don't come any better," Mr. Stinson says. And he cites his records to back up his statement:

In the summer of 1946, Missouri Valley Construction Co. replaced three 3-ton dump trucks with a pair of Koehring Dumptors, powered by GM 4-71 Diesels. Since then, the two units, now quarrying limestone at Warren, Mont., have tripled production with lower fuel costs. Maintenance has been considerably lower too, Mr. Stinson reports.

General Motors Series 71 Diesel engines are designed to produce more power at lower cost. Their sturdy two-cycle operation delivers power at every piston downstroke—smooth, dependable power that responds instantly to varying load demands. They're sensible in size and weight, and compact construction makes them easy to install. Simplified design makes service and maintenance much easier.

All these features combine to make your operation easier and more profitable. It will pay you to investigate the possibilities. Get the complete story from your nearest distributor or write to us.

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES.. Up to 200 H.P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS.. Up to 800 H.P.

GENERAL MOTORS

DIESEL BRAWN WITHOUT THE BULK

GM GENERAL MOTORS DIESEL POWER

Evans Engine & Equipment Co.
SEATTLE 9, WASH.

Cate Equipment Co.
SALT LAKE CITY, UTAH

Fred M. Viles & Company
SPOKANE 8, WASH.

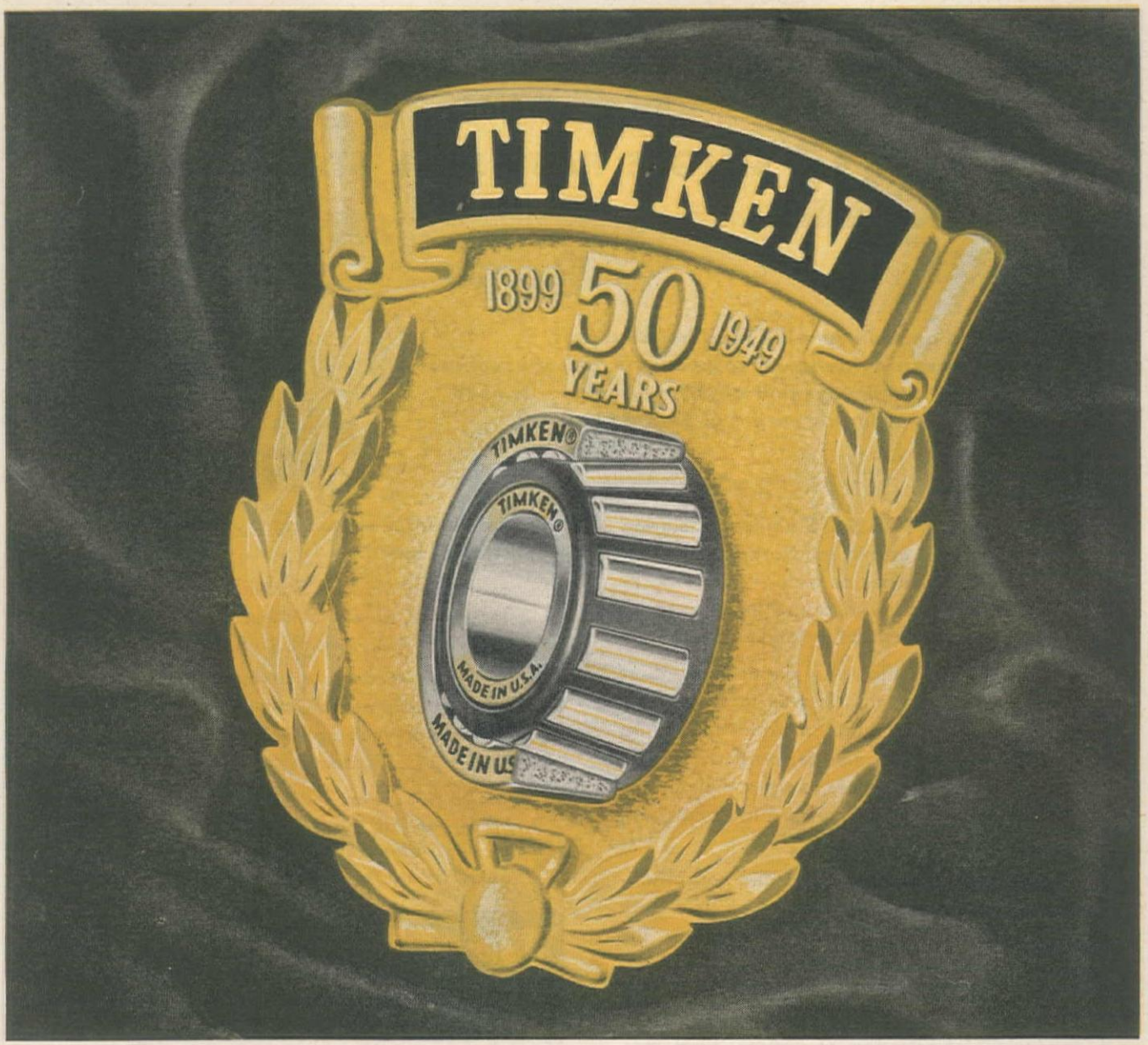
Mountain Tractor Co.
MISSOULA, MONT.

Gunderson Bros. Equipment Corp.
PORTLAND 9, ORE.

Olson Manufacturing Co.
BOISE, IDAHO

Capitol Tractor & Equipment Co.
SACRAMENTO, CALIF.

Anderson-O'Brien Co.
LOS ANGELES 21, CALIF.



50th birthday of the company whose products you know by the trade-mark: TIMKEN

SINCE 1899 THE TIMKEN ROLLER BEARING COMPANY HAS BEEN HELPING AMERICAN INDUSTRY GET THE MOST FOR ITS MONEY

NOBODY likes to buy a "pig in a poke". In America you don't have to. You're protected by trade-marks like "TIMKEN".

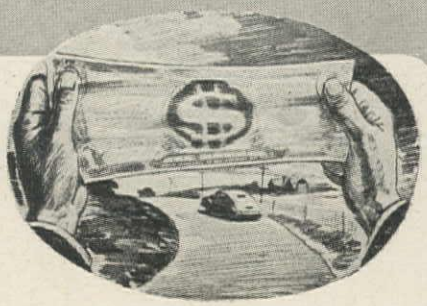
Registered as a trade-mark in the United States Patent Office, "TIMKEN" identifies products made by The Timken Roller Bearing Company: Timken tapered roller bearings, Timken alloy steels and seamless tubing and Timken removable rock bits.

Experience over the years has shown Timken products to be the finest in their respective fields. And many thousands of men and women are working hard to keep them that way. No wonder it has become a habit throughout industry to look for the trade-mark "TIMKEN". The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

More Highway Miles for Your Dollars

...WITH P&H SINGLE PASS SOIL STABILIZERS

Proved on country-wide road building jobs, P&H Soil Stabilizers provide lower cost construction of excellent all-weather roads, highways and airstrips — making its need especially great in this period of pinched budgets.



Everywhere the P&H Soil Stabilizer has gone to work — East and West, North and South, and foreign countries as well — this remarkable machine has won praise for its surprising efficiency, adaptability and performance.

Contractors and highway departments find in it the long-sought answer to lower-cost roads — *one* machine, making maximum use of native materials, performs *all* stabilizing operations to meet exact specifications for roads of *pre-determined* load carrying capacity.

Capable of both soil-cement and soil-bituminous stabilization, the P&H Stabilizer with *one* operator and in *one* pass fulfills the eight basic requirements of soil stabilization: depth control, digging and pulverizing, blending, maintenance of true sub-grade, accurate introduction of liquids, final mixing and uniform spreading . . . and at a rapid rate of speed.

Moreover, the P&H Soil Stabilizer is adaptable for use in all six of these soil classifications: A-1, A-2, A-3, A-4, A-6 and A-7.

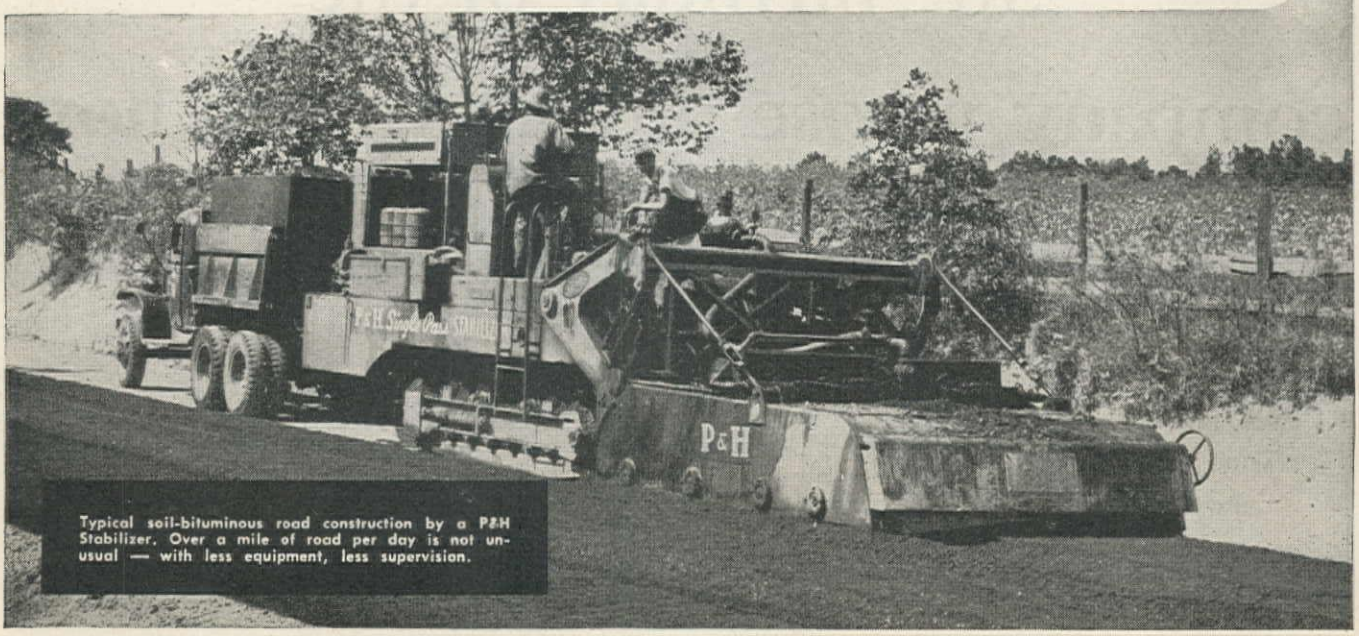
Whether it be secondary highways, streets, base courses, airport runways, parking strips, by all means investigate the P&H Single Pass Soil Stabilizer. Write, today, for the facts.

Sound color films showing P&H Stabilizer on all types of soil-cement and soil-bituminous jobs are available. Write for a showing!

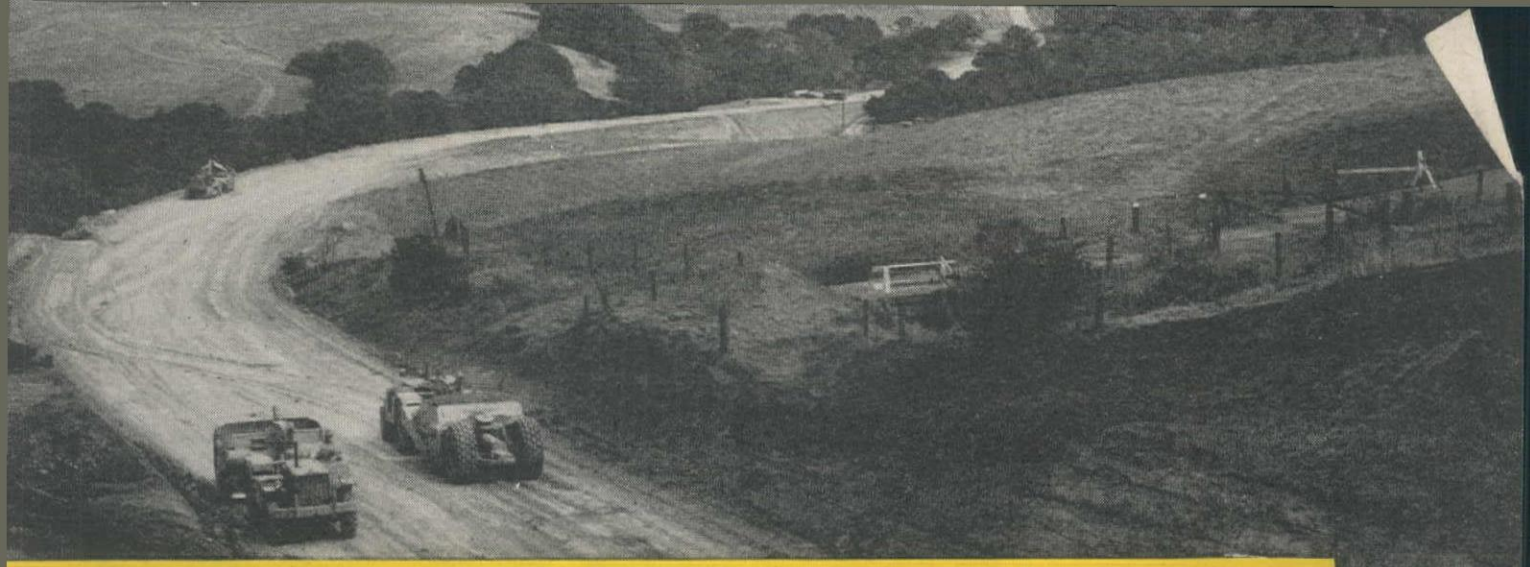
P&H

SINGLE PASS SOIL STABILIZERS
4490 West National Avenue
Milwaukee 14, Wis.

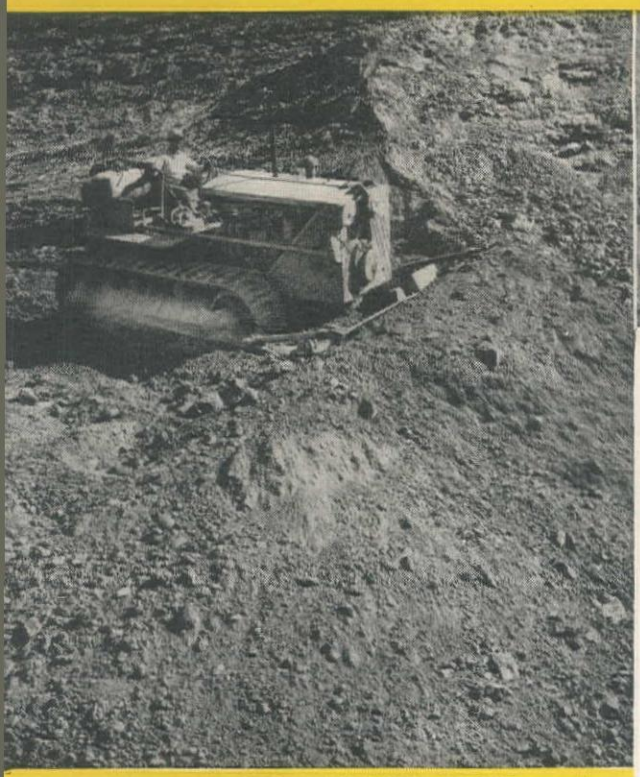
HARNISCHFEGER CORPORATION
EXCAVATORS · ELECTRIC CRANES · ARC WELDERS · P&H · HOISTS · WELDING ELECTRODES · MOTORS



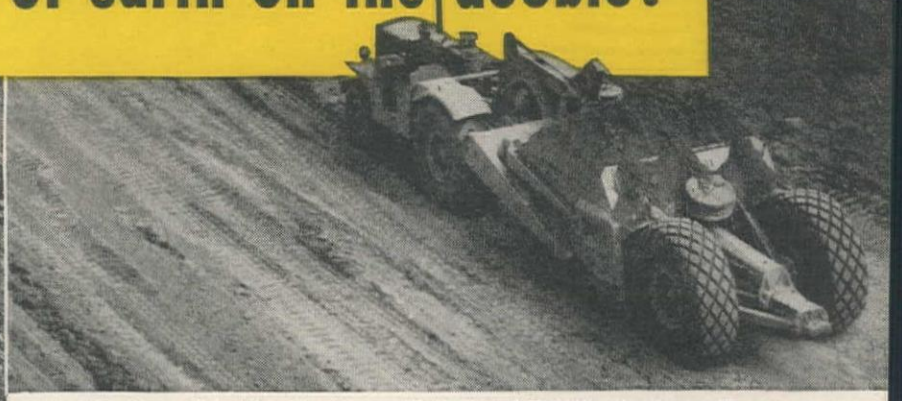
Typical soil-bituminous road construction by a P&H Stabilizer. Over a mile of road per day is not unusual — with less equipment, less supervision.



How to move a lot of earth on the double!



This two-fisted "Caterpillar" Diesel D8 Tractor has front-end cable control for the "Caterpillar" No. 8A Bulldozer, and a 2-drum rear control for scraper use.



High-speed hauling by "Caterpillar" Diesel DW10 wheel-type Tractors means money saved on this road-building job in Crow Canyon, Calif.

When there's a big move on, Louis Biasotti and Son, General Contractors, Stockton, Calif., find it good business to use a fleet of "Caterpillar" zoned equipment to get a lot of dirt moved in a hurry. On this road-building job in Crow Canyon, Mr. Al Biasotti, President, singles out his "Caterpillar" Diesel DW10 wheel-type Tractors for special mention.

"The DW10s are doing better than any other rubberized equipment for moving dirt," he says. "We like their speed and handling. They are fought for by our operators."

These fast-stepping, dependable DW10s really go to town for you. They deliver speeds up to 24.5 mph. . . . give more available time per hour . . . have big tires for flotation on soft fills . . . are just the right size (not too big or too small) for the greatest number of jobs . . . and handle like a toy with air brakes and hydraulic booster steering controls.

In addition to DW10s, the "Caterpillar" line-up on this job includes track-type tractors, motor graders, bulldozers and an engine in the shovel. For the many money-saving advantages of "Caterpillar" zoned equipment, get the whole story from your "Caterpillar" dealer.

CATERPILLAR TRACTOR CO. • San Leandro, Calif.; Peoria, Ill.

CATERPILLAR
REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT

TRAILMOBILE LOW-BED *Praised by* HEAVY EQUIPMENT DEALER

The Treanor Equipment Company of Visalia, California are in the tractor and farm machinery business, operating stores in Porterville, Delano, Tulare, and Visalia. They have found their 10-ton TRAILMOBILE LOW-BED very advantageous in delivering heavy equipment from their warehouse to their 4 stores and also to their retail customers in the San Joaquin Valley.

Speaking of their use of the TRAILMOBILE LOW-BED, Mr. Dave Ringler, Service Manager for Treanor Equipment Company says: "Its loading height, ease of handling, and maneuverability are very advantageous in our operation."

That is the type of a report which we frequently receive from customers who give us full details on their operations and then permit us to recommend the type of TRAILMOBILE which will serve their purposes best. We are always happy to be of assistance in any hauling problem.

WE MAKE A FULL LINE OF TRAILERS

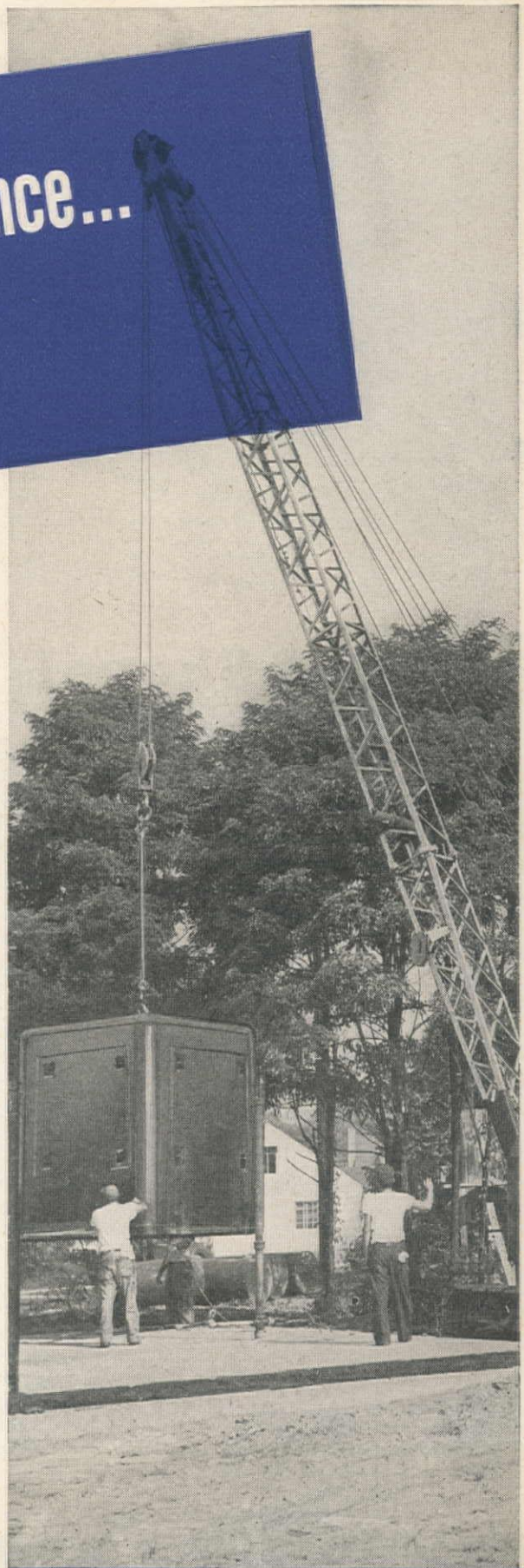
TRAILMOBILE makes a full line of trailers for use in the construction and petroleum industries, including dump trailers, hopper dumps, low beds, flat beds, roller beds, stake trailers, oil and water tanker trailers. If you have the motive power so that you can advantageously put a trailer behind a truck or tractor—you should see the selection TRAILMOBILE offers you.

THE TRAILMOBILE COMPANY
BERKELEY, CALIFORNIA

TRAILMOBILE

LOS ANGELES · VENTURA · SAN LUIS OBISPO · BERKELEY · SACRAMENTO · SANTA ROSA · FRESNO · SAN JOSE · BAKERSFIELD
STOCKTON · EUREKA · SAN DIEGO · SEATTLE · SPOKANE · PORTLAND · MEDFORD · SALT LAKE CITY · PHOENIX · HONOLULU

For EXTRA performance... Roebling Preformed



Costs least—because it lasts longest

"THERE'S THE ROPE for my money," says a contractor speaking of Roebling Preformed "Blue Center" Steel Wire Rope. And *his* first choice is the first choice of more and more construction men everywhere. Preformed "Blue Center" has the dollar-saving characteristic of setting new performance records. It brings fewer shut-downs; cuts your replacement time. Even severe bending, small sheaves and reverse bends find it fatigue-resistant and going strong after ordinary ropes have failed.

EASIER AND FASTER TO HANDLE. Besides these advantages, Roebling Preformed has almost no tendency to set or kink...and that makes it easier to handle and install. It saves still more time because you can cut it without seizing, and apply fittings readily. In operation, Preformed is superior, too . . . practically free from vibration and whipping.

FREE ENGINEERING SERVICE. Have your Roebling Distributor help you select the *right* wire rope for longest service and lowest cost. When you have special wire rope problems, your Distributor will be glad to get the help of a Roebling Engineer. John A. Roebling's Sons Company of California, San Francisco, Los Angeles, Seattle, Portland.

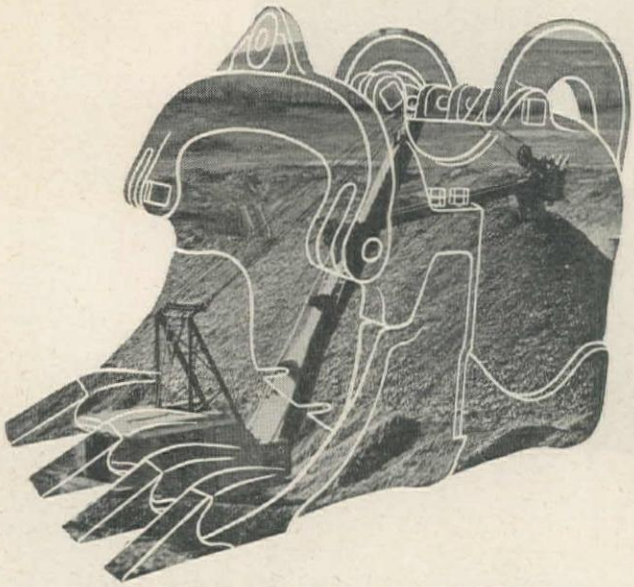
WRITE OR CALL THE ROEBLING FIELD MAN AT YOUR NEAREST ROEBLING OFFICE AND WAREHOUSE

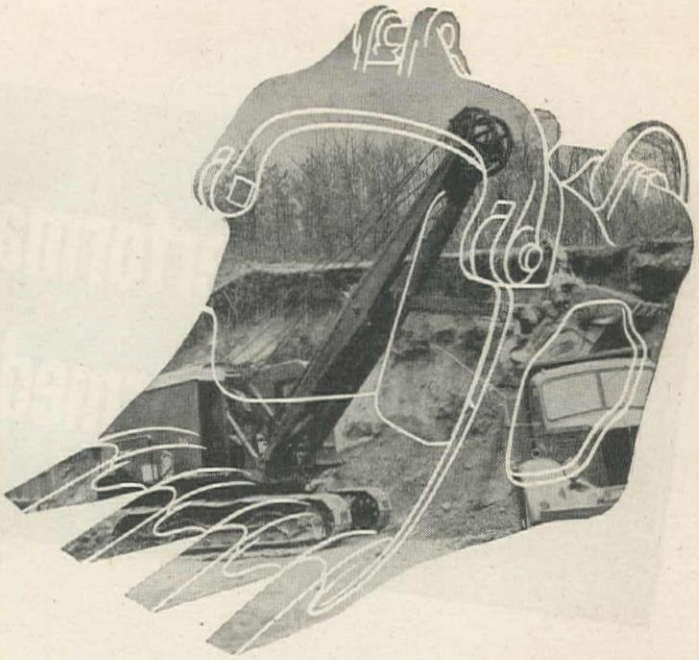
Atlanta, 934 Avon Ave. ★ ***Boston,*** 51 Sleeper St. ★ ***Chicago,*** 5525 W. Roosevelt Rd. ★ ***Cleveland,*** 701 St. Clair Ave., N. E. ★ ***Denver,*** 1635 17th St. ★ ***Houston,*** 6216 Navigation Blvd. ★ ***Los Angeles,*** 216 S. Alameda St. ★ ***New York,*** 19 Rector St. ★ ***Philadelphia,*** 12 S. 12th St. ★ ***Pittsburgh,*** 855 W. North Ave. ★ ***Portland, Ore.,*** 1032 N. W. 14th Ave. ★ ***San Francisco,*** 1740 17th St. ★ ***Seattle,*** 900 First Ave.

ROEBLING

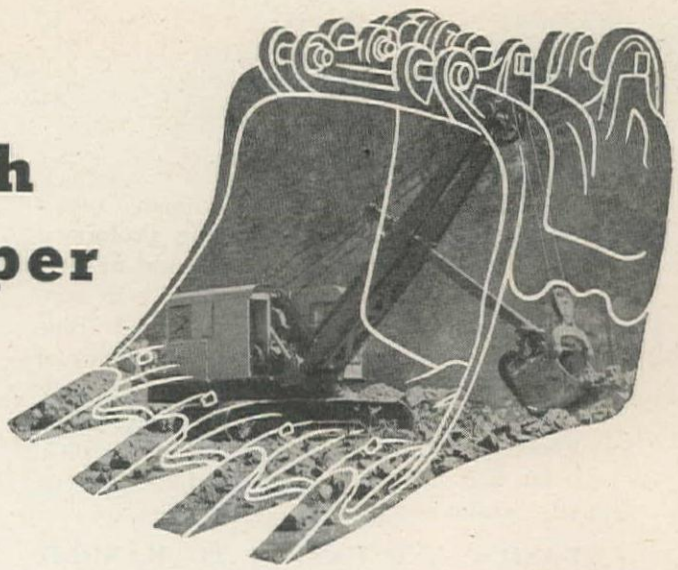
JR ROEBLING

A CENTURY OF CONFIDENCE





A Good Shovel Works Better with an Amsco Dipper



Made of austenitic manganese steel for resistance to impact, pressure, and abrasion, Amsco dippers also provide the advantages of fast, full loading and quick, complete dumping. Design of Amsco dippers is based on an experience of forty years in fields of power shovel application. To make a good shovel work better, specify an Amsco dipper. Available in all standard capacities, up to ten cubic yards . . . and in types as outlined below.

AMSCO RENEWABLE LIP DIPPER

A strong, long-life dipper, designed for low overall cost. Patented Amsco construction makes it possible to replace worn lip quickly, holding down-time to a minimum. Teeth are also renewable and reversible.

AMSCO WELDED TYPE DIPPER

Designed to meet the demand for a strong durable dipper at minimum weight . . . for fast digging and economical use of power. Built in two types: Two Part (½ to 2 yards) and Four Part (2 yards and up); sections are joined by Amsco's patented plug welding process, with all joints overlapped for rigidity. Teeth reversible for double duty . . . and replaceable.

AMSCO DIPPERS for Special Purposes

AMSCO manufactures the famous Missabe Dippers and a wide range of cast manganese steel dippers and buckets for pull-shovels and underground work . . . as well as dippers of any design to meet any particular application.

AMSCO PARTS

AMSCO supplies cast manganese steel dipper and shovel parts, including: teeth, renewable lips, bails, racks and pinions, sheaves, gears, crawler parts . . . as well as a complete line of welding products for hardfacing and reclamation.

For full information on Amsco Dippers and parts—write for Bulletin 547-DS.

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
CHICAGO HEIGHTS, ILL.

Foundries at Chicago Heights, Ill., New Castle, Del., Denver, Colo., Oakland, Calif., Los Angeles, Calif., St. Louis, Mo. Offices in principal cities. In Canada: Joliette Steel Limited, Joliette, Que.

Champ of the Heavy-Duty Class

ADAMS No. 610–100 H.P. DIESEL

Only the Adams No. 610 Offers All These Features

- 100 H.P. Full-Diesel Engine — 6-cylinder—powerful, dependable.
- Weight—up to 27,000 lbs. Plenty to utilize all h.p.—*in all gears.*
- Push-Button Starting from the cab — standard equipment.
- Power Steering—standard equipment. Mechanical-hydraulic type—all advantages of mechanical steering, with power doing the work.
- Powerful 4-Wheel Hydraulic Brakes on tandem—fast, easy stops.
- Large, Wide-Tread Tires (14.00-24 rear, 11.00-24 front). Adequate traction and flotation for every type of grader operation.
- 8 Overlapping Forward Speeds, 2 reverse. Transport speed of 25 mph.
- Extra Wide Blade (28 in.) to utilize No. 610's great capacity.

The Adams No. 610 is a husky extra-heavy-duty machine, through and through—not a "souped-up" lighter model. Specially designed to utilize the full torque of its big 100 H.P. engine—*in all gears*—it handles heaviest work easily—accomplishes more work per day . . . all at lowest possible cost. Let your local Adams dealer tell you about this great new grader.

J. D. ADAMS MANUFACTURING CO. · INDIANAPOLIS, INDIANA

▲ Banksloping rocky mountain side

▼ Scarifying limestone road base

See Your Local ADAMS Dealer

J. D. ADAMS MFG. CO.
Western Factory Branch
San Francisco, California
Adams Distributors at: Oakland, Los Angeles, Sacramento, Redding, Riverside, San Jose, Fresno, Stockton, Salinas, Santa Rosa, Modesto, Visalia, Merced, Bakersfield, Santa Maria and San Diego, Calif.

THE O. S. STAPLEY CO.
Phoenix, Arizona

McKELVY MACHINERY CO.
Denver, Colorado

INTERMOUNTAIN EQUIPMENT CO.
Boise and Pocatello, Idaho
Spokane, Washington

INDUSTRIAL EQUIPMENT CO.
Billings and Missoula, Montana

NORMONT EQUIPMENT CO.
Great Falls, Montana

NEVADA EQUIPMENT SERVICE
Reno, Nevada

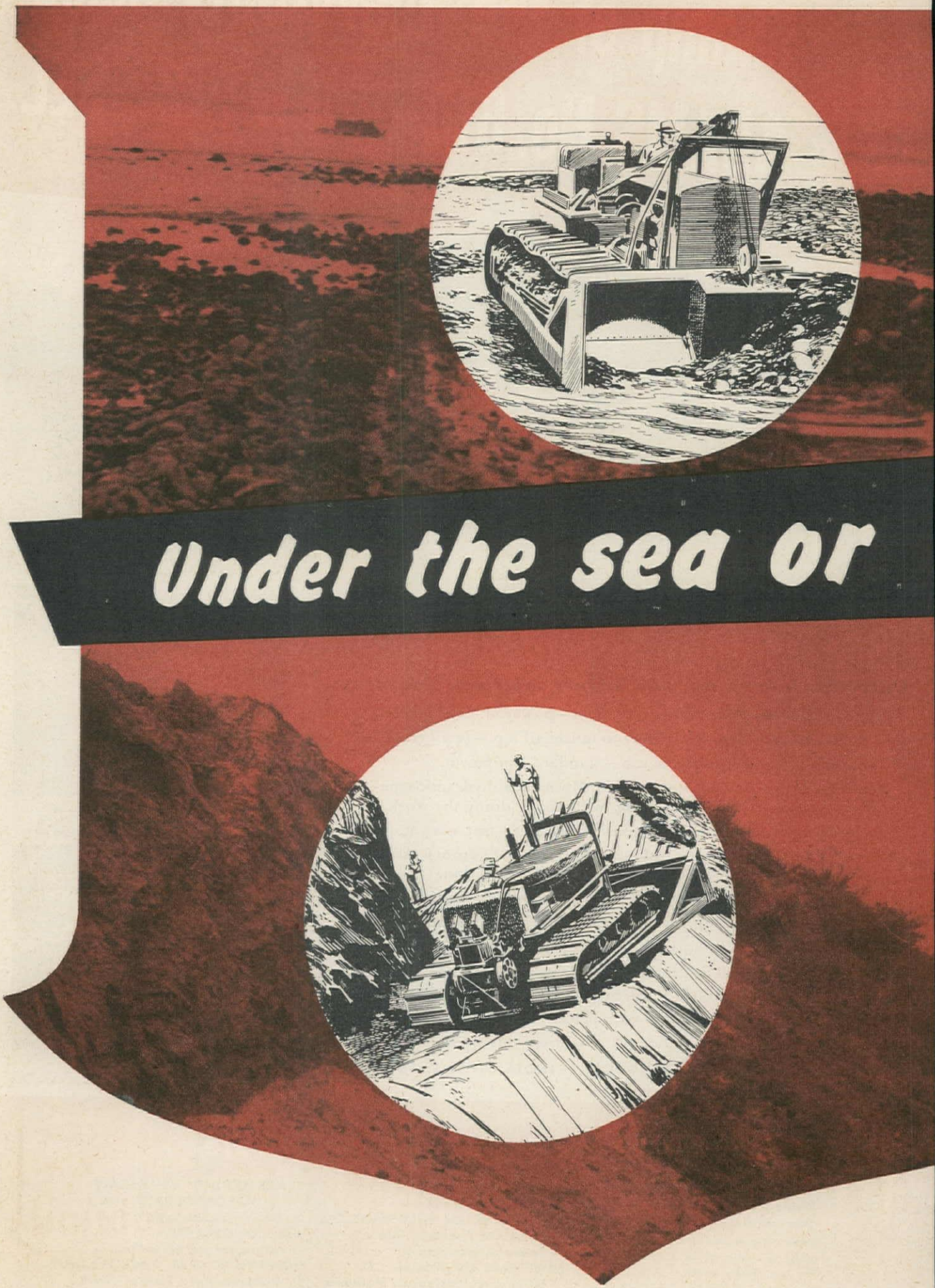
CLARK COUNTY WHOLESALE MERCANTILE CO. INC.
Las Vegas, Nevada

J. D. COGGINS CO.
Albuquerque, New Mexico

HOWARD-COOPER CORPORATION
Portland, Ore., Seattle, Wash.

THE LANG CO. INC.
Salt Lake City, Utah

GLENN CARRINGTON & CO.
Fairbanks, Alaska


Under the sea or

Under the sea

Unusual conditions became the "usual" thing on recent jobs handled by A. Teichert & Son of Sacramento. One that put equipment to extremely severe tests was the construction of a levee for flood control, at Ventura. Carry-alls and draglines had to operate partly under water, over a solid layer of rugged boulders.

high in the hills

high in the hills

Another interesting job was surfacing the Arroyo Seco for flood control, which started with the building of equipment roads and finished with concrete paving of the river bed.

In spite of unusual conditions, no special lubricants were needed and on both these jobs the equipment record was excellent. Teichert crews followed G. P. Lube Engineering recommendations and used G. P. Products 100%, with extremely satisfactory results.

G. P. Lube Engineering for Contractors saves money by reducing breakdowns and repairs...lengthens the life of equipment...and improves operating records on tough jobs. Why not ask your nearest branch or distributor.

Jack Hanafin, Contractor Representative for G. P. and Jim Cagle, General Superintendent for Teichert on the Arroyo Seco job.

GENERAL PETROLEUM CORPORATION

Serving the West since the start of the Century

Mobiloil

SOCONY-VACUUM

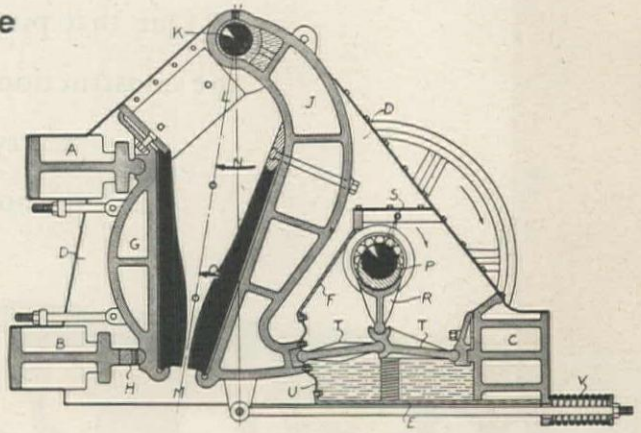
Here's Why Only KUE-KEN* Crushes Without Rubbing

Outmoded Crushing Principles Still in Use

Blake-Type

PRINCIPLE OF 1858. Blake or double-toggle crusher, designed 91 years ago. Swing jaw forces rock upward, with severe rubbing against jaws, causing rapid wear, and waste of power. Unbalanced mechanism means low speed and low capacity. See figure at left.

PRINCIPLE OF 1879. Overhead eccentric or single-toggle crusher. The moving jaw forces rock up and down, causing severe rubbing and excessive wear. Power is wasted, bearing pressures are very high and output is low with high power costs.



TODAY'S KUE-KEN JAW CRUSHER

Pitman always in compression, bears against lower side of shaft ONLY. 90% saving in Pitman weight, 50 to 60% higher speed. The hinge pin is on the center line of the crushing zone. As the jaws swings back and forth it describes an arc which is normal in both crushing faces. RUBBING is impossible with this motion.

Make This Simple Test

PROVE TO YOURSELF how the patented Kue-Ken crushing principle is better . . . why Kue-Ken users get 5 to 10 times longer jaw plate life, with far less power . . . "never go back to old-style crushers."

Place point of a pencil compass on center of hinge-pin of old-style Blake crusher above and describe an arc anywhere along the face of swing jaw. Note how jaw *must* travel the path of this arc, and how this path of travel is upwards in relation to the stationary jaw. (Changing shape of jaw cannot change path of travel, which is established by location of hinge pin.) This means every piece of rock as it is being crushed is pushed upward, causing severe rubbing, extreme wear on jaw plates and wasted power.

Now, place compass point on center of hinge pin (K) in Kue-Ken diagram. Note that hinge pin is on center line of crushing zone. Describe an arc and note that path of travel is normal to both jaw faces. There is practically no upward movement, so rocks are crushed without rubbing and jaw plates last 5 to 10 times longer than any other crusher operating under equal conditions. Elimination of rubbing also makes big savings in power.

Kue-Ken crushers are furnished with straight or curved jaw plates, depending on crushing requirements. 17 sizes from 12″ x 7″ to 42″ x 25″.

Send for Bulletin 605

DEALERS
Some Territory Is Still Open

YOUR NEAREST WESTERN DEALER

Oregon-Washington
P. L. Crooks & Co.....*Portland*

Montana*.....Caird Engineering Works.....*Helena

Texas*.....Engineered Sales Co.....*San Antonio

***Utah*.....Lund Machinery Co....Salt Lake City**

*Pronounced Que-Ken. U. S. and Foreign Patents Pending.

STRAUB MFG. CO.

530 CHESTNUT STREET — OAKLAND 20, CALIFORNIA

Kue-Ken Balanced Crushers	Rib Cone Ball Mills	Overflow Classifiers
Kue-Ken Simplex Crushers	Concentrating Tables	Feeders
Kue-Ken Gyratory Crushers	Overhead Eccentric Crushers	Screenwheel Classifiers

Harbor Presents Star PerFORMers for Concrete Form Work!

You'll find basic concrete form panel problems answered by Harbor Plywood's quartet of concrete form panels—each engineered to meet specific service requirements, and starred in order of their performance, quality and price.

★★★★

HARBOR **Harborite**

Trade Mark Registered. Patents 2,150,697—2,150,698—2,150,841 and 2,343,740

The Superior Multiple Re-Use Concrete Form Panel

★★★ SUPER-Harbord **PLYCRETE**

Bearing the industry grade-mark:

EXT • DFPA • AA

For multiple re-use form work demanding relatively high architectural treatment, Harbor hot-press bonded with phenol-type resin adhesive. ALL veneer is jointed, which eliminates appreciable voids. All defects in centers and crossbands are repaired, eliminating weak areas and concealed voids. All panels are re-humidified after pressing, reducing tendency to warp. These exclusive Harbor extras mean longer service on your form work. Sanded smooth both sides. Factory edge-sealing and oiling optional.

★★ Harbord **PLYCRETE**

Bearing the industry grade-mark:

INTERIOR • AA • DFPA

Harbord PLYCRETE has the same AA (Sound) veneer faces as SUPER-Harbord Plycrete, but is bonded with 10-cycle moisture-resistant glues instead of the waterproof adhesives used in the Exterior-type panels. A superior form panel, sanded smooth on both faces. Will withstand many re-uses, but can not, of course, be expected to deliver the service established by Harborite or SUPER-Harbord Plycrete. Ideal for average jobs where limited re-use will write off the cost. Factory edge-sealing and oiling optional.

★ HARBOR **PLYFORM**

Bearing the industry grade-mark:

PLYFORM • DFPA • BB

The standard DFPA PlyForm panel, manufactured to Harbor Plywood Corporation's strict quality standards. Bonded with highly water-resistant 10-cycle glues (not waterproof), it will withstand a reasonable number of re-uses. Both faces are BB (solid) veneer, with surfaces free from open defects, but admitting neatly made plugs, tight splits, and slightly rough grain, sanded smooth. Factory edge-sealing and oiling optional.

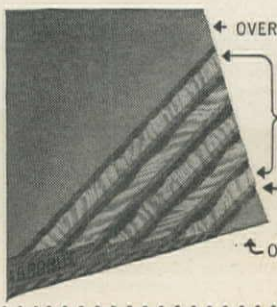
"Four-Starred" Harborite

. . . engineered to deliver the lowest cost-per-foot-per-use

MADE by Harbor's exclusive hot-press bonding of phenolic-type resin-impregnated overlays on a core body of genuine SUPER-Harbord, Harborite offers these outstanding advantages for concrete form work:

1. Harborite has hard, check-free, durable overlay faces which cast easily-finished, near-perfect concrete surfaces.
2. Harborite's overlay is tough, abrasion-resistant—not brittle. Its "tooth" holds oil, sealers or lacquers. Its absorptive-liner effect reduces pit voids.
3. Harborite's reddish-brown color does not bleed or discolor concrete. No added finishing problems!
4. Harborite's durable overlay faces, plus the superior core body of genuine AA SUPER-Harbord, gives you maximum panel re-use. It delivers the lowest cost per foot per use.

Harborite—"Four-Starred" for perFORMance—is the panel to demand if you require superior, easily-finished concrete surfaces PLUS form panels which can be re-used again and again . . . to ultimate destruction.



Harborite is manufactured under rigid quality control. The core panel is genuine SUPER-Harbord, with improved face veneers. ALL veneers (even core veneers) are jointed. All veneers and overlays are hot-press bonded with phenol-type resin adhesive. Thickness tolerance of finished panels, 1/64". Standard Harborite sizes: Widths—36" up to 48"; Lengths—96" up to 144"; Thicknesses—¼" to 1 11/16". Edge-sealing and mill-oiling optional.

Like any other quality product, most satisfactory results are gained by using approved procedures. For full data on Harborite use, write requesting instructions.

For Information Concerning Harborite and Other Harbor Concrete Form Panels, Contact:

HARBOR PLYWOOD CORPORATION, Hoquiam, Washington

—or any of the following—

California - Geo. E. Ream Co., 235 S. Alameda St., Los Angeles 12; Harbor Plywood Corporation (of California), 540 Tenth St., San Francisco 3 **Colorado** - Donald B. Richardson, 1650 Eleventh St., Denver 4 **District of Columbia** - Harbor Sales Co., Inc., 4th and Bryant Sts., N. E. Washington **Florida** - Harbor Plywood Corporation, 2355 Dennis St., Jacksonville 4; Harbor Plywood Corporation, Box 265, Buena Vista Sta. (3627 N. E. 1st Court), Miami 37; Harbor Plywood Corporation, P. O. Box 2168 (802 No. Rome Ave.), Tampa 1 **Georgia** - Harbor Plywood Corporation, 1161 Ridge Ave. S. W., Atlanta 3 **Illinois** - Harbor Plywood Corporation, 1444 W. Cermak Road, Chicago 8 **Indiana** - E. W. Camp Plywood Co., Inc., 1001 E. New York St., Indianapolis 7 **Kentucky** - E. W. Camp Plywood Co., Inc., 825 S. 9th St., Louisville 2 **Maryland** - The Harbor Sales Co., Inc., 1501 S. Warner St., Baltimore 30 **Massachusetts** - Kimball Lumber Co., 148 Waltham St., Watertown; Lawrence R. McCoy & Co., Inc., 332 Main St., Worcester 8 **Missouri** - H. H. Horton, Harbor Plywood Corporation, 1301 R. A. Long Bldg., Kansas City 6; Fry-Fulton Lumber Co., 148 Carroll St., St. Louis 4 **Nebraska** - W. R. Stelzer, 200 Foster-Barker Bldg., Omaha 2 **New Jersey** - J. R. Quigley Co., 811 Market St., Gloucester City **New York** - Plunkett-Webster Lumber Co., Inc., 815 East 136th St., New York 54; Plunkett-Webster Lumber Co., Inc., 271 North Ave., New Rochelle; Kimball Lumber Corporation, P. O. Box 625, Schenectady **Ohio** - E. W. Camp Plywood Co., Inc., Commerce at Plum St., Cincinnati 2 **Pennsylvania** - J. R. Quigley Co., Front and Railroad Sts., Cressona; J. R. Quigley Co., 1290 S. Cameron St., Harrisburg; J. R. Quigley Co., 309 Harrisburg Ave., Lancaster; J. R. Quigley Co., 1028 N. Delaware Ave., Philadelphia 25; G. A. Whitmeyer, Harbor Plywood Corporation, 1028 N. Delaware Ave., Philadelphia 25; Wholesale Distributing Co., 36th St. and A. V. R. R., Pittsburgh 1 **Washington** - Harbord Mercantile, Port Dock, P. O. Box 998, Aberdeen; Lundgren Dealers Supply, P. O. Box 1373 (440 E. 25th St.) Tacoma 1

STANDARD ENGINEER'S REPORT

RPM DELO

TEST DATA

LUBRICANT	RPM Delo Supercharged Lubricating Oil
UNIT	Caterpillar Diesel-D17000-V8 Cyl.
CONDITIONS	Cont. High load-Actual field oper.
FUEL	Commercially available Diesel Fuel
TEST PERIOD	4 months
FIRM	Homer Jones Ranch, Chandler, Ariz.

NEW LUBRICATING OIL STOPS ALL RING STICKING WHERE ORDINARY OIL FAILED

Specially Developed RPM DELO Supercharged Oil Solves Extra Tough Load and Carbon Problems

AFTER ONLY 625 HOURS operation on an ordinary heavy-duty type oil, an engine pulling 90% of full load rating had 39 stuck rings — only 9 of its 48 rings were free and several were broken. There were heavy lacquer and carbon deposits in ring grooves and on piston-skirts, as indicated by this unretouched photograph of one of the pistons. Besides stuck rings, note clogged oil-return holes and oil rings.

OPERATED 1582 HOURS — more than twice as long — on RPM DELO Supercharged Lubricating Oil, the same engine, running under the same load and fuel conditions, stayed efficient and clean, as this unretouched photograph shows. At the end of test all 48 rings were free, there were no piston-skirt deposits, ring-groove deposits were 50% less. Note how RPM DELO Supercharged kept oil-return holes open.

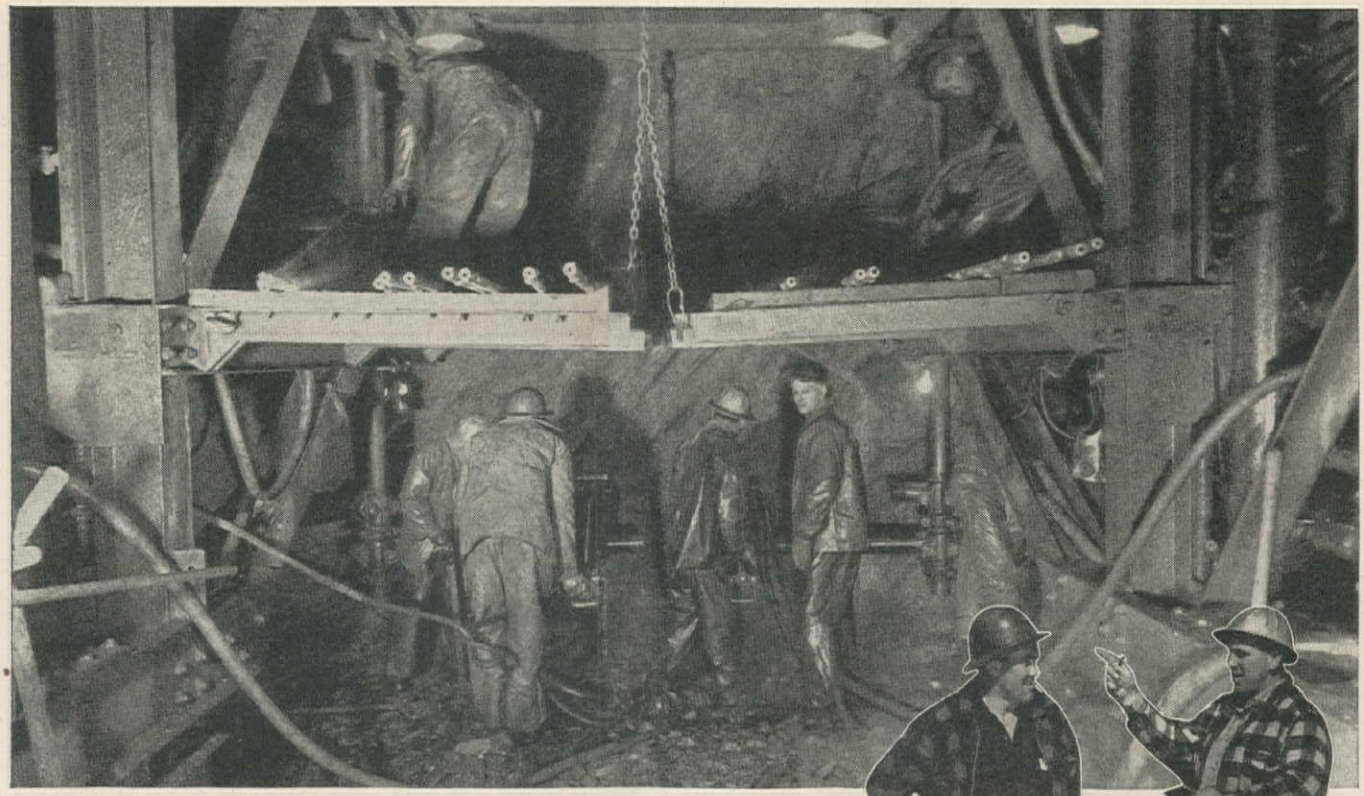
REMARKS: RPM DELO Supercharged Lubricating Oil is a new product added to our line. It solves operating problems in both Diesel and gasoline engines, especially where load conditions are extreme.

Its detergent prevents carbon and lacquer deposits on all parts, even with high sulphur-content fuels.

RPM DELO Supercharged Oil sticks on hot and cold surfaces — reduces wear under the heaviest loads. (Cylinder-wear averaged only 0.0014 inches per 1000 hours with RPM DELO Supercharged, while with the ordinary oil it was 0.0043 inches — three times greater.) RPM DELO Supercharged Lubricating Oil also contains special compounds that resist oxidation and sludging, prevent bearing corrosion and internal rusting, and stop foaming.

STANDARD TECHNICAL SERVICE: checked and reported this test. If you have a lubrication or fuel problem your Standard Fuel and Lubricant Engineer or Representative will give you expert help; or write Standard of California, 225 Bush Street, San Francisco 20.

STANDARD OIL COMPANY OF CALIFORNIA • San Francisco
THE CALIFORNIA OIL COMPANY • Barber, N. J., Chicago
STANDARD OIL COMPANY OF TEXAS • El Paso, Texas
THE CALIFORNIA COMPANY • Denver, Colorado



Here is one of Morrison-Knudsen's record-breaking drilling crews at the upstream face of their 4000-ft section of the 34,700-ft Rock Creek Tunnel. Contractors for other parts of the tunnel and dam construction work are: Walsh Construction Co., T. E. Connolly, Inc., and the Arundel Corp. & L. E. Dixon Co. All use Bethlehem drill steel.

New drilling records speed tunnel *at Feather River Project*

L. E. Huntington (left), tunnel superintendent for Walsh, is the uncle of F. A. Huntington (right), the "super" for Morrison-Knudsen. Rivalry is keen between these two contractors, each driving different ends of Rock Creek Tunnel.

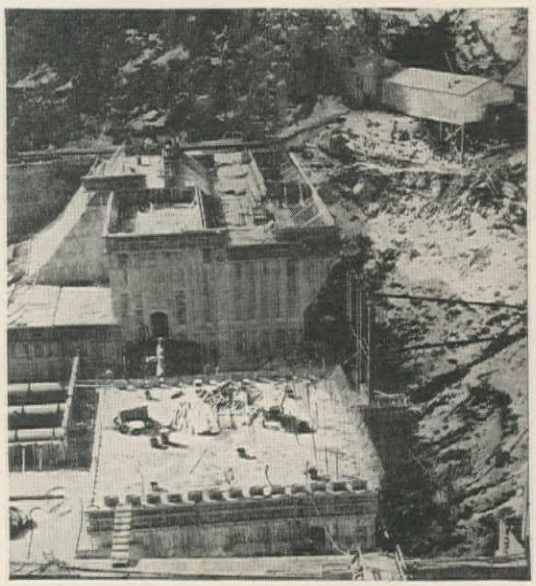
On Pacific Gas & Electric Company's $62,000,000 hydroelectric construction project in Northern California, two contractors using Bethlehem hollow drill steel have recently established what we believe are new all-time records.

Driving upstream from the site of Rock Creek powerhouse, Walsh Construction Company, drilling through the hard granite of Feather River Canyon, advanced 211 ft in six days during January—a record average of 35 ft per day.

Driving downstream on the 25-ft diameter horseshoe tunnel, Morrison-Knudsen Co., Inc., established the record for the most footage in 24 hours—47 ft driven on December 8.

Walsh uses 1 ¼-in. Bethlehem hollow drill steel with detachable bits, averaging 4 or 5 drilling rounds of 10-ft depth per day. Morrison-Knudsen employs Bethlehem hollow drill steel with conventional forged bits.

Two other contractors on this project are users of Bethlehem drill steel. They are T. E. Connolly, Inc., constructing the main bypass and surge tunnels; and the Arundel Corp. & L. E. Dixon Co., driving the central, 24,000-ft section of the Rock Creek Tunnel.



General exterior view of the mouth of Rock Creek Tunnel (upper right) and Rock Creek Dam. This project will divert surging water from Feather River through tunnels to develop some 270,000 hp at two powerhouses for distribution to California industries.

BETHLEHEM STEEL

BETHLEHEM PACIFIC COAST STEEL CORPORATION

Sales Offices: San Francisco, Los Angeles, Portland, Seattle, Honolulu

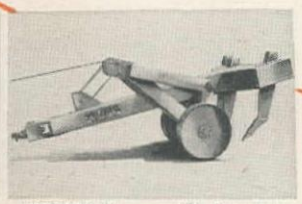
BETHLEHEM PACIFIC

ONE COBRA LEADS TO ANOTHER!

Recognized throughout the South as dirt-wise contractors, the Cherokee and Robert Lee construction companies know self-propelled earth moving equipment—know that profits depend on their having the best. Above, 200 hp Terra Cobra loads on Highway No. 1 near Aiken, S. C. "Machines perform very favorably" states Robert E. Lee, one of principal contractors.

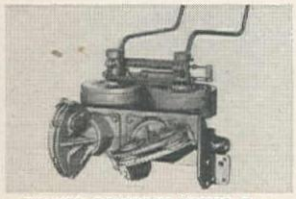
Heaping loads like these helped contractors move 1,100,000 cu. yds. in a record time of 11 weeks. Terra Cobras carry 14 cu. yds. struck, 17.5 heaped. Cherokee Construction Company is an experienced Terra Cobra user. Their men can tell you how the time-tested and job-proved equipment, pioneered and backed by Wooldridge reliability, can pay off in extra yardage—and profits.

SCRAPERS: Bolling Bowl and Terra Clipper Scrapers from 7.5 to 27.5 cu. yd. heaped capacities.



RIPPERS: Three models: for extra heavy, standard or light duty.

BULLDOZERS and Trailbuilders for all standard makes of tractors.



POWER CONTROL UNITS. Two-drum winches for use with all standard tractors.

Three Terra Cobras paid off . . . . . so contractor bought five more!

"We originally purchased three Terra Cobras for our Clark Hill Dam job . . . and their performance was so economical that we have since bought five additional units; the Terra Cobra is rugged equipment which gets the job done," stated Mr. B. A. Jordan, Jr., President and General Manager of Cherokee, Inc.

This firm, together with Lee, Inc., recently used seven Wooldridge Terra Cobras to move a substantial portion of 1,100,000 cu. yds. in just eleven weeks during grading operations for the new four-lane super highway section of U. S. Highway No. 1, near Aiken, S. C. Production estimates showed average loads of 14 cu. yds., trip after trip. With machines operating on a 55-hour week schedule, Job Superintendent Alonzo Bailey stated, "Cobras will move more dirt with minimum down time."

Take a tip from the records of successful contractors like these. See your Wooldridge distributor or write today for complete details before bidding on your next job. Your order now will assure prompt delivery.

WOOLDRIDGE MANUFACTURING CO.
Sunnyvale, California, U. S. A.

WOOLDRIDGE
EARTH MOVING EQUIPMENT

PROVED AND APPROVED FOR EVERY TYPE OF EARTH-MOVING JOB

YOU CAN QUICKLY CONVERT
VICTOR
WELDING TORCHES TO CUTTING WORK

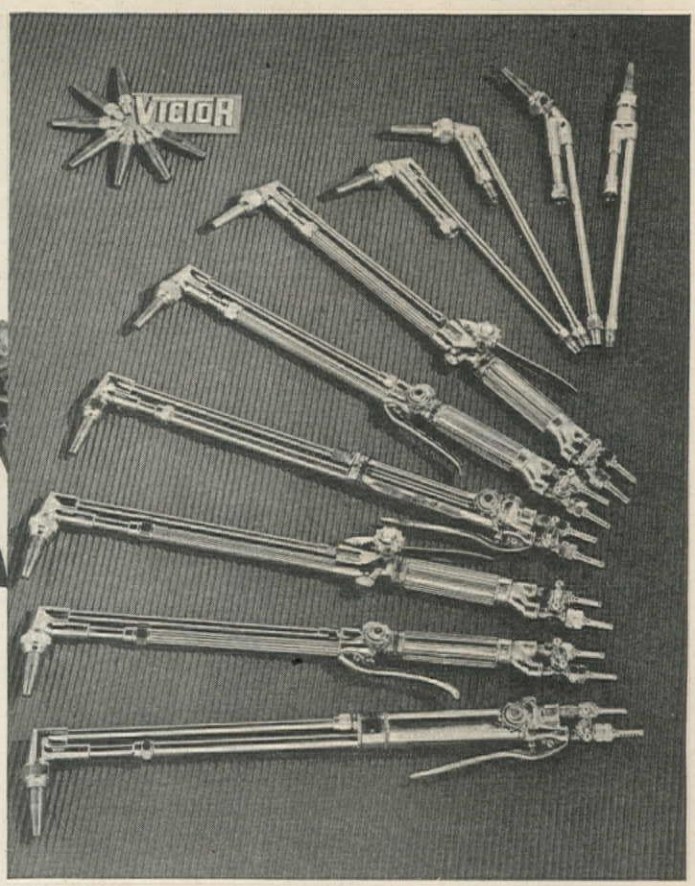
This VICTOR welding torch butt Model 310 and cutting attachment Model 2450 is one of many you can use for converting from welding to cutting. No wrench needed

VICTOR attachments are made so you can change quickly from welding to cutting operations. You simply select the attachment, tip type, and tip size suited to your job and gas supply. Tips are available for oxy-acetylene, natural and city gas, and LP gases (butane and propane).

ONE TORCH HANDLES MANY JOBS

A complete range of tips and sizes permits you to use your VICTOR welding torch for such varied field and shop jobs as plate, general and heavy cutting; cast iron, rivet and boiler tube cutting; scarfing, deseaming, descaling, and rivet piercing.

VICTOR also makes regulators for all gases; a full line of machine and hand torches, cylinder manifolds, cylinder trucks, emergency pack-type flame cutting outfits, and fluxes.



Here are other VICTOR hand cutting torches. As shown, these torches come with high-pressure valve lever in 4 different positions—top, bottom, front, or rear of torch handle—so operator may choose position best suited to him. Note, too, torch head can be purchased with 90°, 75°, 45°, or straight head. Head and tube assemblies are easily interchangeable.

SEE VICTOR DISTRIBUTOR

For help in selecting the VICTOR equipment best suited to your needs, see your nearest VICTOR distributor NOW.

It costs less to own and operate VICTOR!

VICTOR FOR WELDING

VICTOR EQUIPMENT COMPANY

844 FOLSOM STREET • SAN FRANCISCO 7, CALIFORNIA

3821 SANTA FE AVE., LOS ANGELES 11, CALIF. • 1312 W. LAKE ST., CHICAGO 7, ILL.

There's a Branch or Distributor to serve you in Portland, Spokane, Seattle, Salt Lake City, Casper, Great Falls, Anchorage, Boise, Denver, Tucson, Phoenix, Albuquerque, Oakland, San Diego, Fresno, Ventura, Sacramento.

A-6 100 hp

HR-4 110 hp

H-6 150 hp

HR-6 165 hp

HS-6 200 hp

NH-6 200 hp

HRS-6 225 hp

L-6 250 hp

NHS-6 275 hp

NHRS-6 300 hp

NVH-12 400 hp

NVHS-12 550 hp

5 New CUMMINS DIESELS

1. **HR-400**—110 hp (max.), at 1800 rpm. 5⅛" bore, 6" stroke.
2. **HRS-600**—225 hp (max.), at 1800 rpm. 5⅛" bore, 6" stroke. Supercharged.
3. **NHRS-600**—300 hp (max.), at 2100 rpm. 5⅛" bore, 6" stroke. Supercharged.
4. **NVH-12**—400 hp (max.), at 2100 rpm. 5⅛" bore, 6" stroke.
5. **NVHS-12**—550 hp (max.), at 2100 rpm. 5⅛" bore, 6" stroke. Supercharged.

With the addition of 5 new engines, there's now a Cummins Diesel for any power job in the 50 (minimum) to 550 (maximum) hp range. Sixty-six individual models are available . . . with optional equipment to fit your specific operating requirements. Compounded units increase the Cummins range to 1440 hp.

The all-around economy of Cummins Diesels increases your profits on any automotive, marine or industrial job. Standardizing on Cummins Power gives you these additional advantages: engines, units and assemblies are interchangeable . . . service problems are simplified . . . replacement parts inventories are reduced . . . down-time is held to a minimum.

CUMMINS ENGINE COMPANY, INC., • COLUMBUS, INDIANA

"Tastes kind of funny lately, Ma?"

DURING the past half-century, sanitary engineering has made great strides in combatting diseases caused by pollution of water sources. The year 1899, when our Company was established, also marked the development of sewage treatment in America. Today, more than 6,000 sewage treatment plants are in operation serving over half of our urban population.

The growth of water supply and gas service during this period has been equally remarkable. Today, 12,000 public water supply systems serve 85 million people. More than 20 million homes are furnished with gas for cooking and heating.

It has been our privilege to share in the progress of these public services by providing cast iron pressure pipe, for water, gas and sewer mains, and for sewage treatment and water purification plants. Better pipe today, naturally, than 50 years ago—stronger, tougher, more uniform in quality. An old-time pipe founder would be amazed by the improved casting methods, production standards and quality controls in operation at our several foundries.

To those responsible for the great progress in water supply, gas and sanitation service and their contribution to better health and living over the past fifty years, America pays tribute.

U.S. CAST IRON PIPE

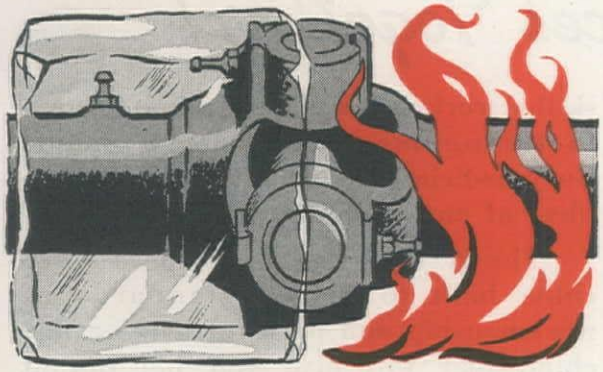
1899-1949
U. S. Pipe & Foundry Co.
Makers for 50 years of cast iron pipe for water, gas and sewerage service.
General Offices: Burlington, N. J.

SAVE TIME—CUT COSTS with MULTI-PURPOSE UNOBA GREASE!

1. Prior to Union Oil Company's development of multi-purpose UNOBA, practically the only greases available were made with sodium, calcium and aluminum bases. Calcium base grease is water-resistant but has a low melting point. Sodium base resists heat but doesn't stay put in the presence of moisture. Aluminum base withstands water but jells at high temperatures.

2. There was an obvious need for an all-around grease that would resist *both* heat and water. Union Oil Company's development of UNOBA—a *barium* base grease—filled this need for the first time in history. As a result, multi-purpose UNOBA is in demand for a great number of uses in all branches of industry.

3. For example, trucks and automobiles formerly required a half-dozen or more lubricants for a single lube job. Now these specialized greases are replaced by UNOBA—one grease for the entire job. Industrial plants find that UNOBA simplifies lubrication by performing jobs formerly requiring many different types, grades and brands of greases.



For full information phone your local Union Oil Representative or write Sales Department, Union Oil Company, 617 W. Seventh St., Los Angeles 14, Calif.

4. UNOBA gives thorough protection at temperatures from below freezing to 300° F. It sticks to metal surfaces with a tenacity that boiling water can't break. Because of these qualities, industry has found multi-purpose UNOBA to be the ideal lubricant. For UNOBA saves time and cuts costs by simplifying lubrication and gives the greatest possible protection in the presence of extreme heat or heavy moisture.

ANOTHER

UNION OIL

SUCCESS-TESTED

PRODUCT

. . . To Put the Pieces Together!

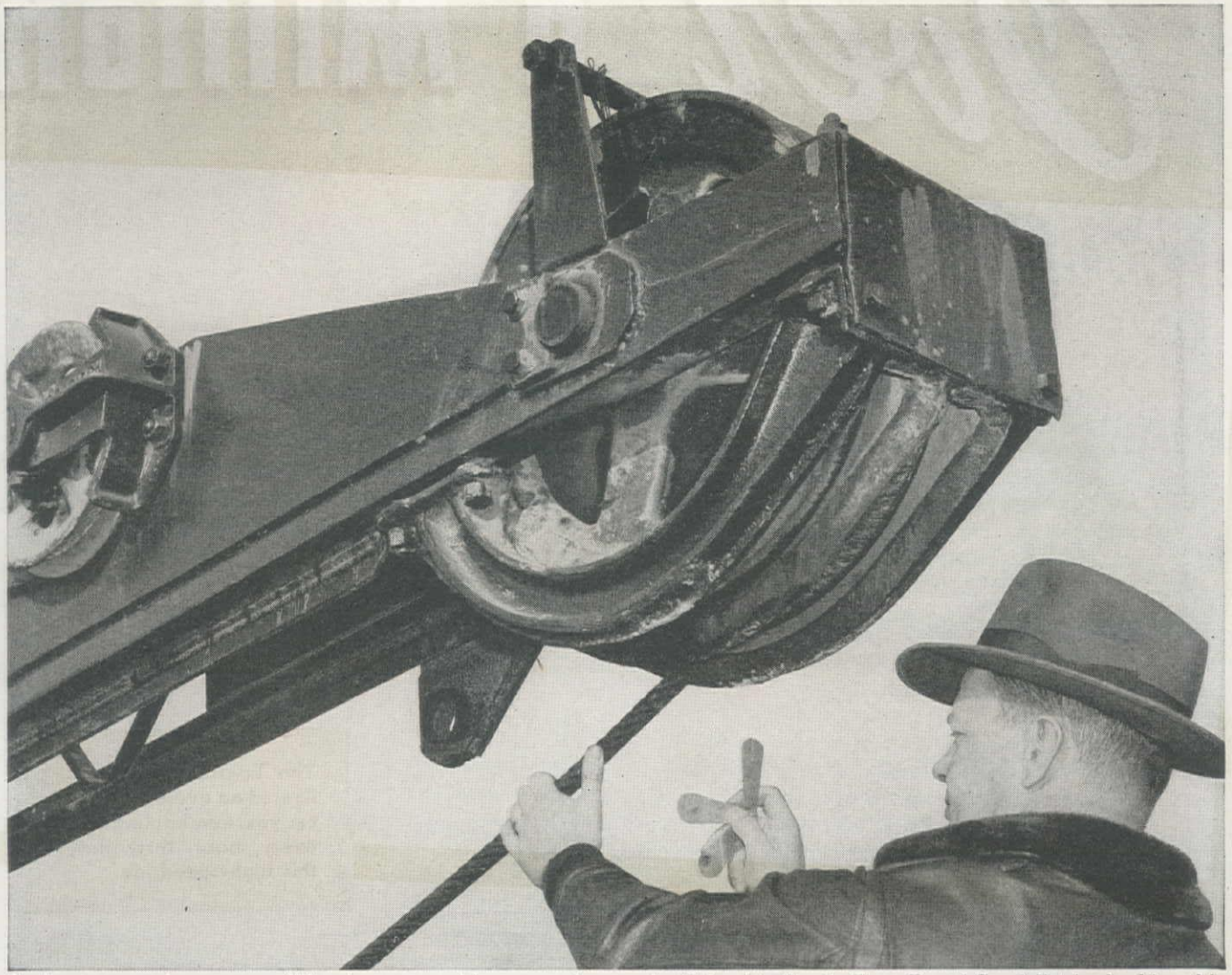
. . . And in building a dredge to meet today's placer mining requirements, you can depend on the skill and experience of Bucyrus-Erie—a company which has built only the best since 1884!

The modern Bucyrus-Erie placer dredge begins with *you* . . . is designed specifically to handle the work you have, at peak efficiency under your operating conditions. Bucyrus-Erie engineers work closely with you to find the best solution for your dredging problems, and their designs are transformed into reality by skilled workmen, up-to-the-minute manufacturing methods and the unique Bucyrus-Erie plant facilities, most complete of any in the industry.

The result is a "years ahead" machine built to highest standards of workmanship and performance—a machine that will give you big output with outstanding economy of operation. Remember the name that has been synonymous with fine excavating machinery afloat and on land for 67 years—Bucyrus-Erie!

SO. MILWAUKEE BUCYRUS ERIE WISCONSIN

18D47



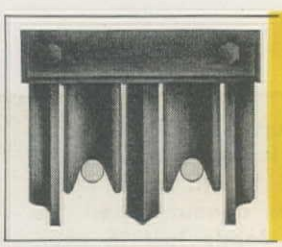
To insure maximum rope life, sheaves must be grooved properly. Columbia Steel's Tiger Brand Specialist is checking this feature in a dragline boom–just one of his many wire rope services. Here he recommended regrooving, to prolong the rope's life.

How to stop wire rope trouble—before it starts

The danger of pinching and binding are eliminated when you let this Tiger Brand Field Specialist help you engineer your wire rope installation. He'll check and double-check your equipment... measure the sheave grooves to assure proper clearance and support... recommend the exact specifications you need for long, tough wire rope life. For his job is to make U·S·S American Tiger Brand Wire Rope work hard, resist bending fatigue and wear, give your machinery better all-around performance.

Tiger Brand Wire Rope is tough, rugged. That's because it's specially engineered for long wear, under constant control from raw ore to the finished product. To be sure that you get all the stamina that hard usage demands, we've put the Tiger Brand Specialist at your service to help you in every way he can. There's no charge or obligation. Simply contact your distributor or any Columbia Steel Company Office.

Columbia Steel Company
San Francisco · Los Angeles · Portland · Seattle · Salt Lake City



Tiger Brand Tip

Grooves in sheaves and drums should support the rope properly and be slightly larger than the rope to avoid pinching and binding.

USS

U·S·S TIGER BRAND Wire Rope

UNITED STATES STEEL

Over a Million

The Euclid Loader delivered an average of 775 cu. yds. into hauling units every hour throughout this high-speed job.

Steep, smooth sides of the improved hopper and full length and width door opening shed the big loads fast in even windrows on the fill.

EUCLID
THE PIONEER

EUCLIDS

Yards in 60 Days!

A Euclid Loader and 6 improved Bottom-Dump Euclids teamed up to move most of the 1,256,000 cu. yds, of earth for Colorado City Dam in Texas. Contractor Harry Campbell of Ft. Worth completed the job in only 60 working days!

The dam is 4,500 ft. long and 74 ft. high, with a main earth embankment 1,600 ft. in length. It will furnish water for a steam generating plant of Texas Electric Service Company and a municipal supply for Colorado City.

At the peak of operations the Loader, "Eucs," and other hauling units attained hourly production of over 950 cu. yds., averaging 775 cu. yds. per hour for the entire job. Powered by diesel engines of 190 h.p., the Bottom-Dump "Eucs" maintained high speeds with capacity loads on the 3,200-ft. haul. The 24.00 x 25 tires on drive and trailer wheels provided excellent traction and flotation on the fill.

Operators on the job liked the comfortable form-fitting seat, mounted on a hydraulic shock absorber and adjustable for weight and position. The Euclid air booster steer reduced driver effort on turns and gave positive control at all times. An improved hopper design shed the big, 16-yd. loads fast in even windrows for easy spreading and compaction — saved time on every trip.

Ability of "Eucs" and the Loader to stay on the job day after day and move dirt faster kept this rush project in high gear and enabled the contractor to complete Colorado City Dam on schedule. Write today for literature on the improved Bottom-Dump and other new models.

THE EUCLID ROAD MACHINERY CO.
CLEVELAND 17, OHIO

Good haul roads enabled the "Eucs" to travel at high speed with capacity loads. Top speed of this Euclid model with full payload is 34.4 miles per hour.

Move the Earth

Four hours ago this complete elevator was on a truck

They hauled it to the job only this morning . . . and before noon it was set up *and running!* And notice . . . this AMERICAN Material Elevator is all there. There's nothing else to add. As upper floors are added, elevator height is already available to serve them. The setup job is done . . . for good.

Now, compare this fast easy job with the costly, labor-wasting, time-consuming task of cutting, fitting and erecting timbers for an ordinary wooden tower. Think of the hours your workmen will spend keeping it in safe operating shape. Try to figure how much it will cost you to tear it down when the job's finished. Try to estimate the cost of the lumber you're bound to waste . . . and remember, with a wooden tower, you'll be repeating this expensive process on *every* job! You can eliminate all those profit-whittling costs with an AMERICAN Material Elevator. Doesn't that make sense?

And you don't even have to buy one. Most AMERICAN HOIST construction equipment distributors have AMERICAN Material Elevators you can *rent* at low cost for as long as you need them. Though, after you've tried one on a job, you'll likely want to own your own.

PUTS ITSELF UP

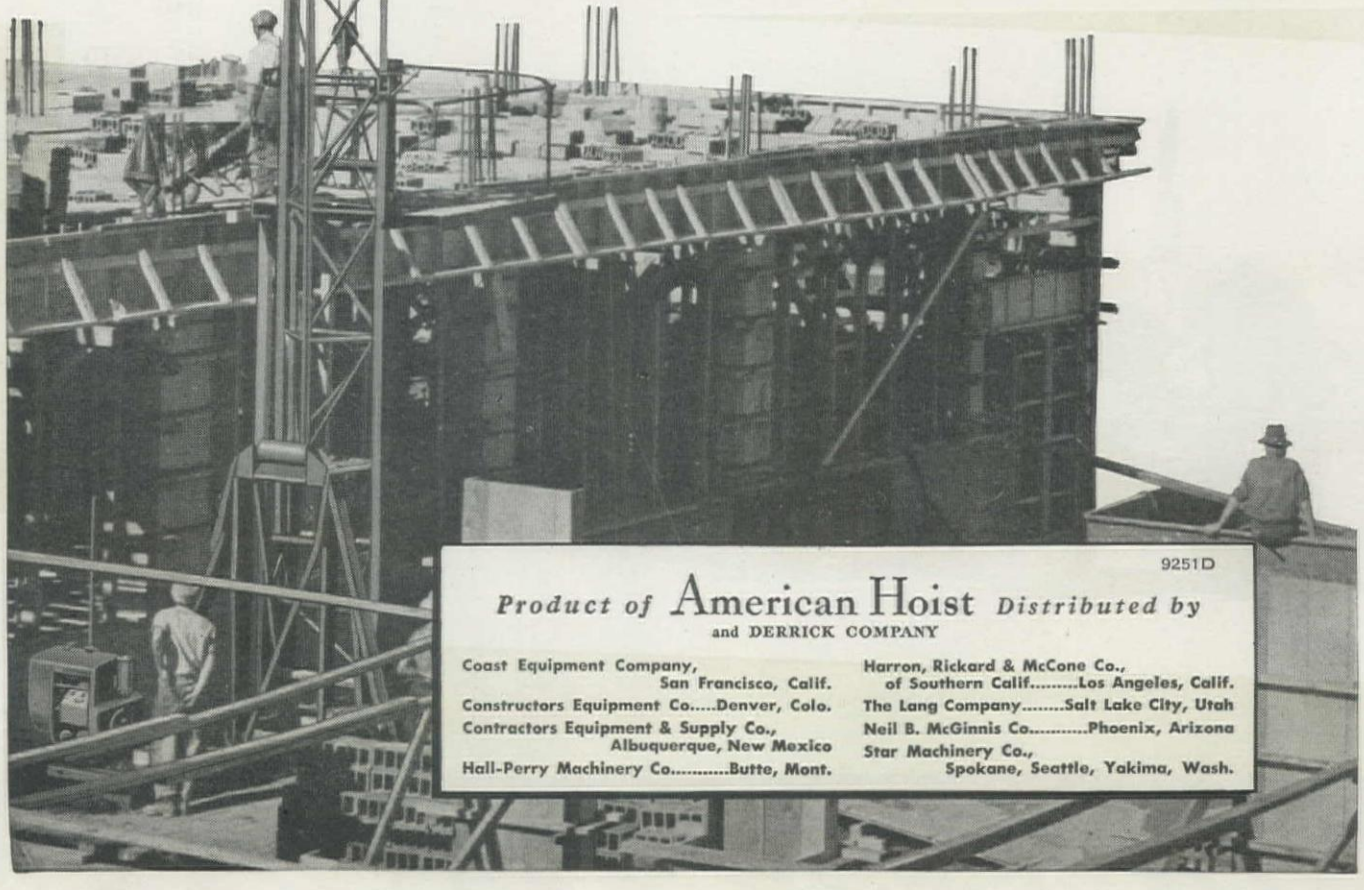
● Elevator's own hoist lifts 47 foot tower into position. Additional tower sections of 10 feet each are easily placed with a gin pole to a height of 97 feet.

INTERCHANGEABLE CONCRETE BUCKET

● Big 6 x 6 foot platform is quickly interchangeable with a half-yard self-dumping concrete bucket.

EXTRA LOAD CAPACITY

● A 2500 pound load glides up the AMERICAN Material Elevator at 87 feet a minute. Bigger loads at greater speed mean savings in time and costs.



9251D

Product of American Hoist *Distributed by*
and DERRICK COMPANY

Coast Equipment Company, San Francisco, Calif.
Constructors Equipment Co.....Denver, Colo.
Contractors Equipment & Supply Co., Albuquerque, New Mexico
Hall-Perry Machinery Co.....Butte, Mont.
Harron, Rickard & McCone Co., of Southern Calif.....Los Angeles, Calif.
The Lang Company.....Salt Lake City, Utah
Neil B. McGinnis Co.....Phoenix, Arizona
Star Machinery Co., Spokane, Seattle, Yakima, Wash.

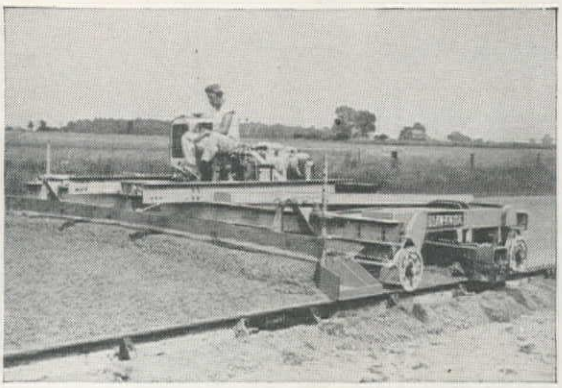
NOW from ONE source

Everything you need for Lowest Cost Concrete Construction

BLAW-KNOX PRECISION SUBGRADER is the only machine that will produce a perfect grade, true to crown and cross-section, through the hardest material without transmitting any shock or movement into the subgrader or road forms.

MULTIFOOTE Paving Mixer with the Highlift Boom is a dual-purpose, high-speed concrete construction tool that will eliminate extra equipment and high costs in the pouring of forms or give you big capacity for pavement too, without making any changes.

BLAW-KNOX CONCRETE PAVING SPREADER with its Automatic Transverse Blade will spread the harsh, dry mixes of two 34-E dual drum pavers no matter where the concrete is placed on the subgrade between the forms.



BLAW-KNOX FINISHING MACHINE will give you record-smashing production and highest quality of finish of concrete pavement regardless of type of mix. Vibratory attachment assures added compaction and still smoother finish.

STEEL STREET FORMS

PAVING FORMS

TRUCK MIXER

BULK CEMENT PLANTS

AGGREGATE BATCHING PLANTS

CLAMSHELL BUCKETS

and for BLACK-TOP too!

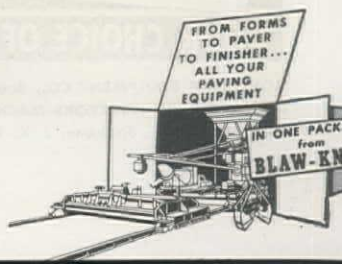
For a complete outfit that will give you better paving with the fewest men at lowest cost in the shortest time—standardize on BLAW-KNOX. One manufacturer and one responsibility for quality, performance and low cost.

THE ADNUN BLACK TOP PAVER, also a Blaw-Knox Product, will lay all types of black top mixes at big volume rates and in addition give you all these extra profitable job possibilities: laying stone, slag or gravel courses, laying soil cement and all types of built-up subgrade material.

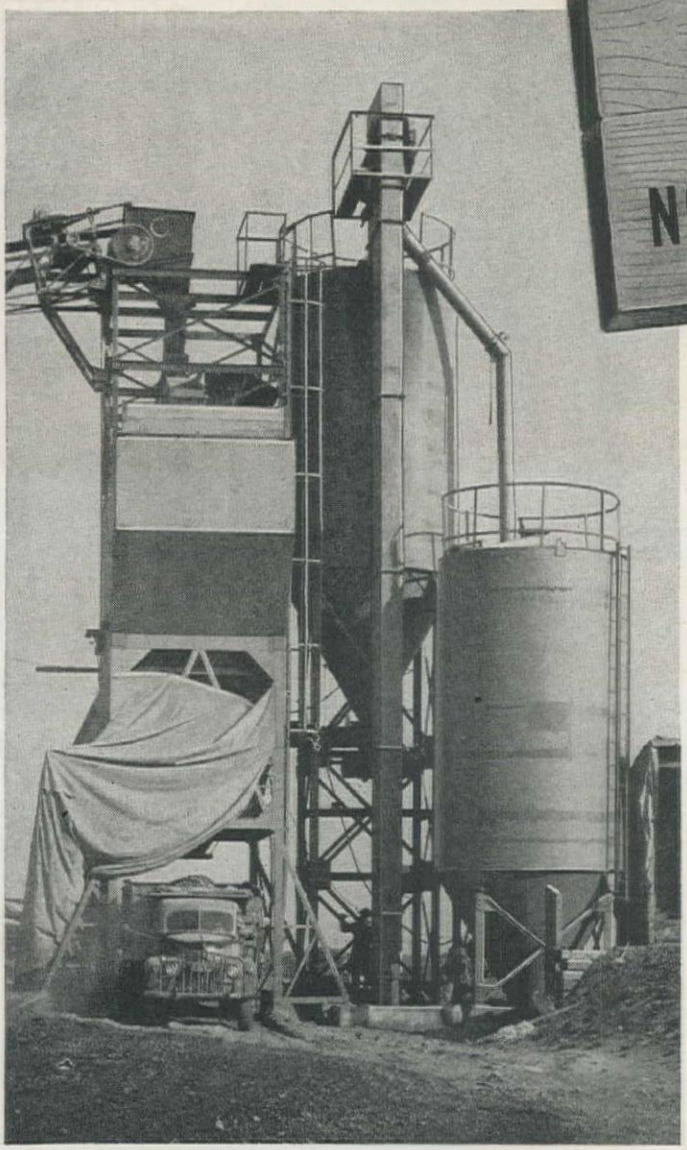
BLAW-KNOX

BLAW-KNOX DIVISION of BLAW-KNOX COMPANY
2102 Farmers Bank Building
Pittsburgh 22, Pa.

THE FOOTE CO., INC.
Subsidiary of Blaw-Knox Company
Nunda, N. Y.



This NOBLE full automatic CA154 plant batched the paving concrete for Peter Kiewit Sons' Company on new 4-lane highway at Malibu Beach. Kiewit used two 2000 cu. ft. cement silos to assure plenty of cement even during heavy pours. The same vertical 12" x 7" elevator raised cement from either the extra silo or the unloading hopper. Canvas protected operators from heavy ocean winds.



WHY PAVING CONTRACTORS MAKE MONEY *with* NOBLE BATCHING PLANTS

Accurate Batching—NOBLE poise beam scales assure accuracy to within .2 of 1%, well within State Highway Department specifications; no losses or penalties for over-or-under-weighing.

Easy, One-man Operation—All batching controls are centralized, enabling operator to handle heavy pours accurately all day without undue fatigue.

Cement and Time Saver—Central cement compartment pre-mixes cement with aggregate, reduces mixing time, eliminates dust and cement loss.

Easy to Erect or Move—A four-man crew will erect a plant in the field and have it in full operation in 3 or 4 days. Shop fitting before shipment, plus all-welded center section with scales, automatic batching controls and motor control switches in place, makes this feasible. All units can be shipped either by rail or truck.

NOBLE Distributors—You get parts and quick service from NOBLE distributors located throughout the West. Any job is within a few hours of NOBLE service.

CUSTOM-BUILT FOR YOUR JOB

You, too, can get these money-making advantages from a NOBLE plant, engineered from standard units to fit your exact needs, frequently at stock-model prices.

Aggregate bin capacities range from 80 to 1500 tons; cement silos from 500 cu. ft. to 7500 bbls., weigh hoppers from 1 to 4 yards. Our engineers will help you select sizes and design plant layout best suited to your needs. No obligation. Wire, write, or phone NOW.

DESIGNERS AND BUILDERS OF

CEMENT AND AGGREGATE BATCHING PLANTS • BULK CEMENT PLANTS • CONVEYORS • ELEVATORS • HEAD FRAMES • SWIVEL DISTRIBUTORS AND CHUTES • GATHERING HOPPERS • CALIBRATED WATER TANKS • WATER SCALES • SLIDE GATES • CLAMSHELL GATES • AGGREGATE BINS AND CEMENT SILOS

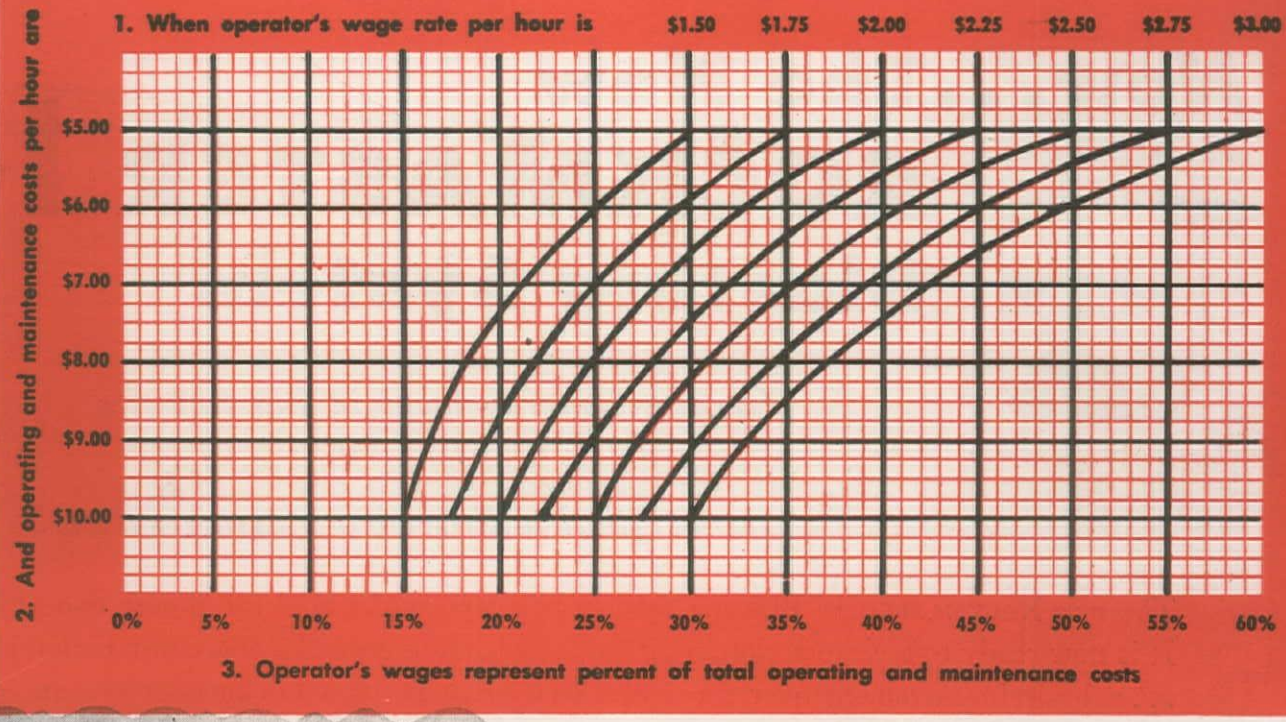
NOBLE CO.

1860 - 7th STREET • OAKLAND 7, CALIFORNIA
TEMPLEBAR 2-5785
4017 MEDFORD STREET • LOS ANGELES 33, CALIF. • ANGELES 2-6455

YOUR CHOICE OF MANUAL, SEMI-AUTOMATIC OR FULLY AUTOMATIC PROPORTIONING

BOW LAKE EQUIPMENT CO., Seattle; ENGINEERED SALES, San Antonio; HALL-PERRY MACHINERY COMPANY, Butte; RAY L. HARRISON CO., Albuquerque; LOGGERS & CONTRACTORS MACHINERY CO., Portland; EQUIPMENT SALES CORP., Oklahoma City, Okla.; TRI-STATE EQUIPMENT CO., El Paso; TRI-STATE EQUIPMENT CO., Spokane; J. K. WHEELER MACHINERY CO., Salt Lake City; CONNELL BROS., LTD., San Francisco; SIERRA MACHINERY CO., Reno, Nevada.

HOW OPERATOR'S WAGES AFFECT EARTHMOVING COSTS



Cost Conscious?

. . . then choose the LaPLANT-CHOATE MOTOR SCRAPER

to lower costs!

With operator wages the largest single cost item on most earthmoving jobs, increased machine production per man-hour is essential to reduced over-all costs. Look at the charts—what percent of *your* total operating cost is going into operator wages? If it's high, it means you aren't getting the pay load capacity and high speed production that minimize labor costs.

LaPlant-Choate Motor Scrapers are the shortest and most direct route to earthmoving "cost-saving." Their big 17.5 yard heaped capacity means *extra yards* in the fill every trip. Speeds up to 19.3 m.p.h. give you *extra trips per hour*. At your own bid price, figure the profit of just one additional, larger load per hour, over 10,000 hours of operation! That's why more and more cost-conscious contractors are choosing LPC Motor Scrapers . . . to insure the highest man-hour production at the lowest possible operating and maintenance costs. Investigate *all* their "cost-saving" features. Ask your nearest LPC distributor for a demonstration. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa—1022 77th Ave., Oakland, Calif.

HOW SPEED AND SCRAPER CAPACITY AFFECT *MAN-HOUR* PRODUCTION

SCRAPER CAPACITY IN PAY-YARDS	YARDS PER HOUR AT		
	10 MPH	15 MPH	3.5 MPH
8	106	133	52
11	146	183	71
14	186	233	91

Based on one way haul of 1000 feet
Loading time—one minute
Ejection and turn time—one-half minute
Efficiency—fifty-minute hour

LPC MOTOR SCRAPERS GIVE YOU

- A BIG CAPACITY SCRAPER HAULING UNIT—14 cu. yds. struck . . . 17.5 cu. yds. heaped.
- BIG POWER—a 225 H.P. Buda Diesel engine gives the unit high performance under the most adverse operating conditions (over 16 H.P. available for every struck yard of scraper capacity).
- BIG TIRES—with ample load carrying capacity, ample traction and flotation insuring fast and consistent operation with big loads in sand, mud, gumbo and other off-highway conditions.
- BIG SPEEDS—up to 19.3 m.p.h., developing the maximum practical working speed for off-highway conditions.

INDUSTRIAL EQUIPMENT COMPANY OF SOUTHERN CALIFORNIA
4441 Santa Fe Ave., Los Angeles 11, Calif.

WESTERN CONSTRUCTION EQUIPMENT CO.
505 N. 24th St., Billings, Montana
Stephens & Mount Ave., Missoula, Montana

GENERAL EQUIPMENT COMPANY
1201 East 2nd St., Reno, Nevada

HEINER EQUIPMENT & SUPPLY CO.
501 W. Seventh Street South
Salt Lake City, Utah

N. C. RIBBLE CO.
1304 N. Fourth St., Albuquerque, N. M.

ENGINEERING SALES SERVICE, INC.
410 Capitol Blvd., Boise, Idaho

COLUMBIA EQUIPMENT COMPANY
1240 S.E. 12th Ave., Portland 14, Ore.
and Seattle, Washington

THE MERRILL-BROSE CO.
11th & Howard Sts., San Francisco 3, Calif.

LaPLANT-CHOATE

Now...The New ROCKMASTER 16 Blasting System

Less Bark . . . More Bite

Greatest Improvement in Blasting Since Atlas Pioneered Rockmaster— the original milli-second blasting system!

The *new* ROCKMASTER 16 Blasting System has been under trial for almost two years. It is now ready to go into action in pits, quarries, underground work, construction jobs . . . a basic improvement over the sensational original Atlas Rockmaster system.

ROCKMASTER 16 brings you a *sixteen-stage* milli-second delay system! It gives you *all* the advantages of the original ROCKMASTER three-delay system PLUS new and even better control over breakage, throw, noise, vibration . . . sufficient milli-second delays to fill out large underground rounds and shots requiring a large number of delays.

Here are just a few of the many outstanding advantages of the new ROCKMASTER 16 *Blasting System demonstrated in actual field work.*

BETTER BREAKAGE means cheaper loading and milling . . . less secondary shooting. Wide choice of milli-second delays gives you improved control over material size.

CONTROLS BACK-BREAK . . . SAVES COAL IN STRIPPING. *Sixteen* periods give you long or short milli-second delays as needed for different formations. Explosive energy is directed toward burden—not wasted in back-break or in degradation of coal.

INCREASES MINE SAFETY. Less vibration means less strain on timbers and roof, less dust, quicker return to face. *Sixteen* delay periods fire in 550 milli-seconds!

REGULATES THROW. Gives high rock piles at the face—or lower piles farther out. *Sixteen* ROCKMASTER periods give you remarkable control of throw.

MORE MATERIAL PER POUND OF EXPLOSIVES. More footage per round. Makes savings in dynamite, in drilling, or both.

FEWER COMPLAINTS ABOUT NOISE AND VIBRATION. ROCKMASTER 16 frequently cuts vibration more than 60%—even when more dynamite is used!

ROCKMASTER 16 TIMINGS

Rockmaster No.	Avg. Time of Each Delay from Zero (milli-seconds)
0 (zero)	0 (inst.)
1	8
2	25
3	50
4	75
5	100
6	125
7	150
8	175
9	200
10	250
11	300
12	350
13	400
14	450
15	500
16	550

ROCKMASTER: Reg. U. S. Pat. Off.

Offices in Principal Cities

ATLAS EXPLOSIVES

"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

SAN FRANCISCO 4, CAL. ATLAS POWDER COMPANY SEATTLE 1, WASH.

MINNEAPOLIS-MOLINE
MM
MODERN MACHINERY

INDUSTRIAL WHEELERS

FLEXIBILITY • SPEED • HIGH CAPACITY WITH MINIMUM OPERATOR FATIGUE

"Drawbar Designed*"

FOR PULL-BEHIND ATTACHMENTS

* MM Industrial Wheelers are available with adjustable pintle hook or swinging drawbar for a wide range of job applications . . . they give you extra utility and greatest flexibility.

A selection of single or dual rear tire equipment is available for maximum flotation and grip on all surfaces.

Front, side, and rear power take-offs provide direct drive for all hydraulically or mechanically operated equipment.

"Front-End Designed*"

FOR FRONT-END ATTACHMENTS

* Dependable performance of MM Industrial Wheelers is obtained by heavy-duty industrial design. Their outstanding efficiency for handling all jobs is largely the result of their flexibility in operation with a complete selection of attachments.

Heavy-duty H-section front axle, front wheels that are heavy cast and inset for easy steering, and oversize tires provide load capacities up to 10,000 lbs. without overloading.

The "shuttle gear" for fast reversing . . . roller steering that makes easier handling of any load . . . enable MM Industrial Wheelers to handle more loads per hour on loading and dozing jobs with less operator fatigue.

SOLD AND SERVICED BY

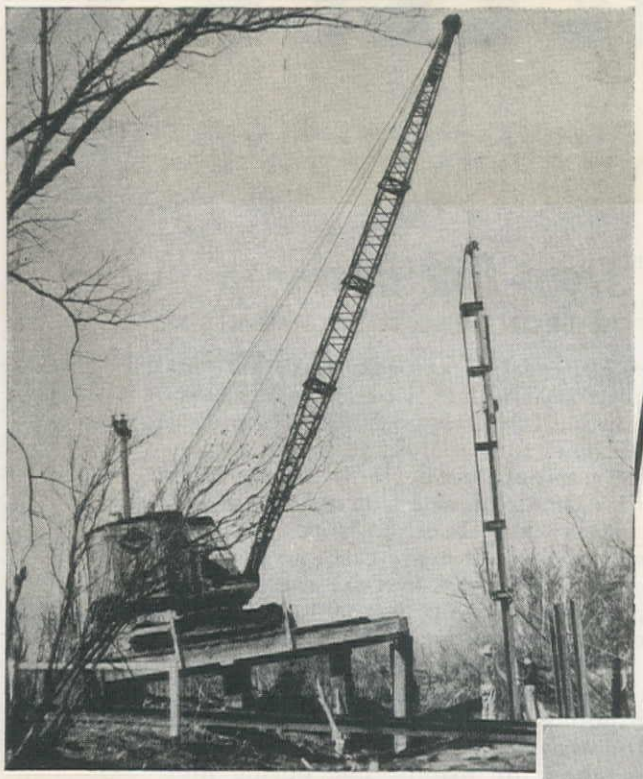
LEE REDMAN EQUIP. CO., Phoenix, Ariz.; INDUSTRIAL EQUIP. CO. OF SO. CALIF., Los Angeles, Calif.; WESTERN MACHINERY CO., Sacramento and San Francisco, Calif.; CLYDE EQUIP. CO., Portland, Ore., and Seattle, Wash.; MODERN MACHINERY CO., Spokane, Wash.; THE SAWTOOTH CO., Twin Falls and Boise, Idaho; REED HDWE. & IMPLT. CO., Idaho Falls, Idaho; MISSOULA MERC. CO., Missoula, Mont.; HAMILTON EQUIP. CO., Salt Lake City, Utah; HARRY CORNELIUS CO., Albuquerque, N. Mex.; BASIN TRUCK & IMPLT. CO., Durango, Colo.; CONSTRUCTORS EQUIPMENT CO., Denver, Colo.; LADD LUMBER & MERC. CO., Pueblo, Colo; CENTRAL MACH. CO., Great Falls and Havre, Mont.; CROSKREY-CARLSON CO., Kalispell, Mont.; GALLATIN IMPLT. CO., Bozeman, Mont.; MILLS IMPLT. CO., Billings, Mont.; TRACTOR & EQUIP. CO., Miles City, Mont.; WYOMING ELEV. & SUPPLY CO., Worland, Wyo.; GARVEY TRUCK SERVICE, Stockton, Calif.

Get Complete Information
FROM YOUR NEAREST MM DEALER

MINNEAPOLIS-MOLINE
MINNEAPOLIS 1, MINNESOTA

LIMA Paymaster

"We are very pleased with our Model 34--- as it is always ready for work"



ELKHORN CONSTRUCTION COMPANY
General Construction
Post-Office Box 479
NORFOLK, NEBRASKA

June 30, 1948

Lima-Hamilton Corporation
Lima, Ohio.

Gentlemen:

We are enclosing some photographs of a LIMA Model 34 combination crane and dragline which was delivered to us in the fall of 1946. The machine is ideally suited to our requirements, being light enough to transport anywhere on our lowboy and yet having capacity to handle a 31 cu.ft. light weight dragline bucket or as a crane to pick up a 27,000 lb. load. Since we took delivery on the machine it has never been idle with exception of three or four weeks of bad weather each winter. Our work is mostly dragline work but we have done a considerable amount of pile driving, clamshell work and steel erection as well as odd jobs such as placing smokestack, unloading and placing heavy machinery, boilers, tanks and transformers. To date the only new parts we have needed were some bushings for the dragline fairleads.

The photographs show the machine in use on a bridge job we recently completed. This is a 300 ft. bridge over the Elkhorn River. The bridge consists of two 75 ft. approach spans and one 150 ft. center span. Using the machine as a dragline we made the abutment and wing excavations. We then increased our boom length to 55 ft. and drove 10 in. H. Beam pier piling each 50 ft. long and the abutment piling which were 40 ft. long. All the steel trusses were assembled on the ground and lifted into place by the LIMA. The center span trusses weigh about 27,000 lb. each.

We are very pleased with our Model 34 as it takes a minimum of adjustments, is always ready for work and combines light weight with large crane capacity.

Yours very truly,
Elkhorn Construction Co.
F. W. Medelman
Medelman

FWM:RED

Driving 50 ft. Piling (10" H Beams) for the piers. 55 ft. Boom, 32 ft. Leads. 3300 lb. Drop Hammer, 700 lb. Pile Cap.

Placing 75 ft. Trusses weighing about 7500 lbs. each. Trusses had to be lifted over telephone-wires.

Dependability, large capacity, per pound of weight, and fast operating speeds are typical of all LIMA equipment from the ¾ yard Paymaster to the 6 yard shovel and 110 ton crane. Performance records like those mentioned in the letter above are being made by satisfied users the country over. They are the result of expert engineering, superior workmanship and higher quality materials which go into every LIMA unit. Moreover, every LIMA is subjected to gruelling performance tests before shipment, assuring continuous dependable performance from the day it is placed in service.

LIMA EQUIPMENT SOLD AND SERVICED BY:

Our Seattle Office: 1932 First Avenue So., Seattle 4, Washington

Our San Francisco Office: 1315 Howard Street, San Francisco 3, California

Sales Agents:

Feenaughty Machinery Co., 112 S. E. Belmont St., Portland 14, Ore.
Feenaughty Machinery Co., 600 Front St., Boise, Idaho
Smith Booth Usher Co., 2001 Santa Fe Ave., Los Angeles 54, Calif.
McCoy Co., 3201 Brighton Blvd., Denver 5, Colo.
Contractors' Equipment & Supply Co., Springer Bldg., Albuquerque, N. M.
Modern Machinery Co., Inc., 4412 Trent Ave., Spokane 2, Wash.
Foulger Equipment Co., Inc., 1361 South Second Street West, Salt Lake City 8, Utah
Acme Iron Works, Culebra Ave. at Expressway, N.W., San Antonio, Texas
Thompson-Sage, Inc., 400 South Wilson Way, Stockton, Calif.
Jameson Engineering Sales, Fairbanks, Alaska

Lima Shovel and Crane Division

LIMA, OHIO

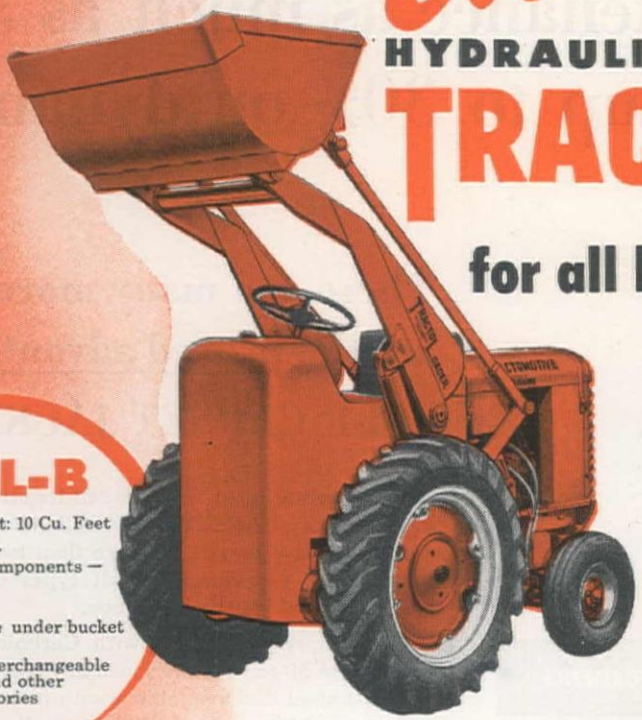
OTHER DIVISIONS: *Lima Locomotive Works Division; Niles Tool Works Co.; Hooven, Owens, Rentschler Co.*

LIMA HAMILTON CORPORATION

now!

BUILDER OF FAMOUS TRACTO-SHOVEL ANNOUNCES two new HYDRAULICALLY OPERATED TRACTO LOADERS

for all kinds of material handling



model TL-B

- Standard bucket: 10 Cu. Feet
- Weight 5,250 lbs.
- Major tractor components — Allis-Chalmers
- Brake Hp. 27.8
- Max. clearance under bucket hinge, 6' 2"
- NOTE—Interchangeable buckets and other accessories

MORE PRODUCTION WITH LESS OPERATOR EFFORT

FULL LOAD IN BUCKET MAKES STEERING EASIER —NOT HARDER Tracto-Loader design — bucket over driving wheels, steering wheels in rear—gives you better traction, easier steering. Saves bogging down—saves dumping part of load to get out of soft going.

GETS BIG LOADS IN SMALL WORKING AREAS Eases into material—no ramming. Forward crowding action and automatic "tilt-back" of bucket mean fast, easy loading . . . bigger loads, in closest quarters!

HYDRAULIC BUCKET CONTROL Fast-acting, positively controlled bucket can be dumped in part or all at once at any height to maximum. Dumps clean—sticky material shakes loose.

FULL VISION Unobstructed operator vision . . . handy controls, comfortable seat.

HIGHEST QUALITY MATERIALS THROUGHOUT for long, dependable service. Hydraulic system has leak-proof, seamless steel tubing and hose lines with "Instant Fix" detachable and re-usable fittings—no waiting for parts.

model TL-W

- Standard bucket: ½ Cubic Yard
- Weight 8,000 lbs.
- Major tractor components—Allis-Chalmers
- Brake Hp. — 38.45
- Max. clearance under bucket hinge, 8' 8"
- NOTE—Interchangeable buckets and other accessories

get all the facts...send coupon for more information

TRACTOMOTIVE

Tractomotive Corporation ***Now in our new plant at Deerfield, Illinois***

NATION-WIDE SALES AND SERVICE

SOLD AND SERVICED EXCLUSIVELY THROUGH ALLIS-CHALMERS INDUSTRIAL TRACTOR DEALERS

TRACTOMOTIVE CORPORATION • Deerfield, Illinois

Please send more information on Tracto-Loader: Model TL-W_____, Model TL-B_____

Name_____

Type of Business_____

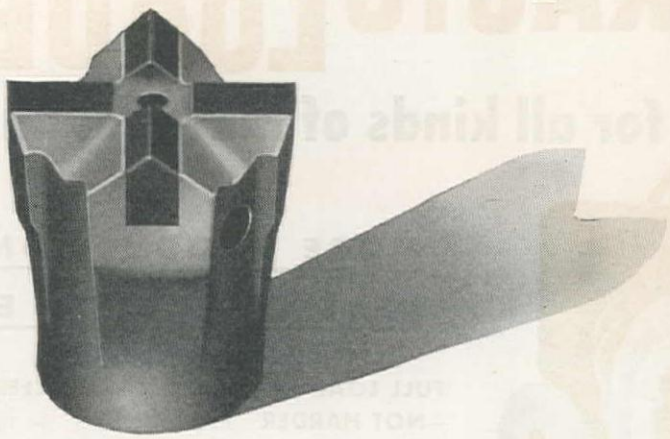
Street_____

City_____ State_____

WCN

Carset Jackbits

Reduce air consumption at least 40%
Reduce drill maintenance as much as 30%
Save up to 30% on dynamite



These and many more are the proved advantages of I-R CARSET JACKBITS

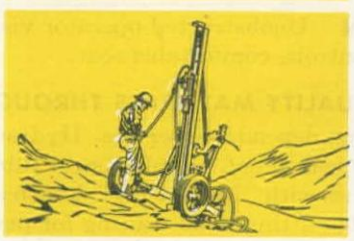
The performance and economy of Ingersoll-Rand's revolutionary CARSET JACKBIT are now a matter of record — proved by more than two years of actual field experience on all types of mining, quarrying and construction jobs.

This super-Jackbit set with Carboloy inserts, drills from 50 to 400 times as many feet of hole as the best steel bits available — with no appreciable gauge wear! It permits drilling of smaller, uniform-diameter holes to any practical depth, without binding and without bit changes. The elimination of tapered holes saves up to 30% on dynamite alone. And because it drills so much faster and easier, even in the hardest rock, the CARSET JACKBIT reduces air consumption per foot of hole 40% or more, and saves as much as 30% on drill maintenance. No wonder rock-drill men call it "The greatest single advance in rock drilling since the invention of the Jackhamer."

For the complete story on the CARSET JACKBIT, write today for your copy of our new 36-page, pocket-size catalog, Form 4091.

HERE ARE A FEW TYPICAL REPORTS ON CARSET PERFORMANCE

ON A LARGE QUARRY JOB, drilling in hard trap rock with 45-lb. Jackhamers, steel bits dulled so quickly that they required 4 to 6 bits for a 2-ft. change — also the strain of forcing dulled bits caused excessive rod breakage. CARSET JACKBITS, now being used, are averaging 300 feet per bit. Rod life has been greatly increased and drill maintenance materially reduced.



ON A LARGE DAM PROJECT, 2" CARSET JACKBITS were used with 4" Wagon drills operating in hard dense basalt. These bits drilled 24-ft. holes in 22 minutes, while steel bits previously used required 66 minutes for an 18-ft. hole (with 10 bit changes). Footage was increased from 120 to 261 feet per shift. The contractor says "If I'd had CARSET JACKBITS at the beginning of the job, I'd have saved $75,000 to $100,000."

IN DRILLING LARGE BOULDERS, for blasting in an open pit operation, Jackhamer operators increased drilling speed from 4 inches per minute with steel bits to 10 inches per minute with CARSET JACKBITS. This combination of higher drilling speed and the saving of time previously lost changing bits, permitted them to complete 60% more plug holes per day.

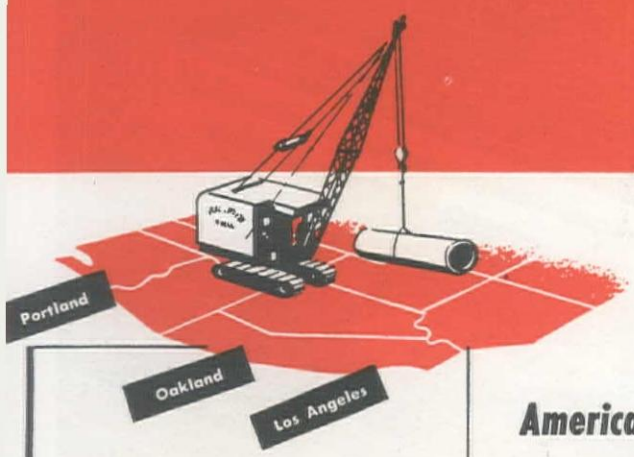
A MINING COMPANY, drove 223 feet of 8 x 8 cross-cut in typical siliceous rock with 3" drifters and 1½" CARSET JACKBITS. Eighteen bits were used, averaging over 300 feet per bit. By drilling small uniform diameter holes with CARSET JACKBITS, they saved 8 pounds of dynamite per foot of advance, or total of $223. — which more than paid for the cost of the CARSET JACKBITS!

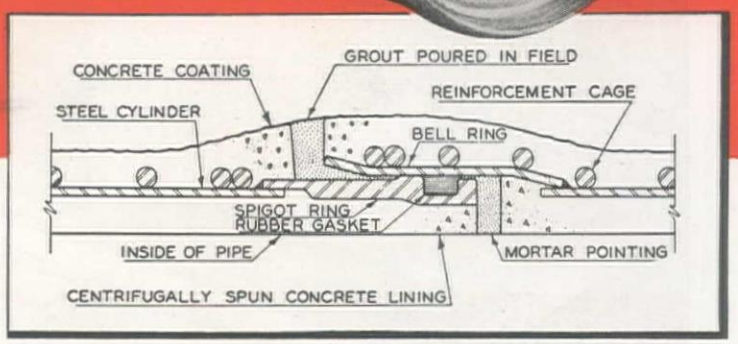
manufactured exclusively by

Ingersoll-Rand

412-15 11 BROADWAY, NEW YORK 4, N. Y.

NOW Over 700,000 feet of proof!





Three plants to serve you

Typical installations

- City of Dallas, Oregon—5500′ of 16″, 150 psi operating pressure—1948
- City of Ellensburg, Washington—37,100′ of 18″ and 24″, 150 psi—1948
- City of Long Beach, Calif.—7165′ of 20″, 24″ and 30″, 150 psi—1947—'49
- U. S. Air Force, Muroc Air Base, Muroc, Calif.—20,300′ of 14″, 150 psi—1947
- U. S. Army, Richland, Washington—Hanford Engineering Works—120,500′ of 24″, 30″ and 42″, 150 and 250 psi—1944
- San Diego County Water Authority—128,600′ of 14″ thru 39″, 150 psi to 225 psi—1947—'48
- U. S. Navy, Treasure Island, San Francisco—14,000′ of 14″, 150 psi—1944
- City of Whittier, Calif.—12,900′ of 14″, 16″, and 24″, 150 psi—1948—'49

American Concrete Cylinder Pipe helps reduce the cost of delivered water throughout the Pacific States

Although the Company began the development and manufacture of American Concrete Cylinder Pipe eighteen years ago, 1941 marks the first appearance of this composite, modified prestressed pipe in its present form. Since 1941, this pipe has become established throughout the West as one of the outstanding developments in the field of pressure transmission of water. American Concrete Cylinder Pipe combines efficiency and economy in the medium diameter range from 14″ to 36″ inclusive and in the range of operating pressures from 100 psi upward. This pipe is manufactured in nominal lengths of 30 feet. Its design incorporates the physical properties of steel with the protection and permanency of concrete. The Lock Joint Rubber Gasket Joint simplifies installation—assures positive water-tightness under normal operating conditions.

The economies of American Concrete Cylinder Pipe are reflected in initial cost, ease of installation, sustained capacity, and trouble-free service. All of these factors mean substantial savings in the cost of delivered water. Complete information available upon request.

IN PACIFIC NORTHWEST...

This Company's Portland Plant is now fully equipped to furnish American Concrete Cylinder Pipe to water users in the Pacific Northwest. Inquiries to Box 1898, Piedmont Station, Portland 11, will receive prompt attention.

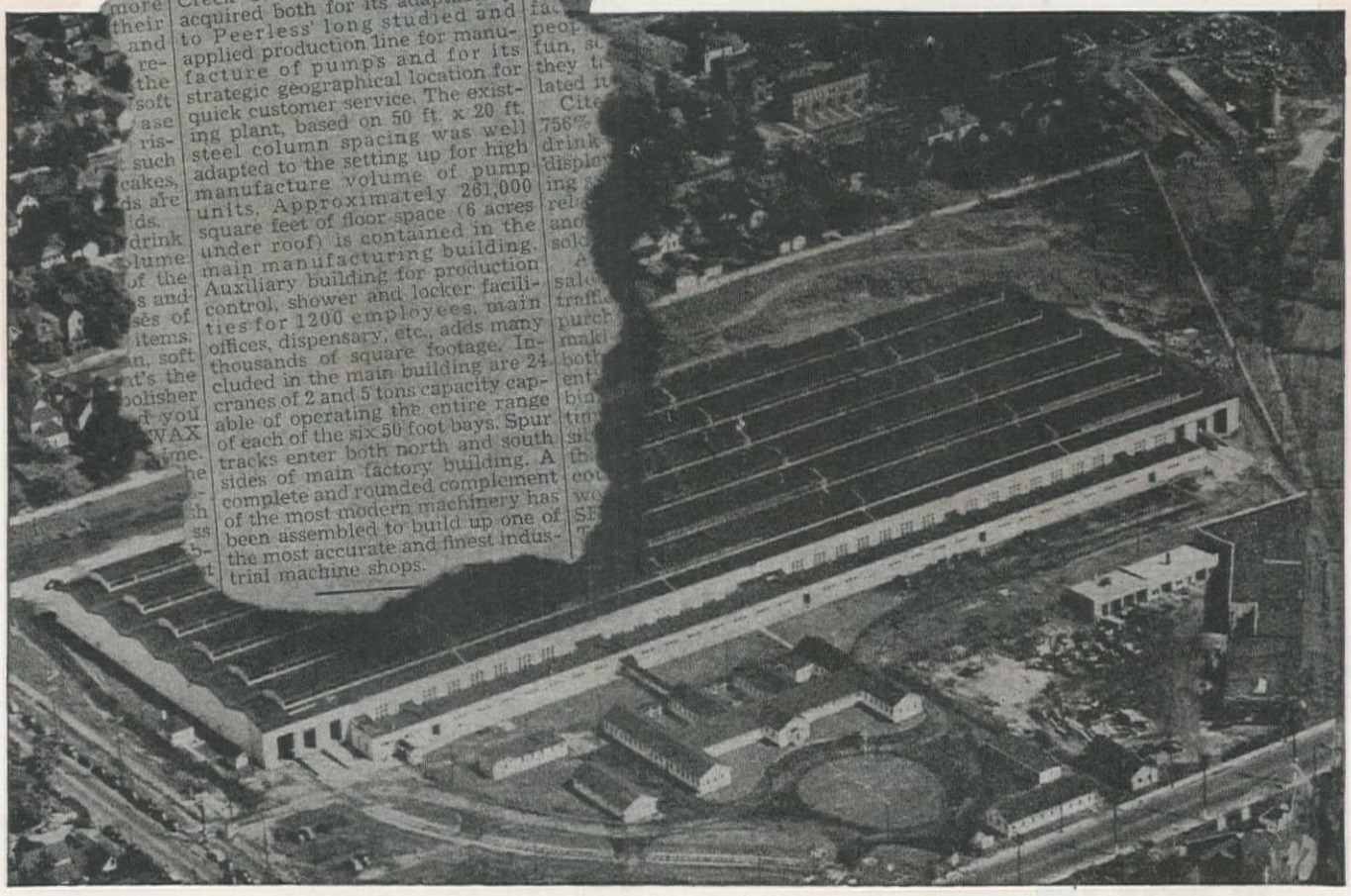
American PIPE AND CONSTRUCTION CO.

Concrete Pipe for Main Water Supply Lines, Storm and Sanitary Sewers, Subaqueous Pipe Lines
P. O. Box 3428, Terminal Annex, Los Angeles 54, California

Quality pipe line products manufactured and installed by American include: Lock Joint Concrete Cylinder Pipe, American Concrete Cylinder Pipe, Prestressed Lock Joint Concrete Cylinder Pipe, Centrifugal Concrete Pressure Pipe.

MAIN OFFICES AND PLANT—4635 FIRESTONE BOULEVARD, SOUTH GATE, CALIFORNIA
DISTRICT SALES OFFICES AND PLANTS—OAKLAND—SAN DIEGO—PORTLAND, OREGON

NEWEST PUMP FACTORY IN THE U. S. GEARED TO HIGH SPEED PRODUCTION OF HORIZONTAL AND VERTICAL PUMPS



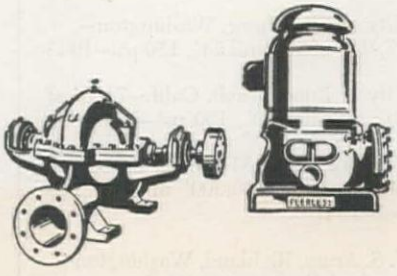
New Eastern Facilities For Peerless Pump Division On Huge Site At Indianapolis

INDIANAPOLIS, IND.—Peerless Pump Division's new Indianapolis works is the former Fall Creek Ordnance Works and was acquired both for its adaptability to Peerless' long studied and applied production line for manufacture of pumps and for its strategic geographical location for quick customer service. The existing plant, based on 50 ft. x 20 ft. steel column spacing was well adapted to the setting up for high manufacture volume of pump units. Approximately 261,000 square feet of floor space (6 acres under roof) is contained in the main manufacturing building. Auxiliary building for production control, shower and locker facilities for 1200 employees, main offices, dispensary, etc., adds many thousands of square footage. Included in the main building are 24 cranes of 2 and 5 tons capacity capable of operating the entire range of each of the six 50 foot bays. Spur tracks enter both north and south sides of main factory building. A complete and rounded complement of the most modern machinery has been assembled to build up one of the most accurate and finest industrial machine shops.

Peerless Pump plant at Indianapolis, Indiana

19 ACRES OF MODERN PLANT FACILITIES DEVOTED EXCLUSIVELY TO MAKING PUMPS

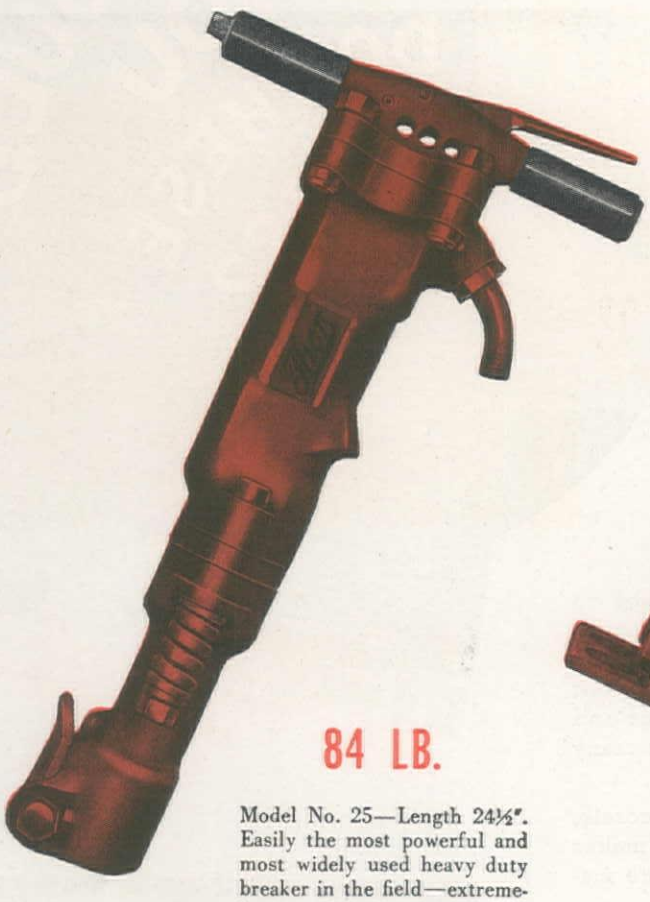
Here is one of America's most modern pump factories. Peerless Pump's new plant at Indianapolis is devoted entirely to making pumps and handling pump service. All types of pumps in the Peerless line, horizontal centrifugal, deep well and close-coupled turbines, Underwriters' approved fire pumps and domestic water systems are made and serviced in this plant. No expense has been spared in tooling Peerless-Indianapolis to insure accurate pump production; testing facilities at Indianapolis are being incorporated into one of the largest pump laboratories in the country. Add these factors to sound basic Peerless pump designs, to the high caliber of Peerless personnel and to Peerless extensive manufacturing facilities at Los Angeles, California, and they combine to make available as comprehensive pump service as is offered to pump owners and buyers anywhere. Peerless-Indianapolis is open for your inspection. You are cordially invited to see for yourself how Peerless-Indianapolis will exactly fit your needs for pumps and pump service. Plan with Peerless; there are horizontal and vertical types for most services, in all industries. Descriptive Bulletins are available on all types upon request.



Peerless
VERTICAL AND HORIZONTAL
Pumps

PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION
Los Angeles 31, California Indianapolis, Indiana
District Offices: New York 5, 37 Wall Street; Chicago 40, 4554 North Broadway; *Atlanta Office:* Rutland Bldg., Decatur, Georgia; Omaha, Nebr., 4330 Leavenworth Street; Dallas 1, Texas; Fresno, California; Los Angeles 31, California

BREAKER FOR EVERY JOB!



84 LB.

Model No. 25—Length 24½". Easily the most powerful and most widely used heavy duty breaker in the field—extremely powerful for all types of heaviest demolition work and spike driving.

SHEETING DRIVER

Model No. 25S—Length 29½". The powerful, heavy duty model 25 breaker fitted with attachment for driving steel or wood sheeting up to three inches thick.

INDEPENDENT PNEUMATIC TOOL CO.

Aurora, Illinois

Export Division 330 W. 42nd St., New York 18, N. Y.

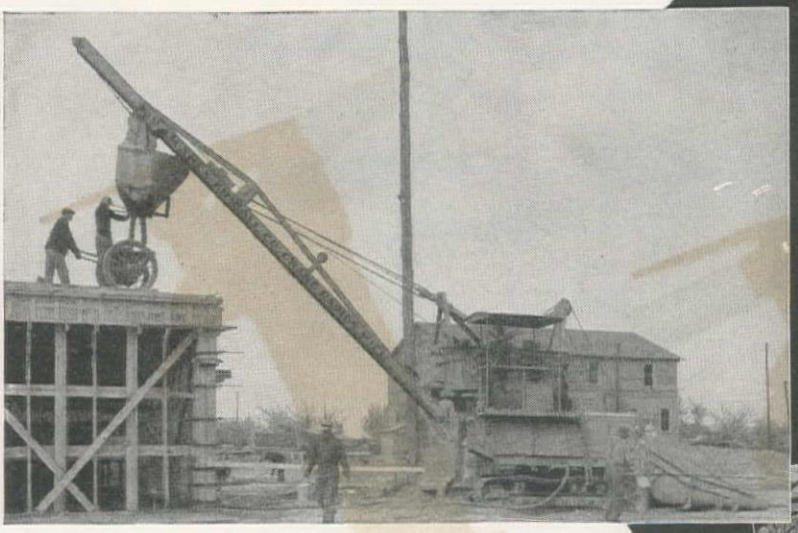
Birmingham Boston Buffalo Chicago Cincinnati Cleveland Denver Detroit Houston Los Angeles Milwaukee New York Philadelphia Pittsburgh St. Louis St. Paul Salt Lake City Seattle San Francisco Toronto, Canada Sao Paulo, Brazil London, England

POWERFUL IN ITS CLASS!

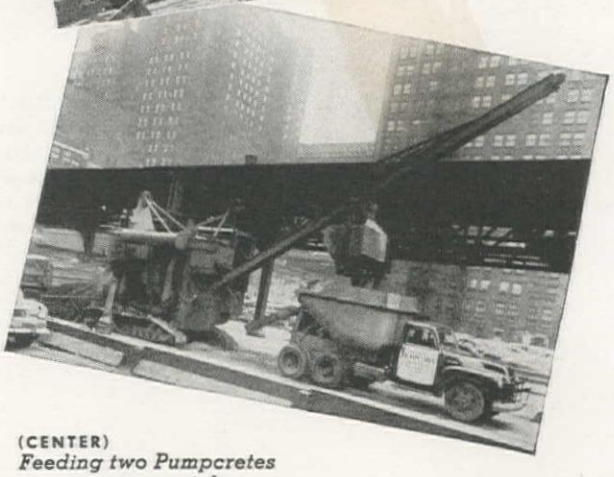
Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

HOW WOULD YOU DO THESE JOBS?



This machine is alternating between pouring to forms and loading concrete buggies. No ramps or cranes required.



(CENTER)
Feeding two Pumpcretes on a sewer job.

HERE are simple every day pouring jobs on which time and money can be saved over ordinary methods. A MultiFoote Paver with the HighLift Boom and MultiFeed Bucket will pour right to forms or conveying equipment and eliminate mixer, crane, false work and in many cases elevator or hoisting equipment.

It assures more uniform delivery of concrete, saves time for concrete buggy men, and makes possible the direct charging of Pumpcrete machines or concrete trucks.

Your MultiFoote HighLift Boom has a lift of 23 feet with clearance under the bucket and your MultiFeed Bucket will deliver a shovelful or a barrowful. Here is a better answer to your retaining wall, one story building wall, abutment construction and concrete footing problems. Your MultiFoote gives you new versatility in job bidding.

Ask for the booklet *"How Would You Do These Jobs?,"* showing how the HighLift Boom has simplified pouring jobs. Don't plan your next contract without looking into the HighLift Boom!

(ABOVE)
Loading a concrete truck on a subway job.

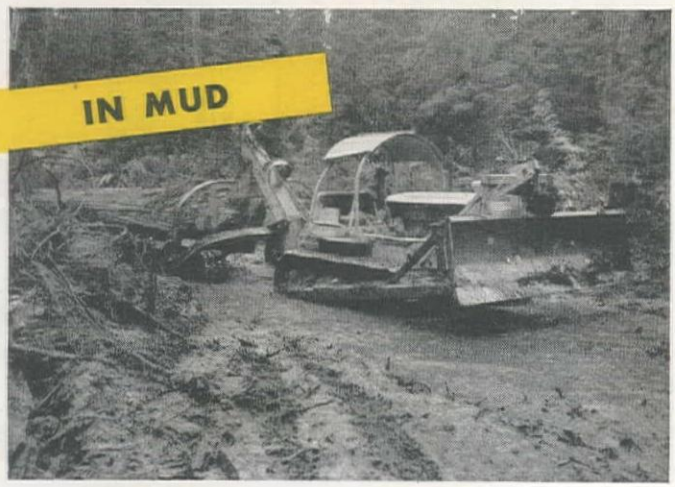
THE FOOTE COMPANY, INC.
Subsidiary of Blaw-Knox Co.
1940 State Street **Nunda, New York**

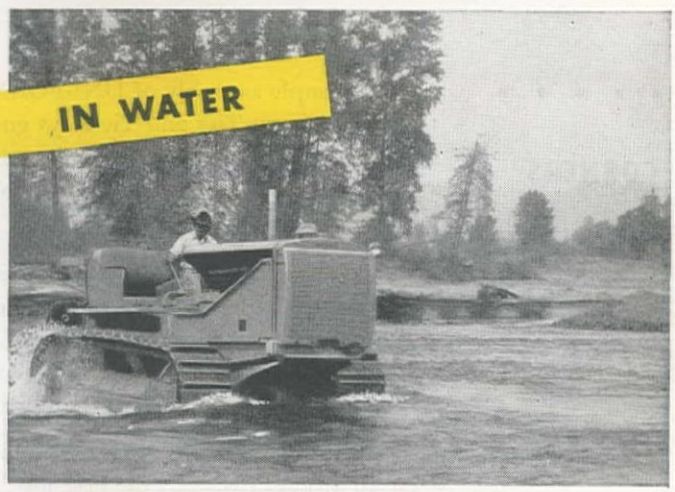
MULTIFOOTE

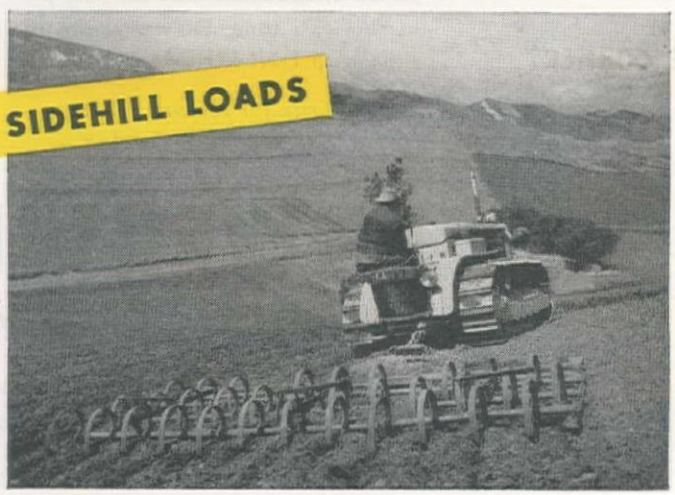
A BLAW-KNOX PRODUCT
FROM FORMS TO PAVER TO FINISHER... ALL YOUR PAVING EQUIPMENT
IN ONE PACKAGE from BLAW-KNOX

THREE SIZES
27-E Singlemix (Single drum)
34-E Singlemix (Single drum)
34-E Duomix (Double drum)

HIGH LIFT TRADE MARK BOOM







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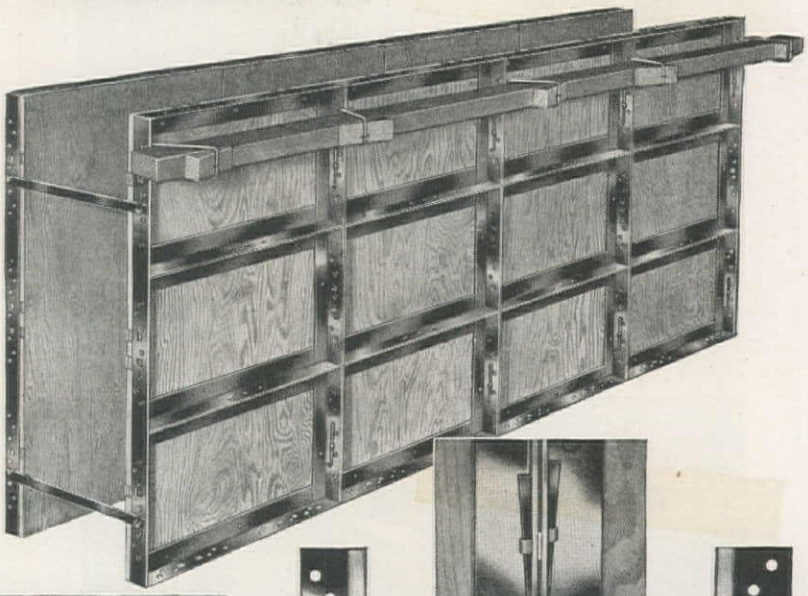

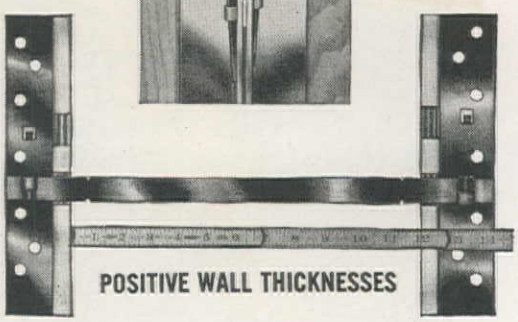

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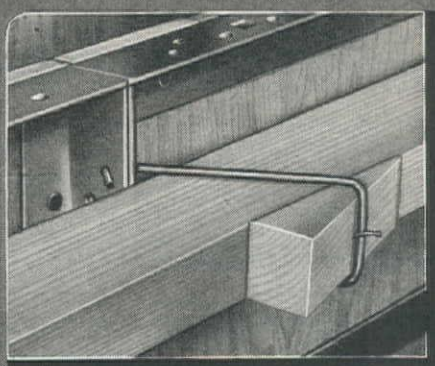

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JOY K-81, a rugged tool capable of sustained operation on the heaviest demolition work.

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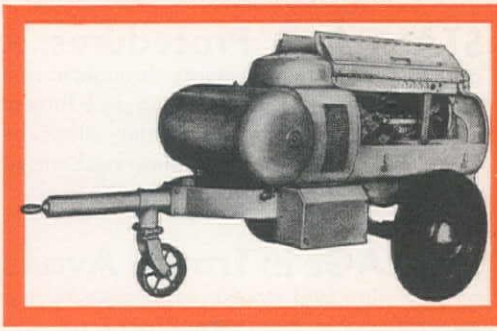

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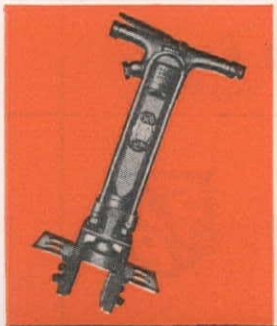

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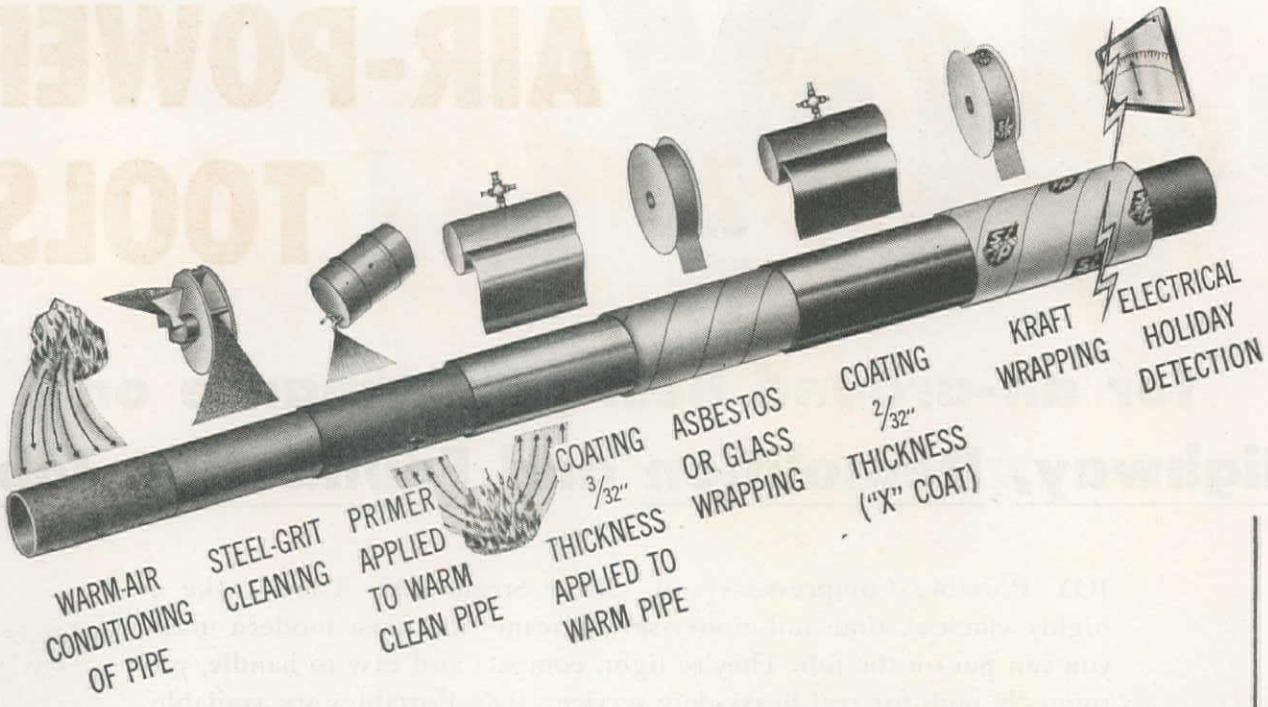

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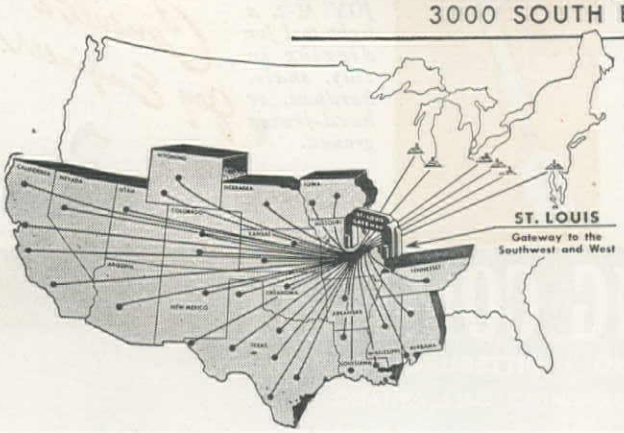

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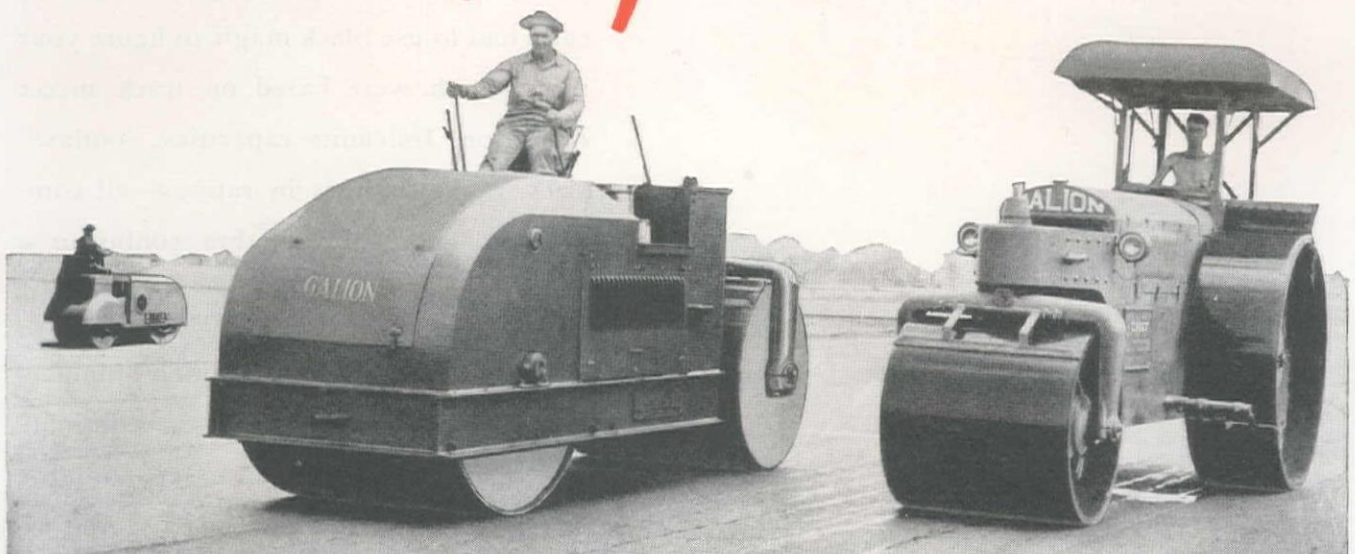

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Abracadabra is expensive. Many of you found that out years ago. You practically had to use black magic to figure your costs which were based on truck mixer operation. Indefinite capacities, "outlaw" sizes, rapid changes in ratings—all combined to make abracadabra confusion a big expense.

That's why the Truck Mixer Manufacturers Bureau was formed—to eliminate that costly abracadabra. We set standards which guarantee size and capacity. And we put a rating plate on each truck mixer. The Bureau has taken the mumbo-jumbo out of figuring truck mixer operating costs, and erased the confusion of "outlaw" sizes.

We think you prefer it this way—with established standards and a rating plate to guarantee size and capacity. Look for that plate, and read it with confidence.

Truck Mixer Manufacturers Bureau

Affiliated with The National Ready Mixed Concrete Association

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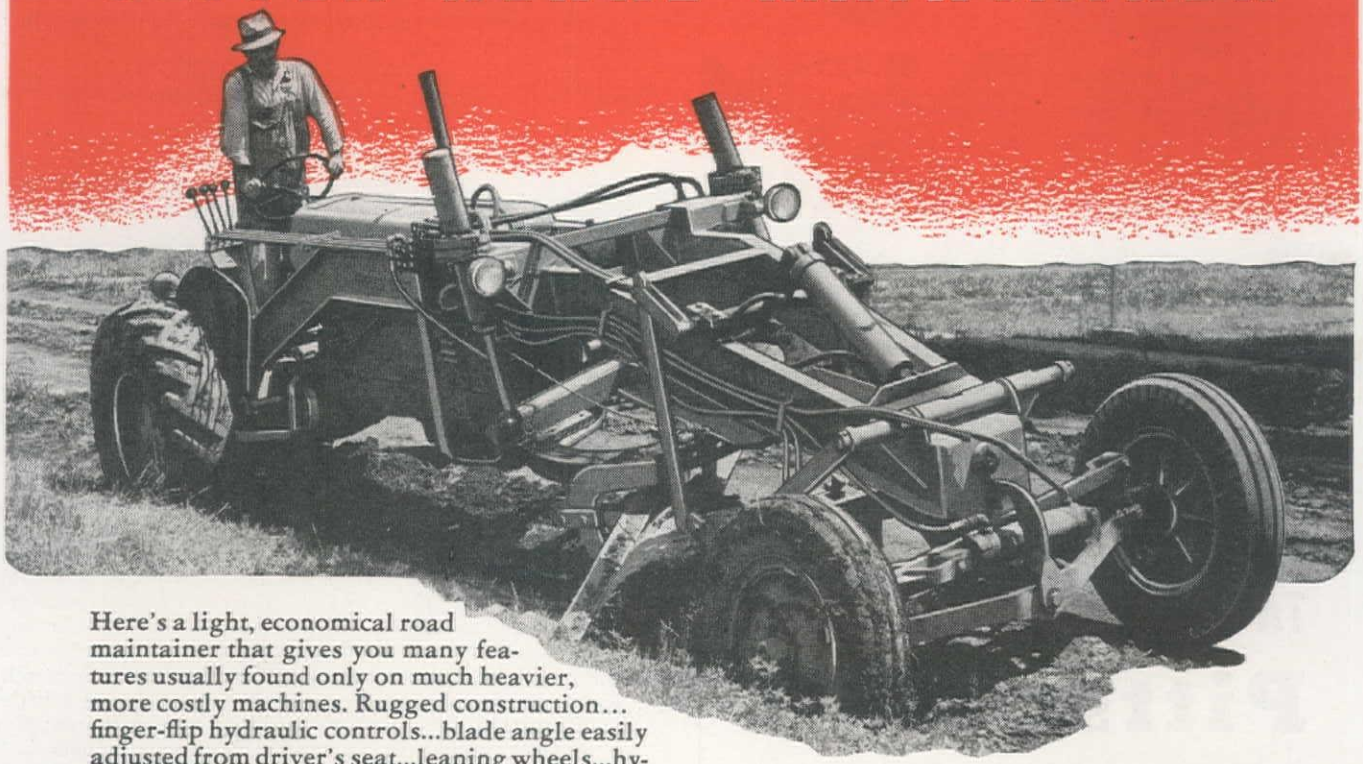
made easy and economical with the

OLIVER-HENKE MAINTAINER



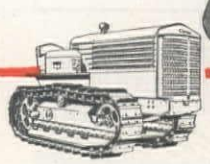
Here's a light, economical road maintainer that gives you many features usually found only on much heavier, more costly machines. Rugged construction... finger-flip hydraulic controls...blade angle easily adjusted from driver's seat...leaning wheels...hydraulic scarifier...hydraulic steering...12-foot blade...plus many other important advantages are yours with the OLIVER-Henke Maintainer.

The powerful OLIVER Model 88 Industrial Tractor gives the unit plenty of power for economical maintenance of gravel and dirt roads and light ditching work. The famous OLIVER "Fuel Miser" engine with variable speed governor assures minimum fuel consumption. The entire unit is easily accessible for service. All wearing parts can be inexpensively replaced if necessary. And, if desired, the tractor can be readily removed from the Maintainer and a front-end loader quickly installed.

For efficient, economical road maintenance, the OLIVER-Henke Maintainer will effectively augment your heavy equipment and do a large share of the work at reduced operating costs. Ask your OLIVER Industrial Distributor to show you the outstanding economy of this unit.

The OLIVER Corporation

Industrial Division: 19300 Euclid Avenue, Cleveland 17, Ohio



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The Editor's Mail . . .

Gunite and Fish Approved

Editor, Western Construction News

We genuinely appreciate the story which you carried in your May 15 issue describing our Gunite work on the General Petroleum Building in Los Angeles. I am sure you can appreciate why we are proud of this job and like to have our friends know about it.

Incidentally, we are just now getting underway with a fireproofing Gunite job on the addition to the Standard Oil Building now being erected in San Francisco.

It is our belief that use of Gunite on structures of this type will increase as time goes by. At any rate, we are bending every effort to find better and more economical means of doing such work.

ELDEN SMITH
San Pedro, Calif. President, Johnson Western Co.

Editor, Western Construction News

I wish to express appreciation for your editorial in the March issue of *Western Construction News* entitled "Washington Loses to the Fish."

We were especially well pleased with your analysis of the situation and wish that we had much more support from others along the same line. We hope the matter is not a closed one, and surely intend to protect the City's interest on the Cowlitz River by all possible means.

J. FRANK WARD
Superintendent, Light Division,
City of Tacoma, Wash.

What Satevepost SAID!!!

Editor, Western Construction News

A recent article in a nation-wide weekly castigated both the Corps of Engineers and the Bureau of Reclamation for the unbridled spending of money on which neither would have risked their engineering reputation if the clients had been civilians. It is regrettably true that there is much in the article that can not be refuted. But let us get a little of the historical background before being too hasty in applying the presidential phrase, "a curse on both your houses."

The Corps of Engineers, in which I was an officer for many years before retirement, looks back upon its 145 years of governmental spending of money on public projects with pride, but with less pride, perhaps, since the days of the CCC, PWA and WPA. The Army Engineers have a record of honesty in office that is very difficult to criticize. Their offices are, admittedly, staffed with many excellent engineer civilians who do all the spade work and assemble the reports for their District Engineer to edit and publish over his own name. A certain amount of jealousy results in the publicity afforded the Army Engineer. The civilian engineer, anxious for publicity too, and sometimes forgetful of his security in his work and position, allows resentment to come out of his soul and often to be heard. So much for the civilian engineers who quite often over-staff the District offices, and, serving under successive District Engineers, often come to think they own their jobs.

During the era of the CCC and other alphabetical organizations, when, in the words of a general serving in Texas, "stage money" was being cast to the winds, a premium was put on the spending of government funds. Previous training in spending money had made the Army Engineer very cautious, researching for the best project, and having a personality which could talk back to pressing members of the Congress and tell them "NO" often and loud. Then came 1933 and what followed. The Chief Executive found he possessed two very capable lieutenants in the construction game. As Chief of all forces, he would call the head of one branch to his office and (so graciously) ask the branch head if some way could not be found to reverse certain unfavorable recommendations and thus find a way to build some politically wise project—let us say, as the Florida Canal, or the Passa-

Continued on page 62

maquoddy Project. It will not be necessary to go into the real merits of either of these projects—for engineers and construction men are reading this, if it is read at all. The country was in a depression and the spending of money—yes, THE SPENDING OF MONEY—was the objective. So you have today the political minded side of the Army Engineer, and a check upon it, as the weekly's writer suggests, is almost in order.

Pressure groups as listed in the article are nothing new. Labor has as many or more than some of the others. The Rivers and Harbors Congress used to hold big dinners in Washington, and I have attended them, paying my own high dinner fee. Army Engineers were praised at these dinners. I often left their meetings wondering if we, indeed, were only catspaws.

A new zone of thought will have to be evolved as to the generation of water power, as I firmly believe it is unwise to grant corporations a hold on our largest power developments. But after developing the power, let the Government sell at the buss-bar. I do not believe that the writer of the article has developed a broad viewpoint on water power. Yet, his criticism of the Missouri Valley Project is popular, and mostly true. So much in one decade is not necessary. Yet, planning studies are valuable and money used on them is not wasted as one would infer from the article. We have been working on the Columbia River region for years—some 20 at least. Of the two big dams on the river, one was built at the Bonneville site by the Army Engineers, and one was built at Grand Coulee by the Bureau of Reclamation. Future work on that river is looked upon by both Reclamation and the Engineers as theirs—and **who** will get it? Will the President of the United States take advice from one of his aides, or will he, as former President Hoover might do, make an engineering study and award by merit?

The Cherry Creek project near Denver may have the record for the worst boondoggling of the Army Engineer. Who knows the inside of the deal? The independent engineer, civilian, sneers at the Army Engineer Department, and the waste of money at Cherry Creek. Railroad engineers are especially critical, as they know they could not recommend such wasteful expenditures themselves and expect to hold their jobs. So, why should government employees call themselves ENGINEERS when they pursue such wasteful projects willingly? The railroad engineer has many standing with him.

Pressure is being put on the Federal purse to finance practically an entire one billion dollars on a Colorado River project, whose return to the Federal Treasury would never meet the clerical costs to collect it; small mud creeks and tidal flats made into boat harbors, and a host of others—such projects would never even get a start under private funds, and the writer of the article is right.

Many do not know that a very large portion of many Reclamation and Army Engineer project expenditures are justi-

Continued on page 156

Barber-Greene

Sensational

NEW CAR UNLOADING TEAM!

unloads car of rock or crushed stone in 45 minutes

358 B-G HOPPER CAR UNLOADER

Here's a rugged all-material unloader that's completely new in design. The 358 cuts hopper car unloading time as much as 90%—unloads most any bulk product from fine sandy material to large-sized rock aggregates at capacities up to 3 tons per minute—empties a 60-ton car in as little as 45 minutes without jam-ups or delays. There's *positive material flow at all times.* Easily "spotted" in track pit or above rails—really portable—can be towed at normal traffic speeds.

363 B-G PORTABLE CONVEYOR

The newly designed B-G Model 363 Portable Conveyor is an extremely flexible machine that will prove to be profitable to yards, industrial plants, contractors, etc. Speeds up stockpiling or transfer of material from car or stock pile to trucks. Entirely new in design, the 363 features V belt drives, pneumatic tires, shock absorbers, towing hitch, and a host of *new* improvements. Send for new attractive literature on these two great B-G machines.

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HORTON ELEVATED TANK

increases gravity water supply at South Gate

THE 500,000-gal. Horton radial-cone bottom tank shown at the left was erected at South Gate, California, to supplement two existing 150,000-gal. elevated tanks. This is proof that once a municipality has experienced the benefits of gravity water pressure, it will turn to elevated tanks when additional water storage facilities are needed in its water system.

The distribution system at South Gate serves approximately 11,265 domestic users and 375 industrial users. Average daily consumption is 6,198,000 gals. with a maximum and minimum daily consumption of 8,912,000 gals. and 3,820,000 gals. respectively.

Elevated storage makes it possible to pump a substantial portion of the water during off-peak periods. This generally lowers pumping costs and adds to the life of the pumping equipment. It also provides for a reserve of water for fire protection and helps maintain more uniform distribution pressures. Write our nearest office for estimating figures on Horton elevated tanks.

Horton elevated water tanks are built in capacities up to 2,000,000 gals. for municipal distribution systems. They are also installed at industrial plants to meet individual plant requirements for either general water service or for providing gravity water pressure for automatic sprinkler systems.

The photo at the left shows the 500,000-gal. Horton radial-cone bottom tank in the water distribution system at South Gate, California. It is 112 ft. 9 in. to the bottom.

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Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, and GREENVILLE, PA. *In Canada*—HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

June 15, 1949

WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER

Vol. 24, No. 6

The Governors CAN Act, If They Wish

WE HAVE RECEIVED a hundred or more letters commenting on our April 15 editorial proposing a new start on negotiations between Arizona and California over division of the water of the Colorado River. All of them have to a greater or less degree approved our proposal for arriving at a peaceful and realistic settlement of the matter. A number of them, however, have expressed the opinion that the situation was so far aggravated that no friendly agreement was possible, and several indicated that they doubted if the two states had authority to appoint negotiating committees as suggested in the editorial.

As this is written, nearly 60 days have passed since our proposal was made. Besides polite acknowledgments, neither governor has, so far as we can determine, made any effort to effectuate our suggested program, or any other of a similar nature. But THEY DO HAVE THE POWER to do so, if they genuinely wish to settle the matter. Article VI of the Colorado River Compact, signed by each of the states and ratified by the legislatures, thereby making it the law in respect to the matter, reads:

"Should any claim or controversy arise between any two or more of the signatory states (a) with respect to the waters of the Colorado River system not covered by the terms of this compact; (b) over the meaning or performance of any of the terms of this compact; . . . the governors of the states affected, upon request of one of them, shall forthwith appoint commissioners with power to consider and adjust such claim or controversy, subject to ratification by the legislatures of the states so affected."

By publication of this possibly-overlooked article *Western Construction News* places squarely before the two governors the responsibility for realistic and early action toward friendly, cooperative, "fresh approach" action on this vexing problem.

GOVERNORS GARVEY AND WARREN, IT'S UP TO YOU!

Failure to act, it seems to us, will indicate an obstructionist position on your part. Early action toward appointment of our suggested committees or others equally capable, will indicate sincere desire to compose differences and to clear the way for future development of the land potentially benefited by the Colorado's water. What is your answer?

Everybody Knows About It Now

WE HAVE READ, and judging from the comments, just about every other Westerner has read, the article by former Governor Miller of Wyoming and a member of the Hoover Commission on Governmental Reorganization, in the Saturday Evening Post of May 14, dealing with the unseemly and long-continuing conflict between the Bureau of Reclamation and the Army Engineers over construction of projects in the watersheds of the West. We congratulate the Post and Gov. Miller on their courage and forthrightness.

Western Construction News has been fighting this same evil for a long time. We have repeatedly spoken of the waste of dollars, manpower and water in the duplication of surveys and reports, the contest for sites, and the controversial demands for use of water.

Gov. Miller, beyond pointing out some fantastic variations between estimates and final costs of some Bureau of Reclamation projects, seems not to lay much of the fault at the Bureau's door, but ascribes most of the blame for prolonging the contest between departments at the feet of the Corps of Engineers. In this, *Western Construction News* is somewhat at variance with him, for it seems to us that the Bureau is at least equally culpable, and in fact we have the feeling it is the more aggressive of the two.

But regardless of which agency is more to blame, there can be no doubt that each must bear some responsibility for a disgraceful and wasteful competition.

Worst of all, however, is the fact that this exhibition of bureaucratic stubbornness adds fat fuel to the flames of the Authority supporters, such as Senators Taylor and Murray.

The basis of cooperative planning, construction and operation has been set up both in the Missouri and Columbia Basins, through the "Inter-Agency Committees" composed of representatives of these two groups, the local states, and the other Federal agencies who have interests, such as Soil Conservation Service, Federal Power Commission, Indian Service, Fish and Wildlife Service, National Park Service, and others. These Inter-Agency Committees, however, must operate on a voluntary basis, and to whatever extent any agency withholds cooperation or full frankness, they fail.

True, there seems little real justification for Army construction on un-navigable creeks and headwaters, and the argument that training of Army men for war construction through civil works in peace time is almost wholly specious, yet the advice of their admittedly capable engineers and their checking of plans of other agencies is a valuable contribution which should be fully utilized through strengthened and empowered Inter-Agency Committees.

The Authority, with loss of local control of valuable water resources, increased cost to taxpayers, and regulation of the daily life of the citizens within its boundaries, is to be avoided at all costs in the West. Somewhere between the non-protestable dictation of an Authority and the rampant waste and open hostility that Gov. Miller exposes, must be an area of fruitful cooperation and economy.

Highways Number

THIS ISSUE of *Western Construction News* is almost wholly devoted to material on highways in the West. In this "country of great distances," transportation is second only to fresh water in importance. The rapid development of the modern system of transportation, the auto, has put such a strain on highway systems of the West that in not one state are roads able to handle the load efficiently and safely.

Highway departments, federal, state and local, are doing their utmost to cope with the situation, but are handicapped by shortage of funds, high prices, insufficient personnel, and in some cases, political battles.

Highway construction must be programmed so as to eliminate, each year, the worst of the bottlenecks, and on page 87, et seq., will be found the methods used in the different departments to do so as fairly and judiciously as possible. But no state is able to rebuild or improve or relocate roads on the wholesale scale which would be desirable to bring the highway system completely and adequately up to date. Even California, with by far the greatest amount of construction money, can only patch the worst holes and relieve the most serious bottlenecks. Most states have already outlined 10, 15 or 20-year construction programs, and realize that even then, with the ever-increasing use of automobiles, their systems will probably still be inadequate.

Unreserved praise is certainly due to the great army of engineers, technicians, and constructors who labor so valiantly to keep the roads in the best possible shape, hoping always that some day, some way, they'll be able to do, not only "the best possible job," but a really thorough job.

Every Pound of Weight is on a Wheel THAT DRIVES AND STEERS

That's Why These Graders Outperform All Others

Dominant in the field, these Austin-Western Power Graders owe their matchless performance to *completely effective* use of power. Through All-Wheel Drive, every pound of weight is a powered pound, harnessed to a driving wheel—and contributing every ounce to tractive effort. This tremendous traction—perfectly directed and controlled through All-Wheel Steer—provides superb earth moving ability, and mastery of all types of work from routine grading and ditching to operations never before possible with any motor grader.

Additional values are offered by specialized attachments—many exclusively Austin-Western—which greatly increase the usefulness and day-in and day-out profit making ability of the graders.

Power and control at all four wheels has been pioneered and perfected in grader application by Austin-Western. . . . The "88-H," "99-H," and Master "99" set performance standards unequalled in power grader history.

AUSTIN-WESTERN COMPANY
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"88-H" Ditching around short radius curves is easy for an "88" or "99"—impossible with any other grader.

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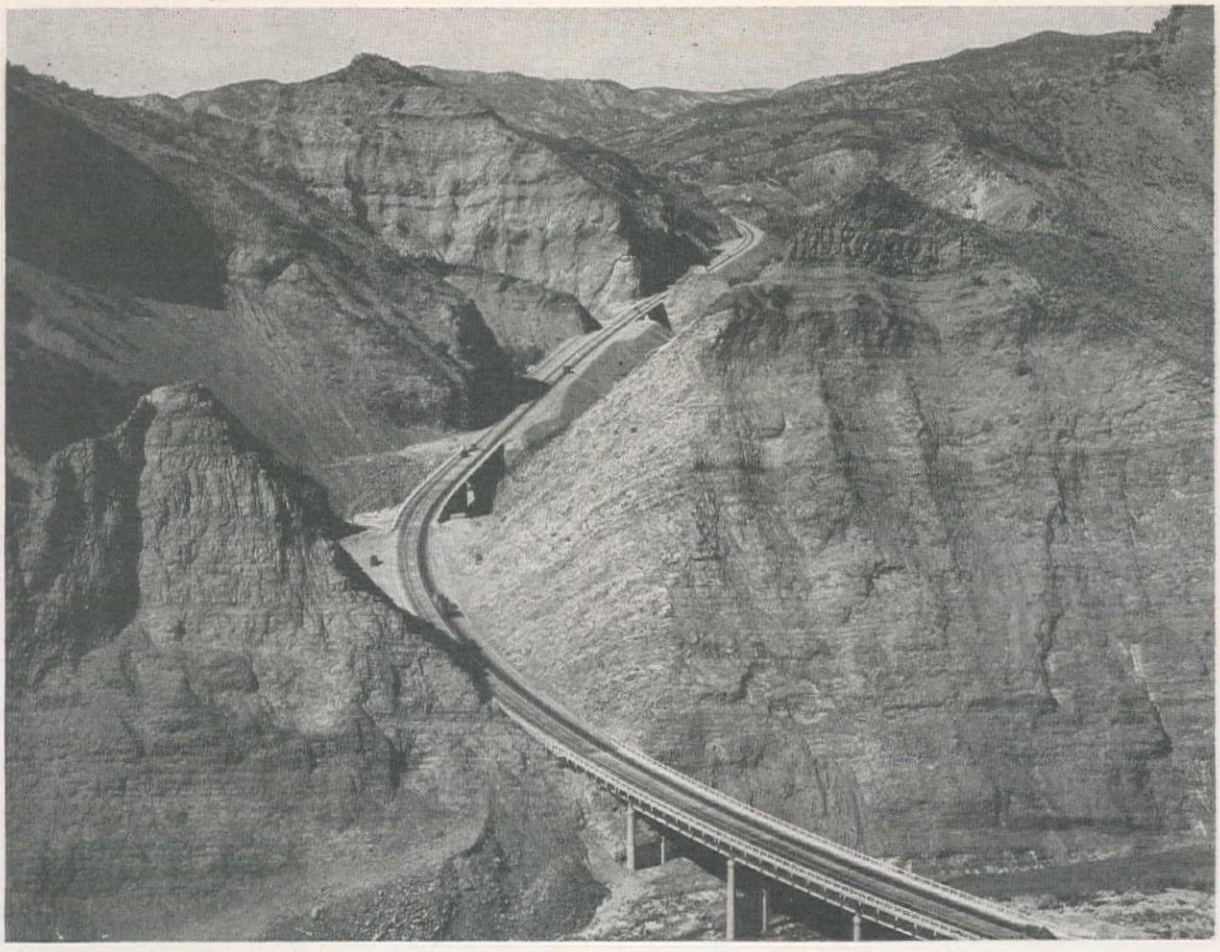
WYOMING—WILSON EQUIPMENT & SUPPLY COMPANY.....Cheyenne

WESTERN CONSTRUCTION NEWS
JUNE 15 • 1949



EXTREMELY heavy grading through the brilliant red rocks of Piru Creek Canyon is a feature of California's great Ridge Route

Surpassing Pennsylvania's Turnpike Is California's Giant of Highways

Four hundred miles of highway with a minimum load of 15,000 vehicles per day, sets up California's "99" as a leader in the handling of postwar automobile and truck traffic—Already at least three-lane for the entire length, it soon will be a 4-lane freeway throughout

IN THE WEST, so accustomed to superlatives in construction that another one hardly registers, the "greatest highway in the country" daily carries its continuous stream of traffic between California's two great metropoli, Los Angeles and San Francisco, with hardly more notice than an ordinary alley.

U. S. Highway 99 (Route 4 on the State system) and its connection to the San Francisco Bay area, U. S. Highway 50 (State Route 5), is the heaviest traveled highway of its length (396 mi. from Los Angeles to Oakland) in the country, and at the same time one of the fastest and most modern.

Eastern roads look puny

Beside it, the Pennsylvania Turnpike and other eastern roads so widely publicized fade into minor prominence. This California giant of highways embraces 40 mi. of the toughest of mountain construction over the world-renowned "Ridge Route," (see the lead picture, showing the Ridge Route through the Piru Creek area) as well as two other major mountain passes and mile after mile of tedious tangent through the flat and fertile acres of the San Joaquin Valley.

It passes through the major cities of Glendale, Burbank, San Fernando, Bakersfield, Tulare, Fresno, Merced and Modesto, as well as the two termini, several smaller cities, and numerous villages and towns. At the present time, it is at least three lanes in width for the entire length, while over half has been built to a width of four or more lanes. At the present moment contracts valued at $11,400,000 are under way, embracing additional widening, installation of grade separations, conversion to freeway, and other improvements.

Huge traffic volume

Traffic, of course, varies over the whole length of the great highway, being considerably swelled at observation stations in or near the larger cities, but throughout its length, on Monday, July

VEHICLE USE of Highway 99 through Bakersfield. This 6-lane divided highway carries about 20,000 cars and trucks each way each day through the metropolitan section shown here.

12, 1948, the last complete count, traffic amounted to approximately 8,000 vehicles per day in each direction.

Interesting comparisons with earlier years can be made. For instance, at a station 1 mi. south of the Bakersfield city limits, Monday traffic in 1920, according to the State Division of Highways, amounted to 543 northbound vehicles and 492 southbound. On a Monday in 1930 (traffic was totaled in that year's count, not split north and south) a total of 2,981 vehicles passed the spot. In 1948 the count had jumped to 18,558 northbound and 17,320 southbound.

Phenomenal growth in use

Equally telling are the figures at the north city limits of Fresno. In 1920, 1,795 vehicles passed in a northerly direction, 1,545 southerly; in 1930 the count was 5,746 and 5,069 respectively; and in 1948 it amounted to 12,991 and 12,957 respectively.

At the north city limits of Madera, in 1920, 529 and 600 vehicles used the highway; in 1930 a total of 3,528 passed; and in 1948, 9,845 and 9,597 were counted.

While no counts were kept at intermediate points on the Ridge Route in the early years, a comparison of traffic at the south end of that section is interesting. At Saugus in 1920 some 1,036 vehicles passed the checking station bound northerly and 794 were going south. In 1930, a total for both directions of 3,367 was counted. By 1948 the Weldon Canyon cutoff had removed Saugus from the main route, but the count at a comparable station at Castaic Junction showed 6,867 northbound and 8,674 southbound.

Ridge Route predominates

Another interesting observation in connection with Highway 99 is the cost of construction to date. Since 1912 nearly $75,000,000 has been spent in construction and reconstruction.

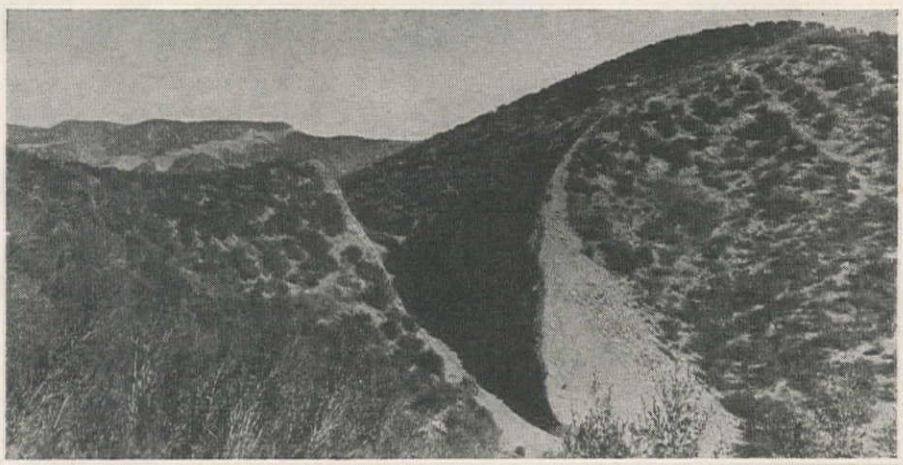
The history of Highway 99, in its growth to its present colossal size, is essentially the history of the Ridge Route. A trail or roadway has existed from the southern end of the San Joaquin Valley roughly up its center to Sacramento since the earliest days of civilization in the area, so that the development of that portion of 99 from Bakersfield to the San Francisco Bay area, has been largely one of growth.

There was no connection, however, from the early Pueblo of Los Angeles to San Francisco, except the circuitous one along the coast, even now with modern construction on that route, at least 50 mi. longer than 99. The coast route was followed by the Spanish padres in establishing their chain of Missions, and the names of the present cities along the coast reflect their journeys—San Buenaventura, Santa Barbara, San Luis Obispo, San Juan Capistrano, etc.

Earliest wagon roads

When the Southern Pacific Railroad built its Valley Line to connect the two great metropolitan areas, it followed roughly down the center of the valley from San Francisco as far as Bakersfield, but then followed a very rugged mountain route through Tehachapi Pass to Mojave, across the Mojave Desert and through Soledad Canyon to Saugus, a route that was 50 mi. longer and far to the east of a direct line from Bakersfield to Los Angeles. At the time the railroad was run through these mountain passes, a wagon road also came into being, and for the first time connection was had between Los Angeles and the southern San Joaquin Valley by either

TWO PHOTOS taken in 1912 show the rugged construction of the first Ridge Route. The reason for the name of the route is obvious from the location on the mountains. This first road was over 50 mi. long, but subsequent relocations shortened it nearly 10 mi.



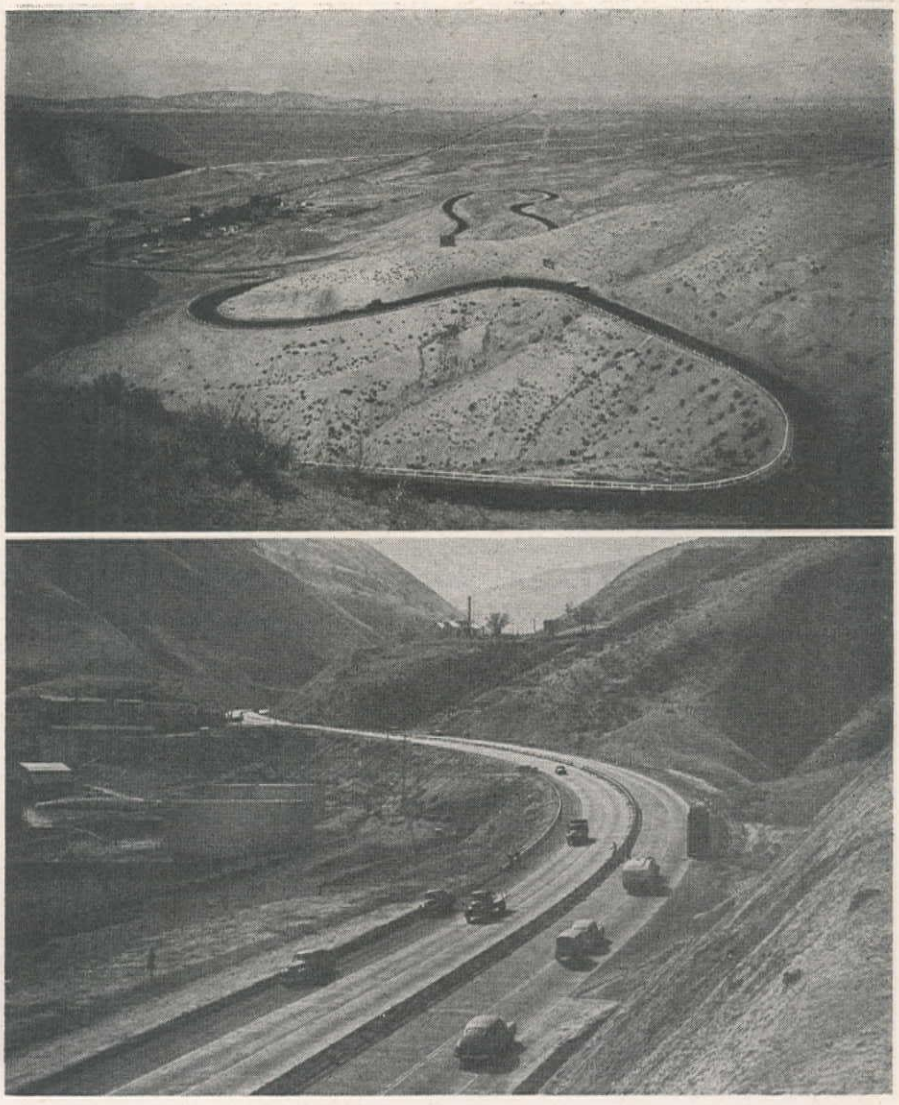
train or wagon, albeit around the long and rugged Tehachapi Pass route. It is possible that a hazardous road existed more or less along this route as early as 1855, but it was seldom used.

A straight line is shorter

However, this route deviated so markedly from a straight connection that surveys were instituted and plans drawn for a new route over the Tehachapi Mountains, and in 1913 the first Ridge Route was opened. It was truly a "Ridge Route," for it climbed from Saugus by sharp loops and stiff grades directly to the summit of the Tehachapi Mountains and continued to "play hide-and-seek" with the peaks for better than 50 mi., until it emerged from Grapevine Canyon in one of the most tortuous and dangerous highway grades on any major thoroughfare, after which it suddenly straightened into a 40-mi. tangent into Bakersfield.

Pavement on the route was 20 ft. wide, of asphalt. This road, except for minor re-alignments of some of the most dangerous curves, served north-south traffic until 1933, when the construction of the "Ridge Route Alternate" was completed from Castaic Junction (near Saugus) approximately to Lebec, but not including the Grapevine Canyon section. This new route took the highway off the peaks and ridges into a succession of valleys, including the Piru Creek section shown in the introductory picture.

Leaving the original road near Castaic School, the relocation follows up Violin Canyon to its headwaters and continues along a much more steady grade than its predecessor. At some points the old and new roads are more than 5 mi. apart. The highest point, about 4,200 ft., at Holland Summit, is one of the few places that the two routes intersect. Another common point is the hotel settlement at Lebec.



THE MOST spectacular section of the old Ridge Route was the descent at Grapevine Canyon, top, a slow and deadly road. The present-day descent, bottom, is a long sweeping curve with a steady 6% grade and 4 lanes. Tanks at left are shown more distantly at left in the upper photo.

The improvements in this new alignment are most graphically illustrated in the following chart:

	Unit	Old Ridge Route	Ridge Route Alternate
Length	Miles	36.45	26.85
Total curvature	Degrees	35,141	2,492
Highest elevation	Feet	4,234	3,550
Minimum radius of curves	Feet	70	1,000
Maximum grade	Per cent	6	6
Total rise	Feet	4,630	3,450
Adverse grade	Feet	2,220	1,040
Roadbed width	Feet	21-24	38
		(Original contract)	
Width of pavement	Feet	20	30
Original cost		$1,614,000	$2,864,000

The Grapevine Canyon section was also entirely re-aligned a few years later, with the following improvements:

	Unit	Old	Relocation
Length	Miles	11.6	10.3
Curves of 80-100 radius		6	0
100-200 radius		16	0
200-300 radius		28	0
300-500 radius		29	0
500-1000 radius		34	0
Over 1000		2	22
Total number of curves		115	22
Total curvature	Degrees	4,246	513
Maximum grade	Per cent	6	6
Adverse grade	Miles	0.4	0

Other round-abouts corrected

About the same time two other improvements on 99, not parts of the Ridge Route, were completed, which considerably shortened and bettered the road. The first of these was elimination of the route from San Fernando, north through the very restricted Newhall Tunnel, built in 1910 by Los Angeles County, and past the towns of Newhall and Saugus, thence west to Castaic. The new route through Weldon and Gavin Canyons chopped another 1.2 mi. off the length of the road, eliminated the use of the narrow tunnel and materially improved the alignment and grade.

The second important change on the Los Angeles-San Francisco Valley Highway was the elimination of a narrow twisting road through Dublin Canyon on the U. S. 50 connection to Oakland between the towns of Livermore and Tracy, by construction of a 4-lane divided highway over the hills on the south side of the canyon, again shortening the line and greatly improving driving conditions. The new road is called the Altamont cutoff.

A continuous program of widening has been under way on the entire route, and State Division of Highways engi-

OUTSTANDING example of freeway construction to carry Highway 99 through a metropolitan area is the above layout, recently opened through the southern part of Fresno. Ultimately the freeway will continue straight on through the full length of the city.

neers estimate that within three years the entire 400 mi. will meet the 4-lane (or more) divided standard. It is expected also that in time the full length will be a complete freeway. Already numerous sections are operated on a limited access basis.

Comparisons with the Turnpike

Comparisons with the Pennsylvania Turnpike, as an example of the widely publicized eastern roads, show clearly the true greatness of 99. In length, 99 is more than twice the Turnpike, being 396 mi. long, while the eastern road totals 164 mi. Both are generally 4 lanes in width, but the eastern road is constricted in numerous tunnels to 2 lanes; 99 has no tunnels. Average traffic volume on 99 is 15,000 vehicles per day, while the Turnpike carries a little over 5,000 daily.

Total grading on the Turnpike probably exceeded that on California's great artery, but no adequate figures are available, since the eastern highway builders merely took over a partially completed railway roadbed which had been abandoned many years ago. An almost perfect grade was already established and needed but to be completed and widened. The Ridge Route, Ridge Route Alternate, Grapevine Canyon, Weldon Canyon and Altamont cutoffs were all absolutely new roads over rugged unmarked mountains. The Turnpike is a toll road, the great California highway is open to all drivers.

Improvements of the future

A brief look-ahead for possible improvements of the highway indicates that in its present general location, little further improvement can be made. As mentioned previously, the entire route will eventually be converted into freeway, and some line changes are still contemplated through or around some of the towns and cities on the highway. But no more major re-alignments remain, with the possible exception of construction of a short cutoff from Modesto on 99 to Tracy on the connecting U. S. 50, which will save perhaps a mile in length.

However, for that portion of the future which today is but a dream, two interesting possibilities have been suggested. Both John Reber, author of the Reber Plan for San Francisco Bay, and a high official of the State Division of Highways, have briefly outlined to editors of *Western Construction News* a plan for a straight-line high-speed freeway from the mouth of Grapevine Canyon to the eastern end of the Altamont cutoff, in the vicinity of Tracy. The two have arrived at virtually the identical conclusion from absolutely independent studies. The suggested route would not hit a single major population center, would avoid the lowlands of the Tulare and Buena Vista Lake basins, and would provide absolutely the most direct route between Los Angeles and San Francisco Bay.

A long, long tunnel

The second "dream route" being thought about today is a tunnel under the Tehachapi Mountains, eliminating the need for any Ridge Route whatever. Suggested possible lengths vary from 26 to 34 mi., depending on what line is adopted, but in any event, all curves and grades would be eliminated between San Fernando and the southern end of San Joaquin Valley. It is proposed that the Southern Pacific and Santa Fe railways, which still use the old Tehachapi Pass route south from Bakersfield, with an added travel time of many hours over grades up to 3% and sharp curves, also be carried through the tunnel. In addition, some advanced thinkers who vis-

ORIGINAL tree-bordered roadway in Madera County was converted to 4-lane operation by building second road alongside, above. Grade separations on Highway 99, below. The upper is just north of Bakersfield, being duplicate overpasses, while the underpass is near Famoso.

ualize diversion of the Columbia River to California at some far future date, are also suggesting that the tunnel be made of sufficient size to accommodate a large flow of such water to southern California.

The Division of Highways has made an adverse report on such a tunnel, but it has a way of popping back into the news every once in a while, and may one day still be considered.

U. S.' greatest highway

While, of course, many city streets and short urban stretches of primary highways carry heavier traffic loads than the average for California's great central route, there can be no question that it stands today as the "greatest highway in the country," of its length. And should the two dreams mentioned above ever come to pass, it would undoubtedly be called the "greatest highway ever conceived."

It would be impossible to give due credit to each of the thousands of competent engineers and construction men who have poured their talents into construction of this monumental road. Through much of it Charles H. Purcell has had supervision either as State Highway Engineer, or Director of Public Works, the post he now holds. George T. McCoy is now State Highway Engineer. Fred Grumm, assistant to McCoy, has been connected with various phases of location, design and construction since 1920. S. V. Cortelyou, now district engineer at Los Angeles, has been one of the long-time engineers on development of Highway 99, and particularly the Ridge Route section.

CHARLES H. PURCELL

At various responsible posts down through the years, he has supervised design and construction of the greatest highway in the country.

Virtually every heavy construction contracting firm in California and scores from other states have performed contracts on the great highway, and have thus assisted in making it the greatest highway in the country.

Negotiations Terminate for Sale of Arizona Power Plants to Government

AFTER FIVE YEARS of negotiation, Bureau of Reclamation officials have terminated their efforts to purchase the hydroelectric and other generating plants owned by the Salt River Valley Water Users Association in Arizona. The move came to light in a letter from E. A. Moritz, regional director for the Bureau, to R. D. Searles, president of the association, in which it was stated that, in Moritz' consideration, negotiations were at an end.

The move reflects a change in attitude toward federal control of public power by the Democratic administration. Harold L. Ickes, then Secretary of Interior, sought control of the plants by the government in 1943 as a link in the vast federal power network he was seeking to develop in the West. In 1944, he made a definite proposal to provide the association with sufficient funds to pay off interest and principal on $16,000,000 in bonds, issued to finance additional dams and power plants. Under Ickes' plan, the government also was to assume or cancel $8,200,000 the association owed to it on original construction debt and to waive all claim to income and federal taxes. Thus, the federal government would have retired all of the association's bonded indebtedness, amounting in total to some $24,000,000, in return for taking over the power plants.

In 1947, under Secretary of the Interior J. A. Krug, the federal government mollified its move to acquire power plants and Krug suggested that the Salt River association and the Bureau of Reclamation devise a mutually acceptable arrangement that would be in accord with reclamation laws and would also have a chance of receiving Congressional approval (from a Republican Congress). Later stages of the negotiations have hinged on the financial advantages the deal might hold for the association.

Regulations Liberalized for Federal Aid Airport Program

A GENERAL simplification and liberalization of the regulations under which cities and other local government sponsors may participate in the Federal Aid Airport Program has been announced by D. W. Rentzel, Administrator of Civil Aeronautics.

In an effort to help participants in the program and speed up completion of projects, the new regulations eliminate 5 of the 12 forms which sponsors have been required to fill out, and simplify two others.

Limit on payment of grants to sponsors before final audit has been raised from 85% to 90%, and during earlier stages of processing a project the sponsor is relieved of the necessity of submitting detailed title evidence, itemized cost estimates, survey maps, and abstracts of bids. The revised regulations also allow sponsors to award contracts under $2,000 without competitive bidding.

Colorado Gas Company Plans New Facilities

COLORADO Interstate Gas Co., Colorado Springs, Colo., plans construction of additional facilities designed to increase capacity of the company's natural gas transmission system by 62,000,000 cu. ft. per day.

The company's proposal involves an increase in the present 264,000,000-cu. ft. system capacity of its pipelines running from the Texas Panhandle and the Hugoton Field in Kansas to Denver. Plans call for construction of 38 mi. of 20-in. main line loop on the Hugoton line in the vicinity of Denver; installation of three new 1,200-h.p. compressor units at the Lakin station at the Hugoton Field; and construction of a new compressor station, which would contain seven 1,200-h.p. compressors, on the Hugoton line, in Cheyenne County, Colo.

The new facilities, according to the company, are needed to meet increasing requirements of its public utility customers. No additional customers or new communities would be served, the application adds.

The company said it will have adequate cash to finance the project, which would be built at an estimated cost of $4,328,930.

Colorado Interstate's utility customers in Colorado include: Citizens Utilities Co., City of Colorado Springs, Public Service Co. of Colorado, The Pueblo Gas and Fuel Co., Canon Gas Service Co., Limon Natural Gas Co., and Colorado-Wyoming Gas Co.

Court Judgment Pronounces Matilija Dam Safe for Use

MATILIJA DAM, Ventura County Flood Control District's $2,000,000 structure built to provide water conservation and flood control for the Ojai Valley region of Southern California, has been pronounced safe despite the District's claim of an unsafe foundation. This was the concluding judgment after a 70-day trial before the Ventura County Superior Court in which the District sued the Donald R. Warren Co., the dam's engineers, for $1,250,000, and the Warren firm countersued for $178,000. The court awarded the Warren company $112,158, but also awarded Ventura County $78,720.

The judgment of the court stated that the dam, originally estimated to cost $700,000 but finally costing more than $2,000,000, would adequately serve its purpose and no further work would be required at the damsite except grouting of the foundation from time to time.

Trail to Highway in 64 Years

High cuts in a limestone dike 1 mi. long and dry lake beds for a subgrade are some of the problems encountered on limited-access Wellsville Canyon Highway in Utah—New route relocates a section of Logan-Brigham road cut by pioneers in 1860

By FRED D. MILES
Resident Engineer
Utah State Road Commission
Ogden, Utah

THERE HAS recently been completed in northern Utah a 9.25-mi. section of U. S. Highway 91 which has long been needed to replace a torturous, dangerous, steep, and narrow road, perched on the side of a precipitous canyon, and which has been a headache to the regular users and a nightmare to the tourist unfamiliar with mountain roads.

Cache Valley is a fertile agricultural section of about 300 sq. mi., lying approximately 100 mi. north of Salt Lake City. The valley contains several towns of which Logan, population 15,000, is the largest. U. S. Highway 91 traverses the valley, and is the main artery of travel from the Southwest to the Canadian border, with connections to other highways leading to the northwestern states. Approximately 2,000 vehicles travel this road daily, of which one-half are engaged in local traffic. This is augmented in the summer by many tourists traveling to National parks in the mountain states.

Most inaccessible

Cache Valley, as its name implies (hidden valley) is surrounded on three sides, east, south, and west, by a mountain chain. Access to the valley in these directions is available only by means of high passes through the mountains.

Because Salt Lake City is the principal metropolis of the state, a pass through the south mountain was selected by the early settlers as the first site of a road out of the valley. In about 1860, a rough wagon road was constructed up Wellsville Canyon, over Sardine Pass (elev. 6,000 ft.), and down the south side to Brigham City, a distance of 22 mi. from Logan, where it joined another road from the west and from there went on through Ogden to Salt Lake City.

This road with minor improvement continued in service until 1924. By this time the U. S. Bureau of Public Roads was beginning to function and a project was initiated with Federal aid to build a new road from Sardine Pass to Wellsville, at the foot of the mountain, a distance of 7 mi. It was decided to build down Sardine Canyon rather than follow the old road through Wellsville Canyon. The distance was about the same but the Sardine route being a dugway section it was thought that the snow removal problem could be more easily solved, there being at that time no highway snow removal equipment of the type required to handle the deep snows prevalent at this altitude.

A contract was awarded by the Utah State Road Commission to Olof Nelson, contractor of Logan, in Sept., 1922, to construct this road to a gravel surface for the sum of $105,000. The contract was completed in Aug., 1924. In 1930, a roadmix bituminous surface was applied. This was the first major road project constructed with federal aid in Utah.

The winter of 1924-25 was the first in which the people of Cache Valley were able to leave the valley by means other than the railroad. A heavy snow plow was constructed of angle iron and boiler plate in the road commission shops in Salt Lake City, and was attached to a World War I surplus army artillery crawler tractor. It managed to keep the road open and in operation from early November to March.

With the improvement of this road, and also that down the south side of the mountain to Brigham City, travel began a steady increase and at the end of a few years it was foreseen that the road would soon be unable to take care of the traffic. Surveys of a new line were made in 1938, and as a result it was decided to locate the new road approximately along the route of the original highway through Wellsville Canyon, as better alignment and flatter grades could be obtained than through Sardine Canyon.

Access to be limited

From studies made by the planning survey it was evident that a two-lane highway would handle the increasing traffic for several years to come, but that eventually multi-lanes would become necessary. It has also been learned from experience that when a modern highway is built new businesses immediately proceed to occupy adjacent property with buildings fronting on the right-of-way line. To overcome this, it was decided to make the project a limited access highway and right-of-way was secured on this basis. Through the farm land at the north end of the project a 120-ft. right-of-way was bought. In the mountain section the right-of-way varied in width from 150 to 250 ft. All existing cross roads were given access to the highway, but no other access is to be permitted.

It was necessary to construct a few service roads leading to the access points, but this was not a major problem. In the mountain section, which is range land, gates were placed about a mile apart on either side of the road for the use of stockmen. The road was signed where access was prohibited. In order to make the entire road limited access, and for other obvious reasons, the new road was located to bypass the town of Wellsville (population 1,400) to the south and east. Very little opposition by the property owners was encountered when securing the right-of-way with the no-access provision.

Two lanes now

The width of the roadway was also determined by experience. The Road Commission's standard for 4-lane highways in rural sections consists of four

A FILL 17,000 ft. long was necessary to carry the road across Dry Lake, which is actually dry only in the summer. Foreground fill brings road up the elevation of the "big cut."

11-ft. lanes, with a 4-ft. neutral center zone. The two outside lanes are concrete and the two inside lanes including the neutral zone have plantmix bituminous surface. By building a 26-ft., bituminous two-lane road with plenty of width for shoulders and side drainage the roadway can be widened to four lanes by the addition of the two outside concrete strips at a later date and with a minimum of effort.

Using this pattern, a 26-ft. plantmix surface 4 in. thick was laid. The base consists of 3 in. of crushed gravel subbase with maximum 2-in. material and 3 in. of ¾-in. crushed surfacing gravel. The crushed gravel shoulders were 5 ft. wide in the mountains and 7 ft. in the valley section. Minimum width, including gutters, was 58 ft. throughout the project.

Plans were prepared for the new project and construction was programmed to start in 1941, but at the beginning of World War II all projects of this type were cancelled. After the war the project was reopened but due to lack of engineering personnel, construction did not start until late 1947.

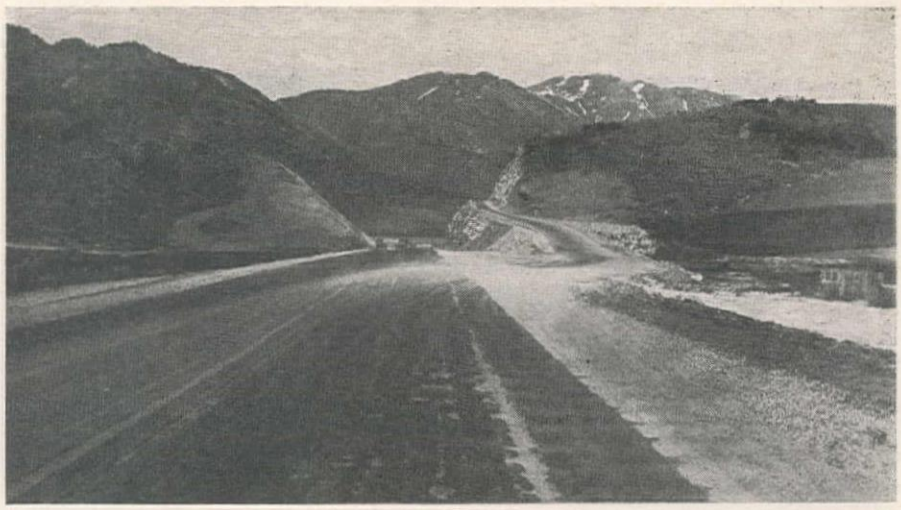
Lake crossing a special problem

Due to the peculiar topography of the country the grading was let in two projects. At the summit, the mountains curve in such a manner that they encircle several square miles of country, causing a sizable valley. As there is no outlet, the lower portion collects water from melting snow and is filled several feet in depth in the spring. This water percolates slowly through the rocky bottom and the lake is usually dry by the middle of summer. The basin is called Dry Lake.

The new road traverses about 1,700 ft. of the lake. Between the lake and the summit a huge limestone dike protrudes to the same elevation as the true summit, making actually two summits about three-quarters of a mile apart. In order to descend to the Dry Lake elevation it was necessary to go through this dike with a cut of 107 ft. at the highest point. As this work was entirely different from the other part, it was let as a separate contract. The surfacing for both projects was let as a third unit.

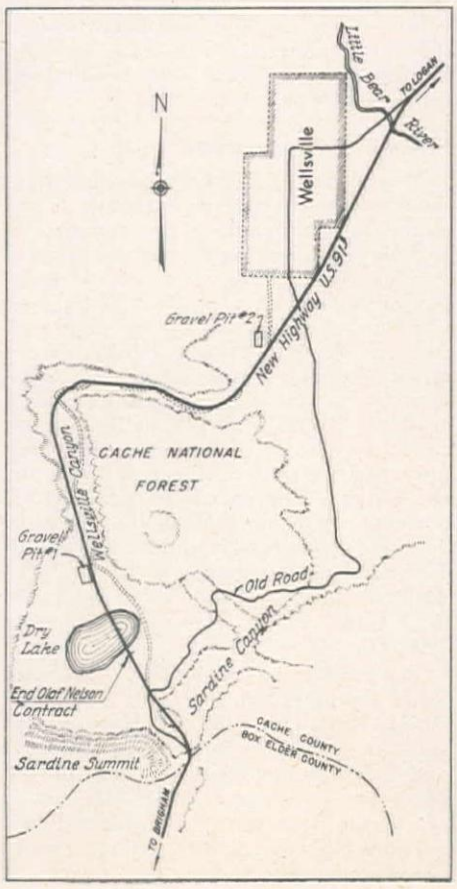
Making a 107-ft. cut

The big rock section, about 5,350 ft. long, was awarded to Olof Nelson Construction Co., the same company that built the first road in Sardine Canyon years before. As this rock was badly faulted, the contractor attempted to take out the cut with ordinary grading equipment including Caterpillar tractors and LeTourneau scrapers. It was found, however, that the rock was more solid below the surface and it became necessary to resort to the regular method of drilling and shooting. A 2½-cu. yd. Bucyrus-Erie 55B shovel and five 13-cu. yd. end dump Euclid trucks were purchased to do the loading and hauling. As the haul increased, five G.M.C. 5-cu. yd. trucks were added to the fleet. Two D8 Caterpillar tractors were used, one in cleaning up the pit and the other used in spreading on the fill. Part of the time a 1¾-cu. yd. Northwest shovel was used in loading muck in addition to the Bucyrus-Erie. The drilling was done by four Ingersoll-Rand wagon drills and ten jackhammers. Air was furnished by two 500-c.f.m. and two 55-c.f.m. Ingersoll-Rand compressors. A Caterpillar 12 motor patrol was also used in spreading on the fill.



BECAUSE the old road passed along the ridge through which the "big cut" was made, a rock cut detour had to be stepped into the excavation to keep traffic moving during construction.

It was originally thought the rock would stand on ½:1 slopes and the section was so designed, but after the work started it was found that a large fault lay parallel and to left of center line at a 26-deg. angle to the axis of the road. By changing the radius of the 30-min. curve slightly at the north end of the cut and changing the slope to 1½:1 on the left, it was possible to keep the excavation entirely to the right of the fault. The rock was scalped clean, giving the slope a smooth surface. This increased the quantity of excavation approximately 40,000 cu. yd. This excess was used in widening the fill.



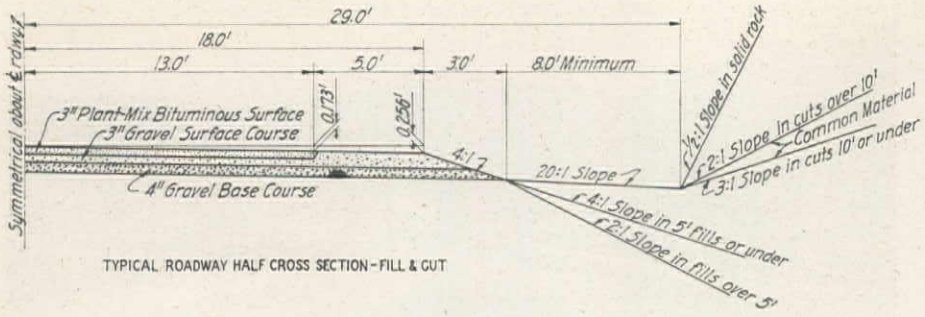
All of the material from the cut was used in building the fill from the north side to the Dry Lake. The greatest depth of the fill was 56 ft. As the rock broke in comparatively large pieces, exceptional care was used in placing the fill in order to avoid future displacement and settlement. As the rock was dumped from the trucks it was spread in layers as thin as possible. At the beginning the fill was built as steep at the trucks could negotiate. As the fill lengthened it was increased in height. No attempt was made at mechanical tamping.

One of the problems incidental to the project was handling the traffic during construction. Traffic continued to use the old road until the new was completed, but the new road crosses the old near the summit of the cut, thus blocking all traffic. This situation was handled by building a detour road on the right side by benching into the cut.

Ground water hampers grading

The contract for grading the remaining 8.265 mi. was awarded to L. T. Johnson Construction Co. of Ogden, and Parson & Fife Construction Co. of Brigham City, operating as a joint venture. Johnson did the grading, while Parson & Fife did the drainage work, fencing, and a 42-ft. span concrete T-beam bridge.

The grading proved to be very difficult due to an unprecedented amount of underground water. In nearly every cut it was a never-ending battle to puddle and drain off this water so that excavation could continue. The soil is gravelly clay and because of heavy snowfall in the mountain section, this becomes saturated in the spring and never really dries out. The common method was to dig trenches to maximum depth with a Link-Belt ¾-cu. yd. trench hoe on either side of the cut, then leave it until dry enough to handle. Some of these trenches were a thousand feet long and 14 ft. deep. This was a tedious job, neces-



TYPICAL ROADWAY HALF CROSS SECTION—FILL & CUT

sitating opening much more of the work at one time than was economical. A large part of this work had to be done late in the fall, during which time unusually heavy rainfall added to the difficulty of excavating the material.

The grading work was performed with three Super-Tournapulls and nine D8 Caterpillar tractors equipped with type E LeTourneau scrapers. The Tournapulls were particularly effective in the valley sections where the cuts were shallow and the haul long. In the large wet cuts the cats and cans were used almost exclusively.

Owing to the granular composition of the soil the specified 90% minimum compaction was easily obtained with the use of a sheepsfoot roller, consisting of six 5-ft. drums drawn by a tractor. No additional water was used in the compaction as the material already carried a surplus of moisture.

Bridges and structures

A concrete T-beam bridge was constructed over Little Bear River near the north end of the job. The bridge is 42 ft. overall in width with 26 ft. between curbs. There are two outside beams and four interior beams at 8-ft. centers. The interior beams are 2 ft., 2 in. wide by 2 ft., 4 in. high, built integrally with the 7½-in. deck. The hand rail is of ornamental concrete. The bridge deck is 8 ft. above streambed. The structure is designed for 20H loading.

The mountain section of the road traverses open range for live stock. For safety reasons it was necessary to fence the entire project. In order that the live stock could pass from one side of the road to the other, cattle passes were constructed. This was done by installing 90-in. C.G.M. pipe under the roadway at various places. They were paved with plantmix bituminous material 4 ft. wide with wing fences leading to the right-of-way fence. In addition to the 90-in. pipe, there were laid over 6,000 ft. of concrete pipe, varying from 12 to 66 in. in diameter.

Contract price of this grading work was $365,519.

Same contractors do surfacing

The gravel and plantmix surfacing for the entire project was let to Parson & Fife, the same company who jointly did the grading. The crushed gravel was secured from a pit located close to the road at a point about 2 mi. north of the north end of the job. The material is a hard limestone but contains a large percentage of minus 200 mesh. As the pit was quite wet considerable difficulty was encountered in removing the surplus fines so as to meet the specification. A new Super Senior Universal Crusher powered with a 3-15 Buda engine, having an hourly capacity of 200 tons did the work and produced an acceptable product.

The base and surface courses were laid with material hauled directly from the crushing plant. It was spread with a Caterpillar motor patrol and compacted with a 10-ton Buffalo-Springfield 3-wheel tandem roller.

A 30,000-ton stock pile of crushed gravel was prepared for the plantmix material at the crusher site. A 4,000-lb. Madison hot mixing plant was set up at the stock pile. As there was considerable variation in the grading of the gravel, a three bin mixture was used. This enabled the operator to waste certain sizes and keep the mix within specification. The mix was hauled to the road in International K-11 trucks. The spreading was done with an Adnun laying machine with a 12-ft. spreader. One foot was added to the bar, making it possible to lay the 26-ft. roadway in two strips. By doing this the joint was in the center of the roadway, making a much smoother job than the previous method of laying it in three strips. This has been made a standard practice in the state. A daily average of 500 tons was maintained throughout the job.

Noteworthy comparison

A comparison between the old Sardine road and the one recently completed is significant of the advance in highway engineering during the 25 years that elapsed between the time of completion of the two projects. The Sardine Canyon road had 27 curves, many of them as sharp as 30 deg. There were 4 mi. of 6.5 per cent grades, roadway width was 24 ft., dugway construction, at a cost of $125,000. The Wellsville Canyon road has a total of 5 curves, of which only two are 3 deg., the maximum for the project. The maximum grade is 5.9 per cent, of which there is only 1,900 ft. The rest of the road is under 5.0 per cent. The roadway minimum width is 36 ft. with flat slopes and wide side drains, and the total cost was approximately $900,000.

The road was built by the Utah State Road Commission, Roy W. McLeese, Chief Engineer; W. J. Nelson was superintendent on the Nelson contract, and J. B. Parson superintendent on the other two contracts. W. E. Mickelson represented the state as Resident Engineer on the two grading contracts and the writer on the surfacing contracts.

Reno Paves Famed Alleys With Comstock Lode Ore

DOUGLAS AND LINCOLN alleys, in Reno, Nev., two of the most colorful and well-known streets in the world, are due to have their faces lifted in a style befitting their rampageous Western growth. The aggregate to be used in paving these alleys is crushed gold and silver ore taken from the Old Occidental Mine in the Comstock Lode country near Silver City, Nev., selected samples of which have assayed as high as $50 to $90 per ton.

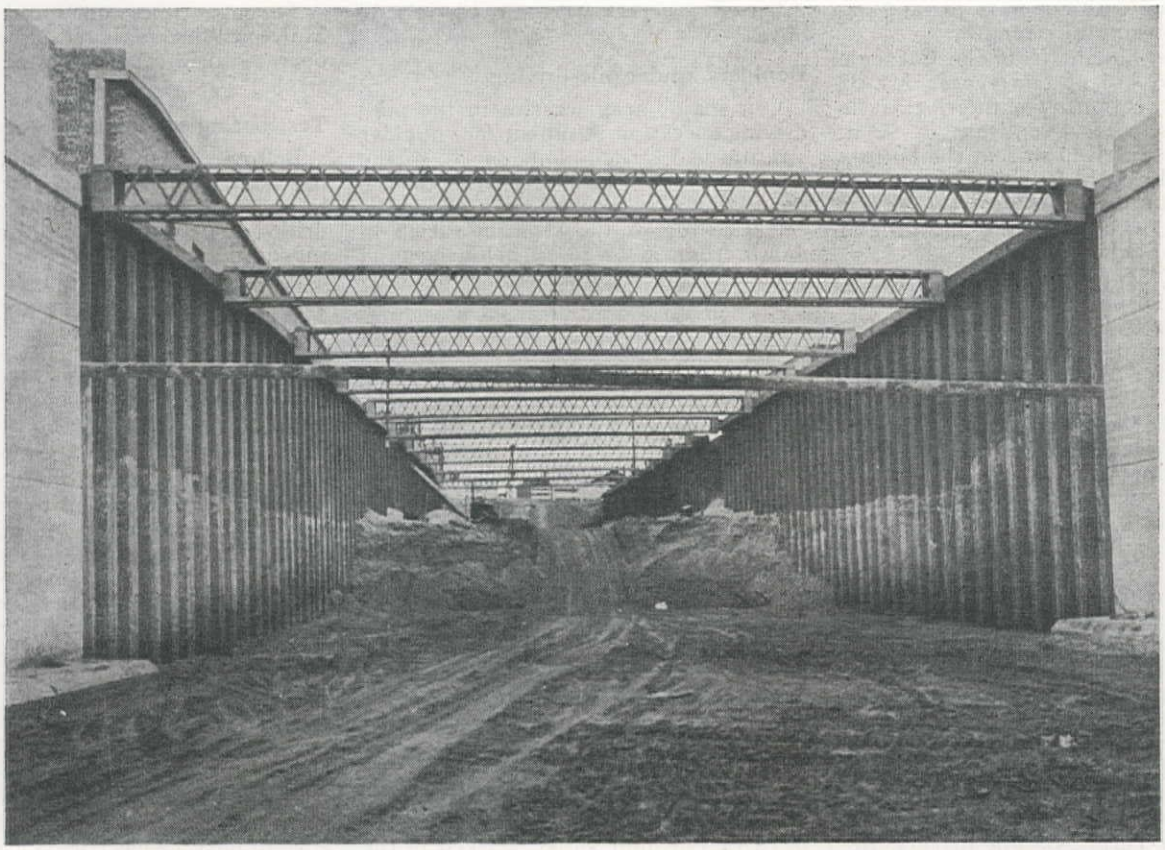
The two alleys were named in early Civil War days after Stephen A. Douglas and Abraham Lincoln, following a trip to Reno by Douglas, and since then have been the location of Reno's biggest gambling casinos and haunt of some of the West's toughest characters. For the past several months, the alleys have been blocked and torn up by much construction and remodeling work on the abutting establishments, and the business men concerned decided to transform the alleys to the most beautiful anywhere.

Since the alleys have been in need of repair, the Reno City Engineer's office is handling the plans and construction of the local project, to be completed early this summer, and the extra cost of paving with ore aggregates and expensive surfacing will be borne by the owners with frontage property. The first loads of ore were trucked by John L. Savage, Carson City contractor and acting road commissioner of Ormsby County and received by police escort in Reno, where they were stored at the Ready-Mix Concrete Co. plant until used in the mix. Pyrite, because of its luster, was at one time considered for the paving job until it was feared that it would produce an alkaline reaction with the cement and ooze the characteristic gelatin that concrete designers on massive structures always guard against.

Canada Plans Joint Venture Gas Line With United States

A PIPELINE, expected to cost about $175,000,000, is being planned to tap the large quantities of natural gas in the northern part of Alberta, Canada, and to bring it through the Canadian Rockies to Vancouver, Washington, Oregon and northern California. A new Canadian corporation, Westcoast Transmission Co., Ltd., has already been sanctioned by the Canadian government to construct and operate the Canadian portion of the line. It is expected that an American corporation will be formed to construct and operate the American end of the line.

Huge natural gas supplies have been found in the Alberta area, but market possibilities were remote since Canada is incapable of consuming more than a small part of the available supply. Market surveys in the Pacific Northwest and California indicated enough demand, steadily increasing, to pay for delivery over a long period of years.



STRUTS begin where steel walls meet concrete in foreground. Visible 8-in. gas main has yet to be moved.

El Paso's "Big Ditch" Will—

Depress Tracks Across Main Streets

Downtown traffic in El Paso, until now completely stopped whenever a train is passing through, will cross over a ½-mi. long railroad underpass being built jointly by the city, state, and the railroads

By ROBERT E. DEWHURST
El Paso, Texas

A $5.5 MILLION "big ditch," slicing like a fresh scar across the downtown business district of El Paso, Texas, is being dug to get railroad traffic out of the growing city's way. The king-size job is a track depression project which bears the official title of "El Paso Grade Crossing Elimination Project."

The 2,600-ft. long cut, when completed, will contain three sets of railroad tracks and will be bridged by eight of the nine highway overpasses in the project.

Now ahead of schedule, work on the big job got under way May 12, 1948; the work at present is progressing on a mile-long front with as much speed as possible. The first train to roll over this, the city's Number One public works project, is expected to make the trip late next year, probably during Christmas week in conjunction with El Paso's annual Southwestern Sun Carnival.

City cut in two by tracks

Before the track depression project started, four main arteries of railroad traffic knifed northeast and southwest at ground level through the heart of the city. Two of these main lines remain. The other two were removed from the site of the giant cut and railroad operations were routed over the two remaining lines.

Chief reason for the project is that today, as for years past, each time a passenger or freight train passes through El Paso the entire city is virtually stalled until the train has passed. The situation is complicated by switching operations which put trains in the downtown district.

There is at this time only one overpass crossing the tracks, a narrow and ancient structure which is too far east of the downtown section to be very useful.

In May of 1946 the El Paso Police Department made a traffic study of downtown rail crossings between the hours of 7 a. m. and 7 p. m. The study showed traffic delays of between six and eight minutes with train-blocked crossings taking up about 10 per cent of the 12-hour check period!

The track depression job is designed to remedy this situation by eliminating 10 grade crossings, eight of them in the downtown district. Despite the reduction in the number of main track lines, the project will not hamper rail operations. In fact, a central traffic control system will make expanded rail activities possible.

"Big Ditch" to hold tracks

The completed cut—now slightly more than half excavated—will be 25 ft. deep and 45 ft. wide. There will be a standard 22-ft. clearance from the top of the rails to the low steel of the bridges.

Ditch construction and building of the sub-structure of eight of the nine highway bridges is in a $1,365,164 contract awarded last July to the R. E. McKee Co. of El Paso.

The track centers will be 14 ft. apart with an 8½-ft. clearance from the center of the outside tracks to the walls of the depression. Lead and zinc slag from the American Smelting and Refining Co. smelter a few miles from El Paso will be used for ballast; 113-lb. head-free rails and creosoted wood ties will be used on the track bed.

A 1 per cent grade will lead westward from the 1,200-ft. vertical curve at the low point of the cut. A 1.7 per cent grade will lead eastward.

Sheet piling for walls

Retaining walls are Z-type sheet steel piling, already driven to grade, which

will be faced with concrete for appearance and structural strength.

The piles, bought from the Carnegie Steel Corp., are of two types: MZ-32 and MZ-38 sections. The interlock-style sheet piles, almost entirely in 42-ft. lengths, were driven so that the bottom edges would be 17 ft. below the top of the rails, to offset in part the thrust against the walls from the backfill and adjacent buildings.

The MZ-32 piling was used where there was no building load against the walls of the track depression. The MZ-38 piling was used where the maximum building load was a one-story brick building.

Where the load against the depression walls came from more than a one-story brick building—and there were eight such cases—shoring and underpinning were employed. Many buildings are only three feet from the steel wall line of the job.

Using concrete cantilever piers, the foundations of those buildings were taken down in some cases as much as 25 ft. below the ground line to remove their weight from the sheet piling walls. In one case, a building was constructed after the track job was under way. The builder, in that one instance, did his own underpinning.

The piling was driven to grade by McKiernan-Terry 9B3 pile-drivers. Because of both the type of piling used and the type of soil in El Paso, this type of hammer was found to be completely successful. Two hammers were used throughout the job, each with a separate rig, and three other hammers were kept on hand. The hammers delivered 8,750-ft. lb. blows.

The pile-drivers caused only negligible damage to one building near the pile-driving operation, engineers reported. Considerable interior and exterior repair and rehabilitation work, however, remains to be done on buildings mainly as a result of the shoring and underpinning work.

Mechanical breakdown of the pile-driving equipment kept one street closed a total of 23 days for pile-driving. But otherwise, streets were closed only 10 days.

Boulders hinder pile-driving

One major snag was hit in the pile-driving operation. A sub-surface boulder stratum was struck along 446 ft. of the steel wall lines on both sides of the depression near the west end of the project. The top of the stratum varied in depth from 20 to 26 ft. below ground surface; the stratum varied between three and nine feet in thickness.

Engineers, before the job began, were aware of the presence of the stratum, believed the result of a prehistoric flood. But it was hoped the piling could be smashed through the sand and stone barrier. When that was tried it was found to be impossible, and a long, arduous solution to the problem resulted:

Nine feet from the steel walls, along the entire 446-ft. boulder area, wood and steel piling was driven down to the top of the stratum. The piling was shored with 12 x 12-in. wooden beams on 8-ft. centers with 12 x 12-in. wooden walers. Clamshell buckets were used to excavate the earth down to the top of the stratum.

Fifteen laborers, at different parts of the boulder removal job, continuing over a period of months and for a while in two eight-hour shifts, worked in the pits removing the stone by hand. The boulders were placed in buckets and hauled to the surface. When removal was finished the holes were refilled with earth and pile-driving in the area completed.

Every 300 ft. the retaining wall is recessed three feet for safety niches. A 30-ft. square recess is provided at the low point to locate a pump house for the drainage part of the project.

Walers and struts now are being placed along the entire project on 24-ft. centers. The walers—24-in. wide-flange beams—are bolted to 6-in. clip angles welded to the sheet piling. The 3-ton fabricated steel struts are bolted to the walers at each junction of the waler sections.

To save time and speed up work McKee engineers rigged a two-gang, air-operated drill for bolting the structural steel.

Test boring schedule

Before the project could be engineered, of course, the water table had to be located and test borings had to be drilled to determine soil bearing capacities in the entire project area.

A test pit was sunk 30 ft. in June of 1946. The pit was 10 ft. square at the top, 6 ft. square at the bottom. At the 30-ft. depth workers, using hand augers, went down to 36 ft. before they hit the water table. Thus it was known the water table would be just about 10 ft. below the proposed base of the tracks.

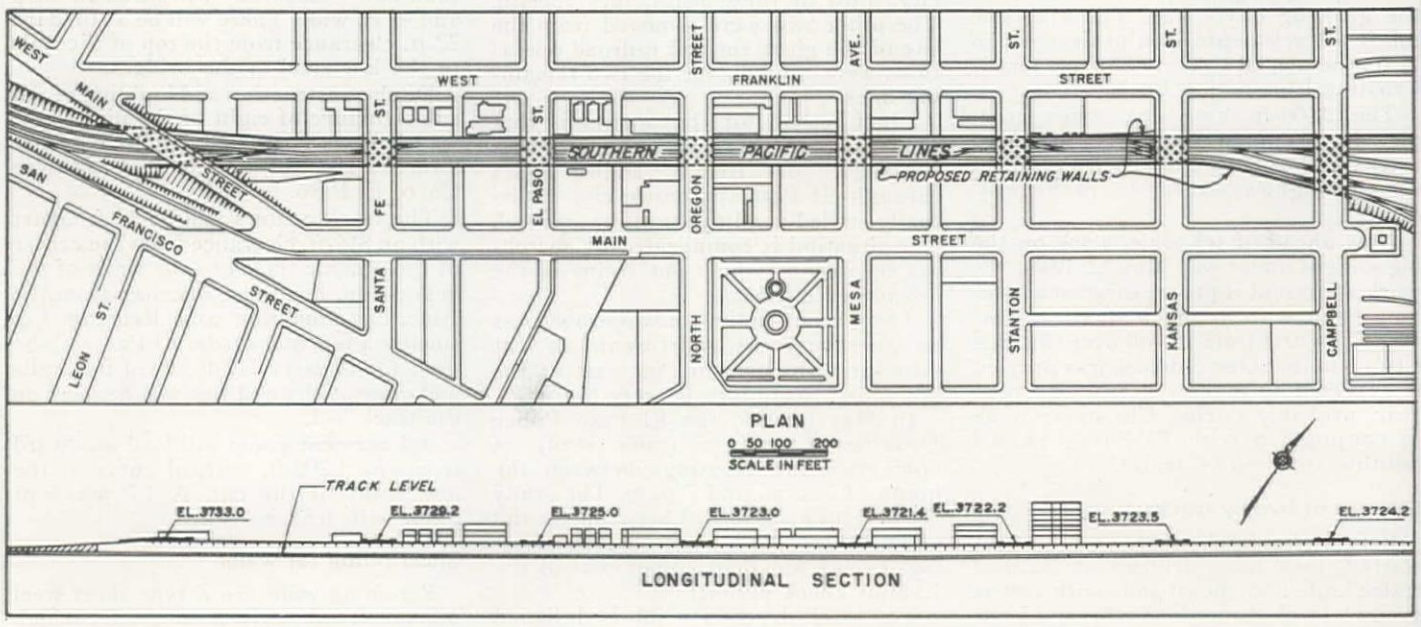
The Raymond Concrete Pile Co. made Gow borings of the entire project area before plans were drawn. The bearing capacity of the soil was found to vary between 6,000 p.s.i. at the west end of the job and 2,000 p.s.i. at the east end. The tests showed there would be ample bearing capacity at the track elevation so that the entire improvement could be made without the use of track supporting piles.

Chemical analysis of test pit samples indicated no corrosive elements in the soil that would tend to disintegrate the steel. But it was learned that the presence of positive electrical charges in the soil would make necessary a ground electrolysis prevention system. The contract for that job will not be awarded for another year.

After the piling has been in the ground a full year it will be tested to definitely determine application of the electrolysis prevention system. Cost of the probable system is estimated at $33,000. The necessary low-voltage D.C. charge that will be put on the piling will be tapped from generators supplying the city's electrical power and will be carried to the project by direct line.

Concrete awaits settlement

Concrete facing will be put on the steel walls later. It will vary in thickness between 6 and 18 in., the variance being



due to the irregular shape of the steel piles.

Engineers are not certain at this time how the facing will be applied to the steel. Two methods are under consideration: use of either wood forms or collapsible steel forms mounted on railroad cars.

The contract specifies the lapse of a year after completion of the pile-driving before the concrete work can be done. The year is to allow sufficient time for "settling" of the load on the piling; but that time allowance may be longer than is needed.

Berry strain gauge readings now are being taken on the struts to determine when settling is stopped and to record maximum loads developed in the struts.

When concrete work is done a 4½-ft. high solid concrete wall will be put along the top of the waler to join the bridge handrails at the street overpasses, as a safety precaution.

Excavation in two lifts

The cut is being excavated by lifts, and the first 12-ft. lift already has been removed for the full length. Work is under way on the second and final lift. Slightly less than 125,000 cu. yd. of dirt will have been removed by bulldozers, power shovels and clamshells when digging is done. Men working with pick-axes and pry bars are removing the earth from the irregular surface of the sheet piling walls, where the heavier equipment cannot function.

There has been no problem in disposing of the dirt. Much of the earth is being used on city streets and recreation projects. The remainder is being sold, when bought in 100-load lots, at 50 cents a truckload plus the cost of hauling. The money is credited to the city.

To understand the "big ditch" it is necessary to understand the railroad traffic problem and what is being done about it in relation to the whole job.

Before the job was begun a plan of stage construction—built around 11 separate contracts—was worked out to coordinate the work of contractors and to minimize interference with train operations and life in the city in general.

Because railroad operations through the heart of the city were to be carried out only on two main lines during the job instead of the previous four, it was necessary to construct "shoofly" tracks to integrate operations between the east yard and the depot tracks and four main lines at the west end. This was done on a $55,023 contract by the Hugh McMillan Co. of El Paso.

Permanent track changes

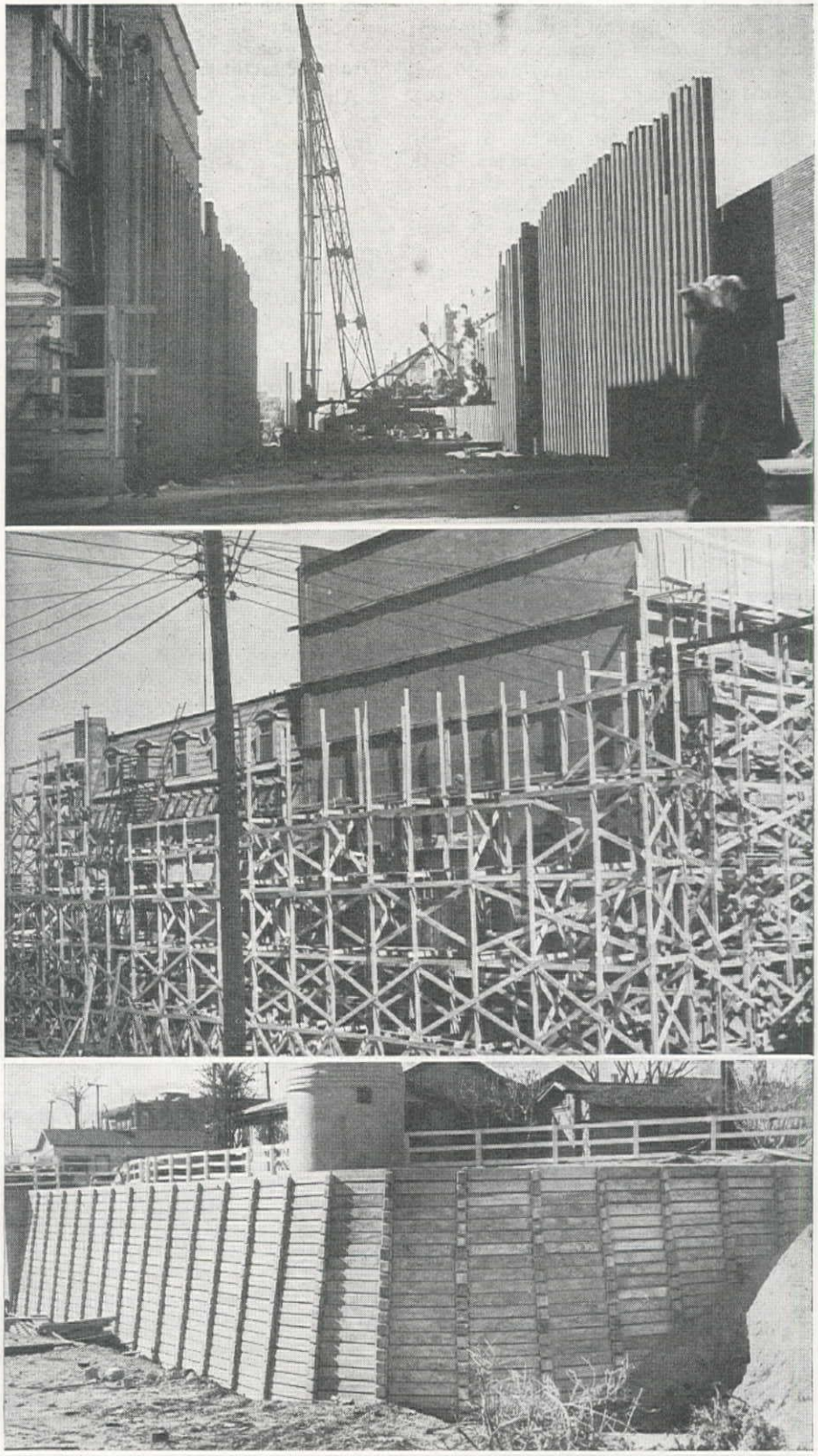
When the project is done, the railroads will have as much yard space as they have now; but a few permanent changes are being made. The east end train yard is being altered by taking track from its west end and adding it to the east end. The 0.8 per cent grade at the west end of the yard is being increased to 1.7 per cent which will concentrate switching operations at the east end of the yard.

The sharper east end grade, by shortening the otherwise required length of yard changes, will prove an important saving in cost.

In relocating tracks at the east end of the project, two railroad bridges were built over the Franklin Canal—an open irrigation conduit. One is a timber trestle, the other is a 176-ft. concrete culvert on a 9-deg. skew.

The east end track relocation and expansion required relocation of an icing dock, previously four miles west of the city. A new $368,000 dock was built conveniently in the east yard. Its location will eliminate 50 per cent of the otherwise needed train travel around the construction site during the job.

The finished track depression will wasp-waist railroad travel through the city by substituting three main lines of rail travel for four. The three main lines



UNDRIVEN SHEET PILES, top, are very close to existing buildings before being driven. Center view shows falsework around building, put up while the foundation was underpinned to take shock load of sheet piles. Concrete crib wall, bottom, is here as an economy measure.

at the east end will spread to feed 23 sets of track in the east yard. At the west end the three sets of tracks will fan out to serve the four main lines and 10 sets of yard tracks at El Paso's Union Depot.

At its east and west mouths where the tracks will begin to fan out, the depression will exceed its normal 45-ft. width. Between the normal 45-ft. cut width, and the 55-ft. maximum up to which steel walls are used, the steel piling is driven on a curve. Longer, heavier struts are needed at the greater widths.

Engineers have found that where the cut exceeds the 55-ft. width it is cheaper to substitute concrete retaining walls for the sheet steel walls. This is done at both ends.

Twenty-five-foot high wingwalls, 2 ft. thick, have been constructed adjoining the steel walls. The concrete facing will join the concrete and steel walls and make the depression wall continuous. Beyond the wingwalls at the east end, a 22-ft. high concrete crib wall is used as a retaining wall for further economy.

CTC will control operations

The restricted track area will not affect railroad operations now or in the foreseeable future, engineers say, despite substitution of three tracks for four.

The reason is a centralized traffic control system to be installed on all tracks throughout the El Paso railroad operation area. The equipment, of the latest design, is from the Union Switch & Signal Co. at Swissvale, Pa.; it is being installed by the Southern Pacific Railroad.

Switching now is done manually with the conventional lever and pipe. All switching under the new system will be by remote control. Cost of the system will be $335,625 and equipment has been 20 per cent delivered. Two $16,000 two-story brick towers, with Solovex heat-resistant glass, are being erected for the central traffic control—one at each end of the cut.

Drainage facilities for flash floods

Although there is relatively little rainfall in the El Paso area, the city sometimes experiences "flash floods." Primarily for that reason, drainage in the "big ditch" is an important consideration.

The track job is near the foot of a long grade sloping from the north of the city toward the Rio Grande.

A $400,000 storm sewer, employing 8 x 5-ft. concrete box culverts, was built paralleling the cut a half-block north of the project. The storm sewer, which will catch all water running down the long grade from the north of the city, empties into the Rio Grande at its west end and, at its east end, into the city's $1.68 million storm sewer project, now under construction.

To pick up water originating between the storm sewer and the cut, a full-length concrete gutter will be built just outside the north wall of the depression. The gutter will have catch basins and inlets to the storm sewer.

Three-inch weep holes are provided at the base of the retaining walls to prevent hydrostatic pressure against the wall.

A 100-ft. wide concrete sump with a 16,000-cu. ft. capacity will be located at the low point of the cut, under the railroad tracks. Manways and other arrangements for cleaning the sump of sand and silt without interfering with rail operations will be provided.

Four 1,500-g.p.m. electrically driven pumps and one 3,000-g.p.m. gasoline standby unit with automatic starting equipment in case of power failures will be installed to get water from the sump to the storm sewer.

Against each wall of the cut, draining into the sump, will be 30-in. covered concrete gutter drains constructed monolithically and acting as a beam at the thrust point of the piling of each wall.

Downtown streets on bridges

The "big ditch" will be crossed by six typical bridges and two other bridges. The typical bridges, 46 ft. long and 70 ft. wide, will put the main downtown thoroughfares over the depression. The bridges will have two 10-ft. walks and 50-ft. pavements.

Depending on the contour of the ground, grades on the typical bridges will vary from a minimum of 0.5 per cent to a maximum of 7 per cent.

So as to cause minimum disruption of traffic during construction of the bridges, they will be built in pairs. No two side-by-side streets are included in any one pair. Work has just started on the first pair and it is estimated that it will take two months to complete each group.

The relatively long tie-up of busy streets will be hard on businessmen near the bridge construction. They petitioned the city council for walkways over the cut so their businesses would not be hurt. But engineers advised against such an undertaking, stating walkways close to construction work would be dangerous. They were not built.

The typical bridges will be made of 24-in. steel I-beams, covered with a 6-in. concrete slab. The outer beams will be encased in concrete for appearance and blast plates will be installed on the under side of all bridges. A solid concrete railing, plain but attractive, has been designed.

The outstanding feature of the typical bridges is in the design of abutments, blended with the sheet steel walls to reduce cost.

Inside the Z-section of the sheet piling, beneath each stringer, is a 10-in. H-beam pile driven to grade. Eleven H-bearing piles were driven at each side of the cut for each bridge. The waler on top of the wall was broken at the bridges and connected to the outer bridge stringers. Separate bridge walers will be used at the abutment.

One long bridge

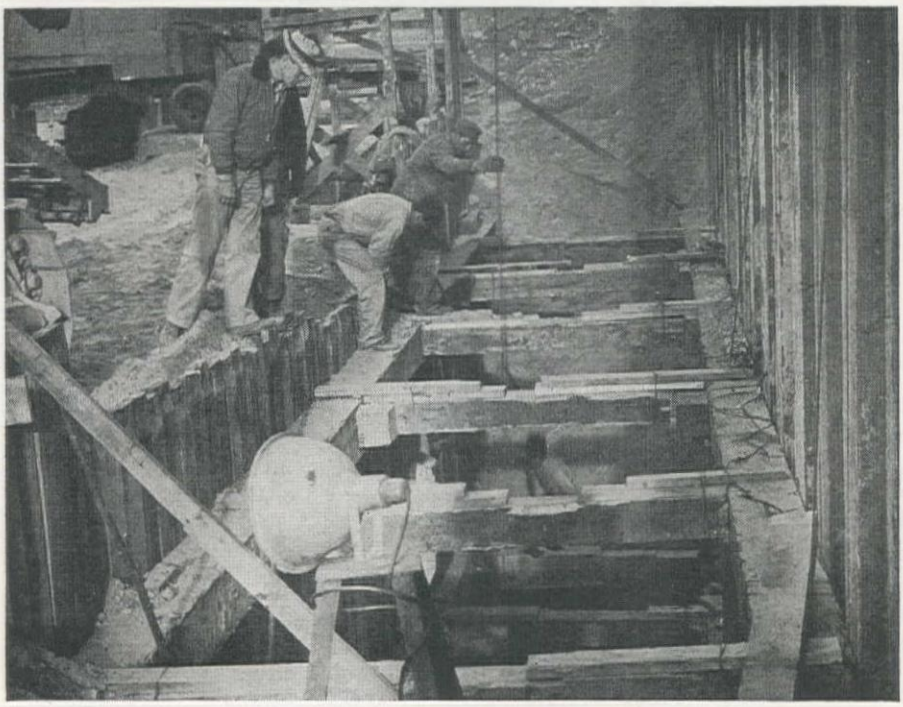
At the east end of the cut a 90-ft. long, 70-ft. wide, two-span steel beam bridge with a 6-in. concrete deck is to be erected. The bridge will have a 6 per cent grade.

Sixty-eight 60-ft. H-bearing piles were driven at sub-grade so their top ends will fit into the concrete footings of the bridge. This was done only at this one bridge because the bearing capacity of the soil there is poor. The piles were battered two inches to the foot to offset the thrust of backfill against the concrete retaining walls.

Abutments and the center pier for the bridge will be built in October. A $153,692 contract for the bridge, and paving of the approaches to the other bridges, was awarded to Western Constructors, Inc. The contractor is awaiting steel delivery.

The H-bearing piling for this bridge was driven in a 22-ft. excavation. After the piles were hammered down, the west

BOULDER FIELD problem, which stopped pile-driving in part of job, is being solved. Wall and shoring are for trench next to steel wall at right. Spotter guides bucket for boulders.



two-thirds of the excavation was refilled with dirt, stockpiled for that purpose, to allow traffic to move over the street. The excavation will be re-dug when work is to begin on the abutments and center pier for the bridge.

Overpass at west end

On the west end of the job, where the tracks swing to the west at the mouth of the cut, a 155-ft. bridge, 70 ft. wide, will be built. The bridge, a two-span through-truss design, will have a 26-deg. skew at one end and a 36-deg. skew at the other. It will have 4-in. steel "T" decking, filled with concrete.

The overpass will have 7 per cent ascending and 10 per cent descending grades on a split pavement. A contract for the bridge was awarded in November to Western Constructors. It will cost $95,279. The contractor is awaiting steel delivery here also.

However, the concrete sub-section of the bridge has been completed. All abutments for the bridge were poured in three horizontal pours while piers were built monolithically in three vertical pours. This technique has been used in all concrete work done so far on the project; wooden forms have been used to hold all pours. The concrete was transit-mixed, and all concrete is bought locally from the Southwestern Portland Cement Co. plant a few miles from El Paso.

The longest bridge in the project will not span the depression but will cross the tracks at the center of the east yard, and will eliminate two grade crossings. It will be a 972-ft., 20-span continuous I-beam steel bridge with a 6-in. concrete deck and a 65-ft. pavement. It will have a 6.25 per cent grade. The contract for the $412,378 overpass was awarded to Bell, Braden, Barker and Gilvin of Amarillo, Tex. Work will begin in the Fall.

Utilities have own bridges

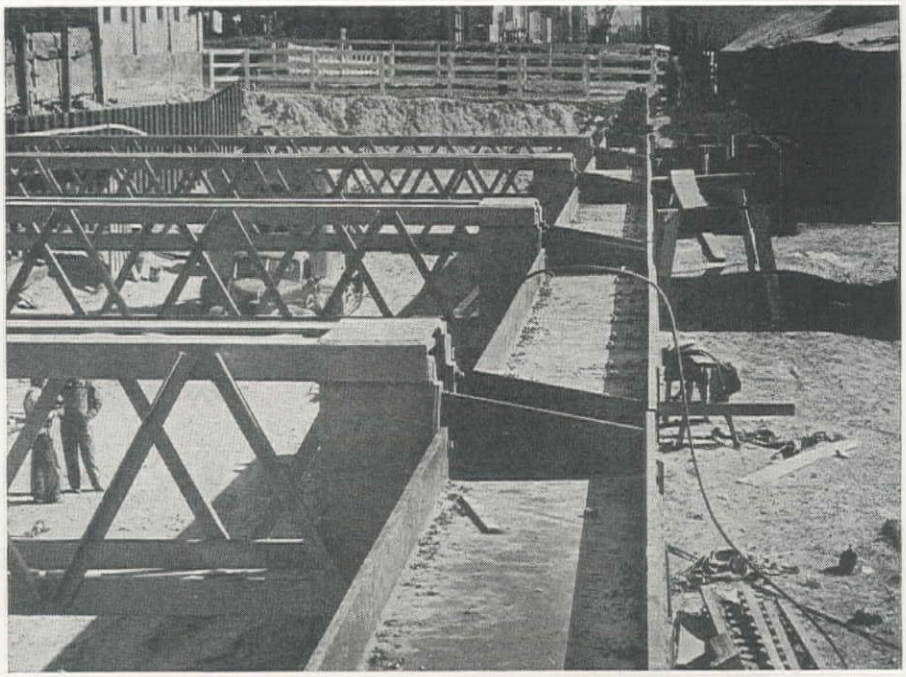
Several methods are employed to get utilities over the big ditch. Near the center of the job will be constructed at strut level a 4-ft. wide steel arch bridge to carry the existing 16-in. gas line over the cut. It will allow access by workmen and steel gates at each end of the bridge will prevent tampering with the pipe.

A main electric cable at the west end of the job will be carried over the depression on a separate bridge. The same technique will be used for a telephone cable near the east end of the job.

Other utility lines will go across the depression between the girders of the steel bridges, under the sidewalks on either side of the street where 30-in. beams have been provided for the purpose. This is to prevent interruption with the "X" diaphragm bracing of the bridge.

A long time coming

Grade crossing elimination has been in El Paso's mind at least since 1901. In that year the City Council adopted an ordinance requiring the railroads to separate grades in the downtown area. Nothing was done and similar actions taken several times in the years that followed accomplished nothing.



STRUT and waler union is shown in closeup. Bolts at right of waler fasten beams to clip angles welded to sheet piling. Struts are bolted to waler at junction with beam flanges.

In 1923, when El Paso adopted its City Plan, the City Plan Commission report included under the heading of "larger present and pressing problems" a recommendation for the "removing of railroads from the heart of the city and abolishing grade crossings, at the very least abating the nuisance of freight train traffic through the business center . . . "

But it was not until 1946 that the ball really started to roll.

The greatest problem in the project was to get all the parties concerned to agree on what should be done.

From 1916 to 1946 the city, the railroads concerned and the Texas State Highway Department could agree on neither the solution to the problem nor the method of financing it. Surveys of various solutions to the problem were made through the years but none were agreed on. The city and railroads finally decided that a nationally-known engineering firm they both approved would be chosen to survey the problem and both parties would abide by the engineers' decision.

DeLeuw-Cather Co. of Chicago was chosen. The consulting engineers surveyed the problem, made a recommendation, designed the track depression job, and now are supervising the work. Harlan H. Hugg is project engineer. He has been on the job since the start.

Three dispositions proposed

When the Chicago consulting engineers were called into the picture there were three possible solutions.

The first was relocation of the tracks in the south part of the city near the Rio Grande. The 1946 estimate of the job—$8,910,000—was prohibitive and that proposal offered nothing but relocation of the trouble.

Besides requiring relocation of the tracks, thus adding mileage to train trips, the plan would have called for relocation of train shops and yards. Even more, the tracks and trains would have had to run through the Chamizal area, a very objectionable fact. The Chamizal is a strip of land on the American side of the Rio Grande which may belong to either the United States or Mexico. Possession became a matter of dispute many years ago after a shift in the river's course.

The second possibility was track elevation along the present site of the depression. The elevation would have been from 3 to 10 ft. above the present grade. The proposal called for the tracks to be supported by earth fill placed between retaining walls. Traffic would have gone under the tracks in underpasses.

Among the engineers' objections to this proposal was the fact that the equivalent of 12 blocks of business frontage would have been ruined because the proposal called for dropping street levels near the tracks six to 12 ft. for access to underpasses. That would have made store and office entrances near the project virtually inaccessible. In addition, the elevated structure would be a sort of China Wall splitting the city in two and reducing light and air in the area adjacent to it. Estimated cost of this proposal in 1946 was $5,130,000.

That left track depression which is what the consulting engineers recommended. And that is what is being done.

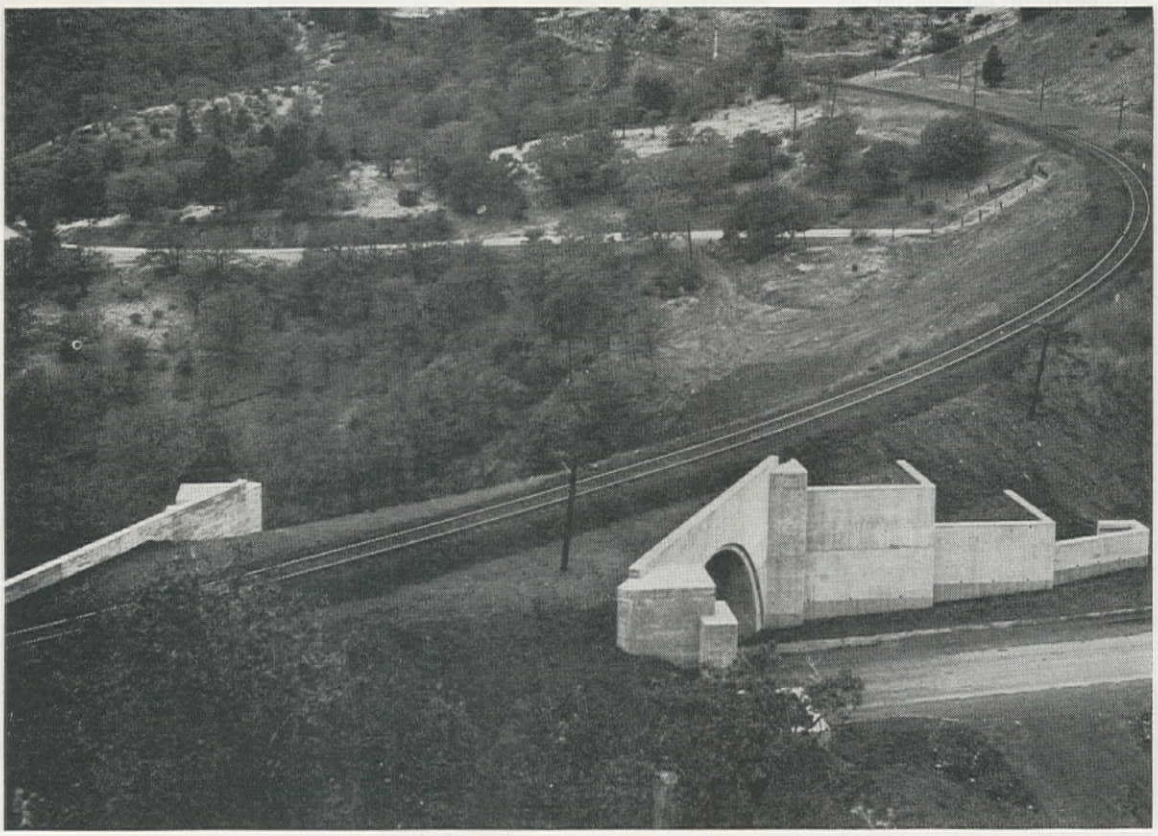
Engineering firm handles all details

The Chicago firm took over all arrangements, met with the railroads, city and State Highway Department jointly and individually and persuaded the State Highway Department to put up $1.5 million. The firm got the city and railroads to agree to put up the remaining $4 million, each paying half. El Pasoans, by a 13-to-1 majority, approved a $2 million bond issue.

The railroads are the Texas and New

Continued on page 144

Deceptively Skewed Underpass



EXTREME SKEW is shown above, with Highway 99 underpass portals built at an angle to both the railroad and the highway.

Complications arise on Route 99 underpass in Northern California as highway cuts across railroad at 53-deg. skew—Building timber shoofly trestle constitutes big phase of construction work

By ROBERT S. BARKER
Associate Bridge Engineer
California Division of Highways
Sacramento, Calif.

A NORTHERN GATEWAY to California has recently been completed in the form of an interesting underpass separating Southern Pacific's single-track Siskiyou line and Highway 99, the northern extension to Oregon, Washington and British Columbia of the great highway discussed in the opening article of this issue. At this location, the highway, following down a deep ravine, encounters a high railroad fill at 53-deg. skew, where the underpass effects a crossing without depressing the highway grade. The new structure replaces an existing underpass of 20-ft. width and a vertical clearance of 14 ft., which was built in 1916 by the railroad.

In the preliminary development of the project several economic studies were made in which the principal competitors were a three span steel girder structure on steel or concrete columns and concrete abutments, and a reinforced concrete earthfilled arch. Due to the extreme skew and consequent long center span, the resulting girder depth did not make for a structure of pleasing appearance. It was estimated, also that a considerable saving in cost could be made by use of a concrete arch structure.

In consideration of these factors, and realization that by giving its portals an attractive architectural treatment the design could be made in some degree responsive to the aesthetic values demanded of a gateway entrance to California, the arch type structure was selected.

Super-skew requires cantilever walls

The underpass is 87 ft. long between end walls and 44 ft. wide between spring lines, and provides a 14-ft. minimum vertical clearance for a 32-ft. roadway between curbs, and a 24-ft. rise above roadway grade to crown of arch. It is built on a 30-deg. skew with respect to the center line of the highway.

A series of counterfort and cantilever retaining walls, stepped down and back from the roadway in succession, are provided at the southeast and northwest approaches to the arch. These walls are necessitated by the extreme skew of the roadway with respect to the railroad track, to support the high railroad fill and live load surcharge. At the southwest and northeast corners, boxed buttress walls are placed to retain sufficient earthfill so as to equalize the dead loading over the entire arch and are stepped to harmonize with the appearance of the opposite corner walls. Parapet headwalls surmount the arch barrel at each end and terminate in buttressed corners.

The footings for the arch barrel, counterfort walls and boxed corner wall are supported on 10-in. steel H-piles. Other walls are of standard spread footing design. The arch extrados, and end parapet walls to the height of backfill received membrane waterproofing.

The earthfill height at crown was in excess of 6 ft., and at the skew back increased to about 29 ft. The live load used was Cooper E-72, according to A.R.E.A. specifications.

Skew could cause unequal loading

Due to the extreme skew of track to roadway the possibility of unequal loading of the arch barrel at the parapet walls causing, in turn, unequal deflection of the arch, was considered important. It was felt that the effect, in addition to that from possible temperature and shrinkage distortions, would cause the parapet walls to crack if rigidly connected. In consequence the original design called for an expansion joint in these walls 13 ft. either side of underpass centerline. The outer quarters were designed as cantilevers from the buttress corner walls, while the 26-ft. long center half was cantilevered from the arch barrel. However, connection of this center wall with the arch by reinforcing bars was concentrated at wall ends only,

these serving as counterforts. The wall was keyed into the arch for its full periphery of contact to serve as a shear connection. Later an additional expansion joint was placed in this wall at crown of arch, and counterfort reinforcing steel added to resist the pressures caused by close operation of heavy compaction equipment. Expansion joint material and rubber water stops were used at all joints.

Shoofly trestle during construction

Planning of a 33-span timber shoofly trestle to accommodate railroad traffic during the construction period was a difficult part of the design, and its building later constituted a major phase of the construction work. The railroad fill and adjoining ground slopes were so extensive in drop and reach that it was necessary to hold the shoofly alignment as close to the existing tract as possible and yet keep interference with underpass construction to a minimum. Timber piles were used except at the crossing of the southeast retaining wall where rock was found at near footing level, and 12BP53 steel piles were required to secure minimum penetration.

In the construction of the shoofly trestle a pile-driving unit consisting of a Vulcan #1 single acting steam hammer with 5,000-lb. striking ram was used. A steel skid type pile-driver with 65-ft. leads was manufactured at the job. Equipping it with a pivot point about 40 ft. above the bottom of the leads and a special "moonbeam" attachment to provide positive control for driving batter piles was an important factor in the speed and accuracy of driving. Extra 10 x 12-in. caps, 18 ft. long, were set on top of the 14-in. trestle caps in order to permit sufficient sidewise movement of the pile-driver. The piles were of especially sound quality, large and straight. Some were 60 ft. long and in some cases had to be driven to solid bearing with only 9-ft. penetration. Calculated bearing value of timber piles was in excess of 20 tons and for the steel piles was more than 100 tons. It was found possible to drive all steel piles below retaining wall footing grade and into rock.

Arch footings on piling

In the construction of the underpass the excavation of the existing railroad fill was performed with the use of tractors with bulldozers, while most of the structure excavation for footings was removed with the help of a ¾-cu. yd. dragline. The footings not containing piles were excavated at later dates as the crane became available after other duties.

In the driving of 10-in. BP42 steel piles for the arch footings the same pile-driving unit used on the shoofly trestle was available. Test piles were required in the various footings, and two of these were subjected to a loading test. These test piles saved considerable splicing in that the longer length indicated for the west footings resulted in a considerable increase over the original estimate for furnished pile length. Bearing values for footing piles averaged 70 tons as calculated by the Engineering News formula.

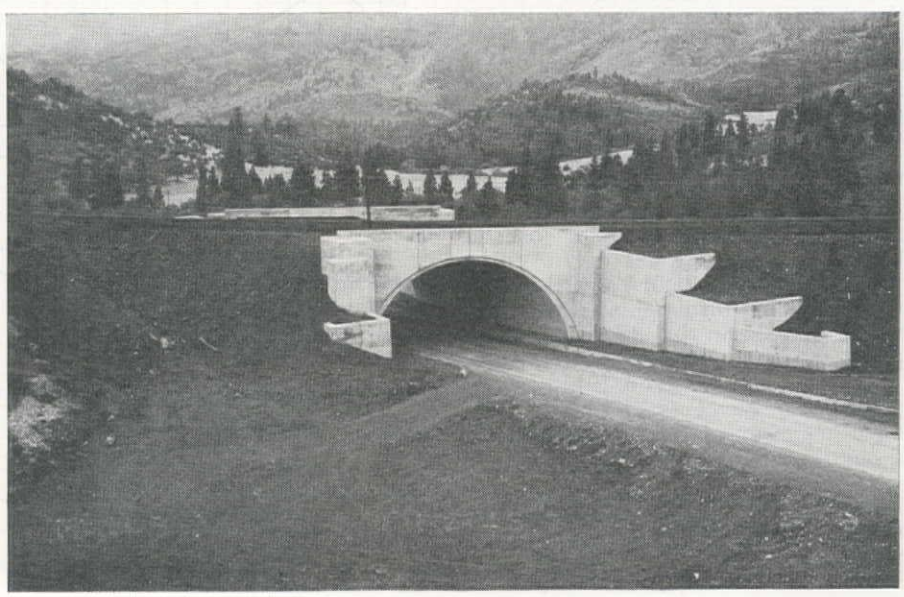
PLEASING LINES were the result of using a reinforced concrete earthfilled arch structure for this underpass. Chief competitor in preliminary design was a three-span steel girder.

Forms supporting the arch crown section consisted of bowstring trusses at 2-in. centers on 6 x 12-in. caps. These were manufactured on the job and assembled to fit one template. Vertical side trusses on 6 x 6-in. posts were placed at 8-ft. centers. Intermediate side segments at 2-ft. centers were braced to the vertical truss members. All truss and rib material was 2-in. rough and split ring connectors were used in crown trusses at points of greatest stress. Sheathing for the arch intrados consisted of 1 x 4-in. tongue and groove, while for exposed surfaces of all walls was of ¾-in. plywood. Arch falsework trusses were assembled with 1-in. camber, and as nearly as could be determined an average of ½-in. deflection was obtained when crown concrete was placed.

Concrete poured in cold weather

Concrete was mixed in ½-cu. yd. batches in a Jaeger 16S mixer. It was placed directly into the forms or chute by means of crane and concrete bucket. On some pours an average of 15 cu. yd. of concrete per hour was placed. A 36:24:40 concrete mix was designed for the work, with $W/C = 0.75$ and a slump of 3 to 3½ in. used for the footings and arch, and a $W/C = 0.77$ and 4-in. slump used for retaining walls. At times during the coldest weather, in addition to the use of heater water, an admixture of 1 to 2% of calcium chloride was added to the cement. Consolidation of the concrete was obtained with a powerful, high speed electric vibrator turning in

SUPPORT of high railroad fill and live load surcharge required construction of a series of counterfort and cantilever retaining walls, right of highway, and boxed buttress walls.



excess to 9,000 rpm. A standby air-powered vibrator was available at all times in the event of electric power failure.

Curing of the concrete was accomplished by covering with wet burlap sacks. Generally, in lieu of this, the contractor elected to leave the forms in place throughout the curing period.

After stripping of the arch forms the structure backfill was brought up, following the placing of membrane waterproofing, so as to produce approximate balanced loading on each side of the arch. This backfill was spread by tractors and thoroughly rolled in 6-in. lifts with loaded trucks. Back of the counterfort and northeast cantilever walls approximately 16 ft. of backfill was compacted by dropping a 3,000-lb. hammer from a height of about 4 ft. over the entire area. At constricted places hand tamping was employed.

Upon completion of the backfilling the track was relaid over the underpass and railroad traffic over the original alignment resumed. The shoofly trestle was removed by means of a winch truck which lowered stringer chords in its progress along the trestle. Pile bents were sawed off at ground level using a chain saw, and pulled over along the axis of the trestle. Pile stubs were drilled and dynamited, then saturated with oil and burned out. Shoofly embankments were removed and placed along the toe of the main railroad fill on the same side, as a reinforcement.

The total cost of the project was $269,000. Ted F. Baun of Fresno was the contractor. The structure was designed and the contract administered by the Bridge Department, Division of Highways, State of California. Fred C. Marshall was Resident Engineer under the supervision of F. W. Panhorst, Assistant State Highway Engineer in charge of bridges.

Gone Up, But Starting Down, Is the—

Trend in Construction Costs

CONSTRUCTION PRICES, they say, are up. Certainly no one can be found to dispute the claim. How much they're up, however, is a moot point. As is the question of whether they have started down again, and the matter of just what elements are responsible for raising the prices. Of course, the base used in the calculations will cause considerable variation in the percentage of increase.

PRA base is 20 years old

The accompanying chart, prepared by the Public Roads Administration, shows the percentage increase of 3 main construction factors: excavation, surfacing, and structures, based on the average costs from 1925 to 1929. On this basis, computed for the entire United States, no item but structures has gone up 100 per cent in cost.

However, in data issued by the PRA to support the graphs shown in the chart, the cost increase has also been calculated on several other bases. For instance, if 1940 is used as the base, excavation had gone up 105% by the end of 1948, concrete pavement had increased 116%, structures 156%, and the composite mile 121%. Based on 1946 prices, the increases were: excavation 19%, pavement 31%, structures 36%, and the composite mile 29%. On any base, the first quarter of 1949 registered a small reversal of trend, as is indicated on the chart.

California studies

Meanwhile a most comprehensive study of trends in construction costs has been prepared by Richard H. Wilson, Henry C. McCarty, and Richard R. Norton, of the California Division of Highways, founded on that department's experience.

Based in that case on 1940 prices, a great many elements of highway cost have been considered and plotted. Although some individual items vary rather widely from the findings of the PRA, it is extremely interesting to note that at the end of 1948, the composite mile costs were almost exactly the same. Using 1940 as 100, and using actual experience figures, PRA found the composite mile in the last quarter of 1948 to cost 218 nationally, while the California researchers established its cost at 217 in their state. Both were considerably above the "Engineering News-Record construction cost index," used in some parts of the country, which quotes 191 as the index figure for the close of 1948.

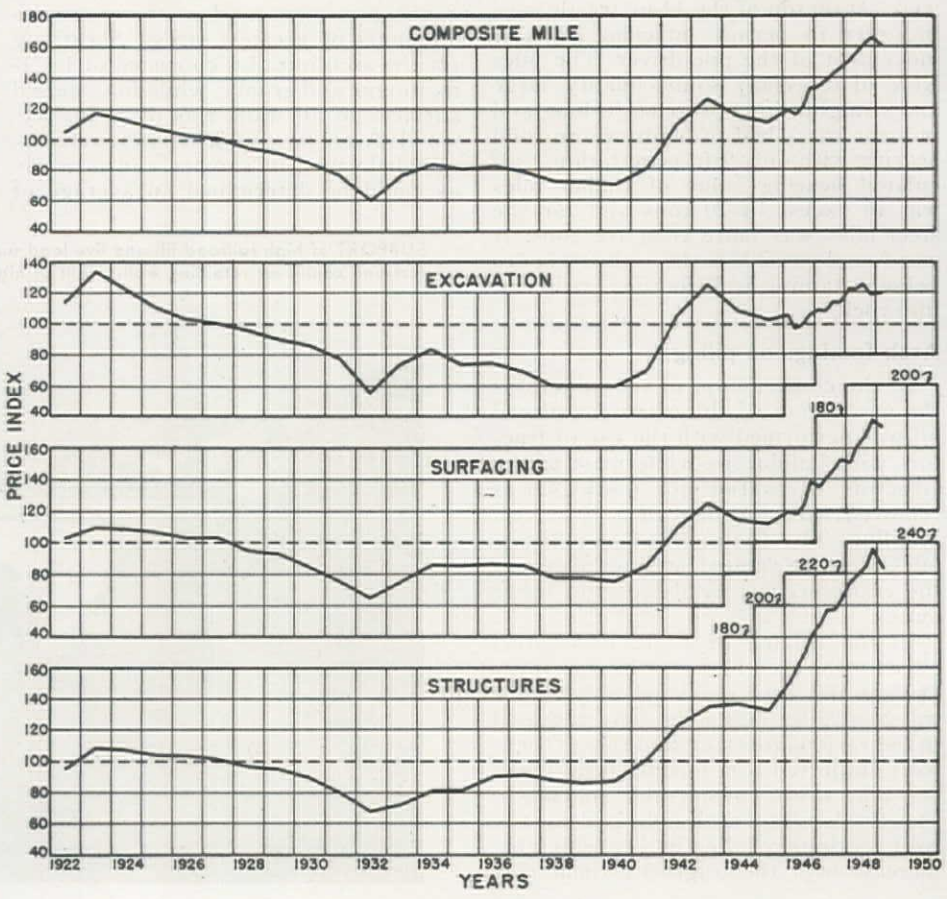
According to Wilson and his associates, the three basic elements of cost in construction of highways are materials, wages, and equipment rental or ownership charges. Such factors as overhead, supervision, insurance, taxes, and profit, are more or less proportional to the three principal items.

The increase in cost of some of the principal construction materials is shown in the following table:

ITEM	Unit	1940 Price	1948 Price	% Increase
Cement	Bbl.	$2.29	$3.34	46
Paving asphalt	Ton	6.54	16.29	149
Aggregates	Ton	1.13	1.79	58
Reinforcing steel	100 lb.	2.37	5.02	112
Structural steel	100 lb.	3.65	5.16	41
Lumber	Mfbm	32.36	96.17	197
Corr. metal pipe	Lin. ft.	1.84	2.64	43
Concrete pipe	Lin. ft.	3.30	4.67	41

Labor costs doubled

Labor prices, as shown by the California investigators, and based on contrac-



tor's labor statistics, show that in 1940 the average wage paid for an hour's labor (skilled and unskilled) on California highways was $1.01. By the middle of 1948, it had increased to $2.00, or 198% of the 1940 cost. Efficiency or productivity of labor, however, has, according to all observers, shown a marked decrease, so that the labor cost assigned to any given unit of production, must necessarily have increased more than 198%. Increased use and greater efficiency of machines has not completely counteracted the lowered productivity of manpower.

Virtually every observer gives 65% as the relation of the average worker's efficiency in 1948 as compared with 1940. Messrs. Wilson, McCarty, and Norton, after due consideration, used 75% as a fair factor when the improved mechanized output is added. With this factor, they arrived at 264 as a proper index for labor costs in 1948, when 1940 is used as a base.

Lacking any better information, the researchers of the California Division of Highways used a Public Roads Administration estimate of 160% as the relative cost of equipment in 1948, compared with 1940.

They next analyzed a number of jobs on California highways to determine the percentage of total cost applicable to labor, materials, equipment, and overhead, and after weighing each by the proportional increase determined above, found that the contractor's cost index in 1948 amounted to 221.45, on a 1940 base of 100. Recognizing the possibility of error in the calculations and assumptions, they consulted average bid prices on 8 items upon which numerous bids had been taken both in 1940 and 1948, and found that the given item of work which cost $100 in 1940 actually cost $217 in 1948, an almost exact check of their computed index figures.

Drop apparent since 1948

The California figures used in the report were based on costs in mid-1948, but in verbal communication the researchers have assured *Western Construction News* editors that a "slight falling off" has been noted in the first quarter of 1949, but no exact figures are available on this change in California costs at the present time.

The Public Roads Administration, on the other hand, has brought its figures up to include the first 1949 quarter, showing that on a 1940 base of 100, excavation had remained exactly even at 200 in the last quarter of 1948 and the first quarter of 1949. Concrete pavement had dropped from 233.3 to 228; reinforcing steel from 257.8 to 251.1; structural steel from 268.3 to 265.1; and structural concrete from 275.9 to 255.8. The composite mile, with these reduced items, had dropped from 223.5 to 218.2.

Various factors are given credit for the reductions evident in early 1949 (which, on the basis of observation, are continuing). Among them are the eagerness of contractors for jobs, and willingness to sacrifice some profit; a general recession in cost of equipment, materials, and other items of expenditure; an increasing efficiency of labor as employment becomes more limited.

The latter is given a rather high position in the list of possible causes. It is of course an intangible factor, but is none-the-less evident. While hourly rates of pay have not been reduced, and have in some cases actually been increased, the productivity factor has bettered itself to the point of reducing the labor cost per unit of work in recent months.

To indicate the trends in construction costs, *Western Construction News* presents in its regular Unit Bid Summary this month six highway jobs in various parts of the West, and with each, the unit bids for a comparable job in approximately the same locality, reprinted exactly as it appeared in issues of the magazine approximately 10 years ago. This feature will be found on page 142.

Looking ahead

Western Construction News' staff feels that highway costs will remain approximately even, or be slightly on the lower side for the balance of this construction year, but that commencing with the first quarter of 1950, a marked decrease, perhaps as much as 10%, will be noted. All the factors going into costs will be involved: greater efficiency of workers, tighter management, continued increase in efficiency of mechanical aids, reduced profit and overhead, competitive pricing of machinery, stronger supply and resultant lowered costs of construction materials.

President Truman Awards High Honor To Catskinner for Actions at Fire

JAMES W. SIMONS, a bulldozer operator, was honored by the President of the United States and by Secretary of Agriculture on May 17, for outstanding heroism and devotion to duty last November on the Topanga Canyon forest fire in California's Malibu Mountains, a few miles west of the city of Los Angeles.

The fire, which started around 1 p. m., on Nov. 4 during a prolonged dry spell, was fanned by a 45-mi. wind and in an hour's time had traveled about 3 miles across the brush and tree-covered area, burning 123 homes and other structures, despite the best efforts of more than 100 trained forest fire fighters with about 20 pieces of fire fighting equipment.

When Simons, an employee of the Department of Los Angeles County Forester, arrived shortly afterward with his bulldozer, the fire had almost reached the Topanga Woods and Topanga Post Office Tracts and was threatening the several hundreds of homes in the vicinity. Beyond was the even more thickly populated suburban area of Fernwood. Due to the steep canyon slopes and the strong wind, the ground crews had found construction of a fire line ahead of the advancing flames impossible and had been forced to withdraw. There was a chance that such a line might be made with a bulldozer, but because of the extreme hazard involved the fire boss hesitated to order a frontal attack.

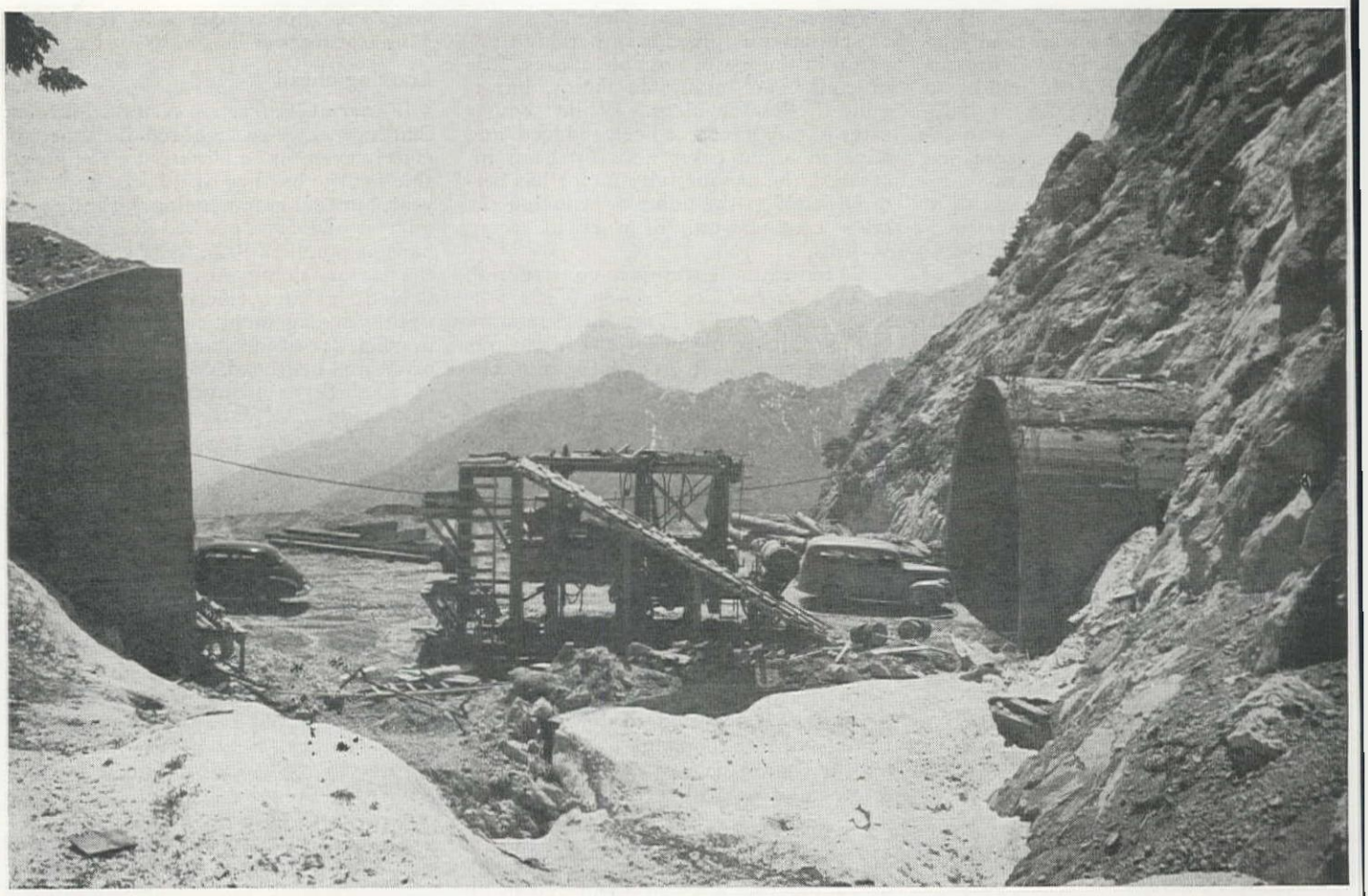
Simons volunteered to tackle the job. It was necessary for him to drive directly across the front of the fire while at the same time cutting through heavy brush. As he did so, he and the bulldozer were at times practically enveloped by flames. But he persisted, clearing a fire break, piling up dirt on the fire, and finally checking its forward progress. When he came off the fire line, his clothing had been partly burned off, his hair was singed, and his face blistered. His skill with the bulldozer, which he was forced to drive on mountain sides where it seemed impossible to avoid overturning; his persistence in the face of the flames, and his disregard of his own safety aroused the admiration of all who witnessed his efforts. Had he failed the fire would have swept through the Topanga and Fernwood areas with great damage. Records credit Simons with saving 550 buildings, including 265 homes, valuable watershed lands, and preventing almost inevitable loss of life.

Simons flew to Washington to receive the American Forest Fire medal for heroism from Secretary of Agriculture Brannan, and special honors from President Truman.

New Approach Proffered For Colorado Kilowatts

PUBLIC SERVICE Company of Colorado, which last year challenged the Bureau of Reclamation's right to build power distribution lines on the Colorado-Big Thompson Project that would duplicate power lines of private companies, has now offered some constructive suggestions that may open the way to a compromise of the differences and eliminate a great amount of construction planned by the Bureau. In its 1950 appropriation request, the Bureau has asked $661,000 toward the total cost of a power grid between Greeley, Fort Collins, Longmont and Loveland, Public Service's Valmont plant and the Bureau's planned Flatiron plant. A booklet just released by the company points out that these lines, and a Greeley to Brighton line to cost $989,531, are "duplicating and unnecessary."

In the booklet, the company offers to deliver the power over its own lines to public power customers in the interests of economy. This power would be "firmed-up" by the company's steam generation facilities and would be delivered to the municipalities and co-operatives which are preference customers at a service charge of 1¼ mills per kilowatt-hour. Also, the company offers to build at its own expense a line from Estes Park to Valmont at a cost of $432,500.



Steep Slopes at Angeles Crest

California pushes mountain highway through inaccessible section of Los Angeles County by full cooperation of Corrections and Public Works Departments — Year-around prison camp is maintained for 100 of the workers as construction of tunnels and 5-mi. section goes into high gear during summer months

HIMALAYAN MOUNTAIN road building couldn't be more tricky than the present Angeles Crest Highway job in the heart of Southern California. Working on terrain almost as steep and uncertain as that near the Tioga Pass in Yosemite National Park, Calif., the California Division of Highways, under a cooperative arrangement between the State Department of Public Works and the State Department of Corrections, is using a selected crew of prisoners to do labor work on the Angeles Crest Highway extending from Montrose past Mount Wilson toward Big Pines, in Los Angeles County.

Not many state highway projects are of such a character that prisoners can be used effectively and economically, nor are there locations sufficiently isolated and inaccessible to be suitable for the establishment of prison camps for these workers. There are only four such projects in the State of California, and of these the Angeles Crest Highway camp is the largest. The quota is 100 inmates for the Angeles Crest Highway camp and the total quota for all four camps is 275 inmates. The men assigned to these camps are carefully selected, and eligible for parole in the near future, and they would have much to lose by attempting to escape or by other misconduct. The prisoners that are extended the privilege of working on the state highways number only three per cent of the total prison population.

Present construction section

Work at present is on a 5-mi. portion of the road up to station 85, with the ultimate destination being 6.4 mi. distant from the end of present earthwork operations. Included in the project now being built are two 32-ft. diameter tunnels, 680 ft. and 470 ft. long. The date of beginning on the present 5-mi. section of the job was August, 1946. Excavation since then has reached some 700,000 cu. yd., leaving another 700,000 cu. yd. to be cut. Average movement of dirt is 1,000 to 1,100 cu. yd. per day in this rough territory, and is being done mostly with shovels and trucks.

ANGELES CREST highway overlooks some rugged and mountainous country as its grade winds up for 7,000 ft. toward Big Pines. View at top of page shows drill jumbo between gap in the two tunnels on the job. Winter snow is still visible here and on ridges in background, and covered road ahead.

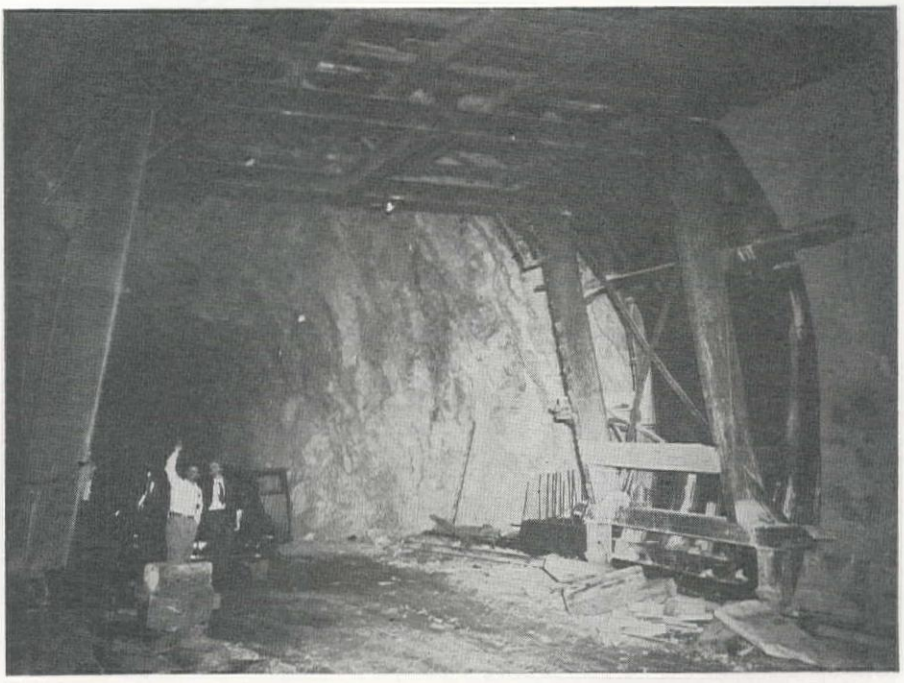
One of the cheapest materials surrounding the Angeles Crest Highway location is good quality stone, and it is used exclusively in the construction of all culverts, head walls and tunnel portals. Crib walls, when used, are built from concrete blocks poured right on the job near the aggregate plant, and are made 6 in. by 10 in. in three lengths to 6 ft.

In general, costs run slightly high on the entire job because of the need for keeping the entire camp operating on a year-around basis. During the winter months the snow storms and deep snow banks keep construction at a standstill. For the section now under construction, well-kept cost accounts on the job place the cost at $246,000 per mile. This includes the cost of excavation and grad-

ing, rubble masonry culverts and walls, and 3 in. of roadmix surface; but does not include the cost of the two tunnels. The engineer's estimate on excavation was 75¢ per cu. yd. at the beginning of the present 5-mi. stretch, but the cost actually runs 64¢ at the present time.

Modern tunneling methods

The two tunnels on the project now under construction have a diameter of 32 ft. and an 18-in. lining of reinforced concrete, with portals made of shaped rubble masonry. The tunnels are being completed in 10-ft. sections, with one section poured each week. Rock in the tunnel is being blasted in 8-ft. sections with drill holes on 2-ft. centers. The jumbo used for drilling in the tunnel has three platforms and can be telescoped down to two. It rides on old truck wheels and is pulled in and out of the tunnel by one of the bulldozers used for mucking. Equipment on the jumbo includes Ingersoll-Rand electric tampers and two air compressors, and a 10-kw. power plant for the lights, vibrators, and other equipment inside the tunnel. At the present time, job reports place the cost



CONCRETE tunnel lining used on both tunnels is placed behind steel slipform, above, as lining is poured in 12-ft. lengths. Load is transmitted by hydraulic jacks to wheel trucks below.

of the tunneling at $5.00 per cu. yd. Tunnel excavation is through excellent granite rock and no timbering is required.

The slipform for pouring concrete is a 12-ft. wide plate of steel shaped to fit the tunnel's inside radius. It rides on two rails placed ahead of the form as work progresses. The form has a full V at the back for forming concrete construction joints and a half V at the front. As the form is jockeyed into position, the full V fits into the half V previously formed. These V-joints will later be calked for waterproofing, and water will drain out of the tunnel through tile drains placed under the roadway. Hydraulic jacks are placed on blocks of timber to jack up the form into position for the pour, which is done by the Pumpcrete method. Ramps of earth, formed with material not yet mucked out of the tunnel, are built up against the form each time it is ready for the pour, and the Pumpcrete units run up high enough on these ramps to make the pouring a simple matter.

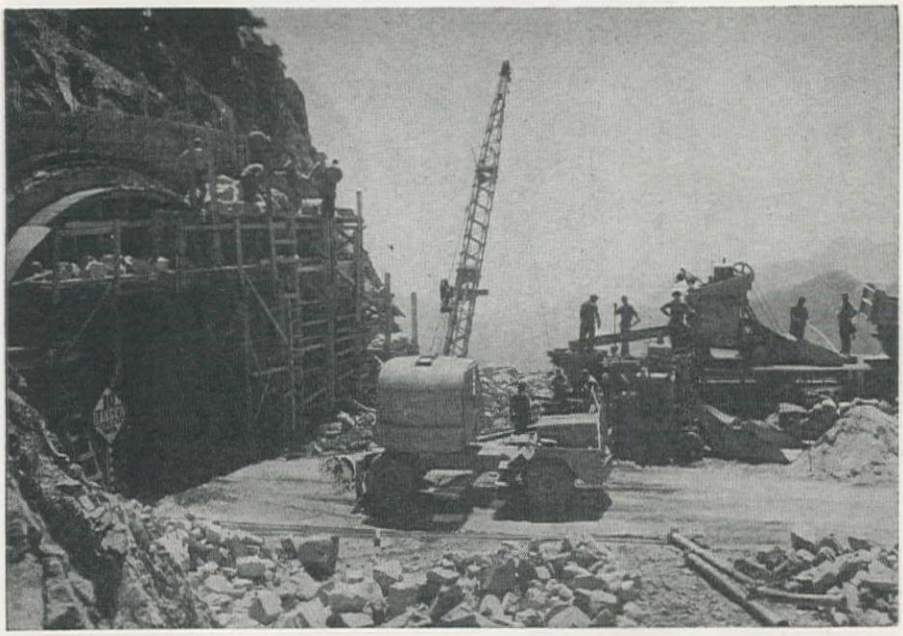
The steel slipform has a hole in the top through which the concrete tube pours its loads, and then the concrete is vibrated externally for the full tunnel radius. Although the concrete is by specifications a 2-in. slump, no trouble has been experienced to date with segregation of the aggregate with this low slump mix. Previous to the final pour around the form, the base wall has already been put in place. When the tunnels on this job are completed, the large steel slipform for the tunnel lining will be used on a prison labor highway job in the vicinity of San Diego.

Unusual management problems

One of the many unusual features of this job from the supervisor's view is the management of both construction details and supervision of inmates on the same job. Resident engineer W. E. Melcher and construction superintendent Harry D. Johnson, although not wardens in the usual meaning of the word, do have a great responsibility for the safety of the inmates and the free men in their charge and for the effectiveness of supervision and management to the end that the greatest possible efficiency is obtained in the camp and on the job. In this they are ably seconded by R. D. Alley, senior foreman in charge of tunnels and rock operations, and R. Truesdale, excavation foreman.

The camp maintains a 50-kw. Diesel generator operating for mess hall and general camp utilities, and has a 35-kw.

INMATES hose out Pumpcrete unit for cleaning between pours on the tunnel lining. Tunnel portals are made of shaped rubble masonry. At left, HARRY D. JOHNSON, construction superintendent.



FORMS are in place and the stone is being lifted by this Michigan crane for one of the four tunnel portals. All foremen and equipment operators are civil service employees.

unit for emergency standby. The entire camp water supply is pumped to the hillside location from a mountain stream in the canyon 700 ft. below.

Job-owned machinery

A 6-inmate crew keeps a job-owned crusher plant operating to supply aggregate when needed for the tunnel operations and the concrete crib blocks. It is a 15 x 28 Pacific jaw crusher powered by a D-8800 Caterpillar power plant. The inmates also operate a job-owned sawmill that handles up to 40-in. logs. The plant produces timber cribbing and lagging for all purposes around the camp and job by using timber cleared from the highway route.

The average stockpile of explosives on the job runs around 20 tons bag and 60 tons stick dynamite, and because of road shooting procedures, a supply of timing delays of commonly 2 to 6 milliseconds. At the high altitude on the job, roughly 7,000 ft., the Diesels can be adjusted very well for good efficiency, but the air compressors lose easily some 20 per cent efficiency. Drilling crews could only use three 80-lb. hammers at best, whereas four or five could be used on the same job at sea level.

Although inmates supply all the common labor, foremen and equipment operators are all civil service employees. All road-mixing and paving equipment is to be supplied on a rental basis. The last 2-mi. section of the road at the Big Pines end will be done on a contract basis. This section had already been surveyed by the Public Roads Administration before the war.

Common labor is supplied through the Chino Institute for Men and includes many former inmates from San Quentin and Folsom prisons. All inmates are felons with an average sentence of two years, but ranging from six months to life. The number of inmates runs between 95 and 100, of which eight to ten per cent are needed for camp maintenance and mess hall activity. The inmates earn $3.30 per day, of which $2.20 goes for room and board and a smaller amount for clothing and canteen supplies. Average savings amount to 76¢ per day, and many inmates are able to save $300 to $400 during their period of duty at the camp. The camp contains eight cottages for foremen and their families, enough cabins for 100 inmates with eight in each cabin, and construction and maintenance offices.

This activity of the California Division of Highways is locally under the general supervision of Spencer V. Cortelyou, Assistant State Highway Engineer; W. L. Fahey, District Engineer; and Frank B. Cressy, Assistant District Engineer. Charles H. Purcell is the Director of Public Works and George T. McCoy is the State Highway Engineer, with headquarters at Sacramento.

W. E. MELCHER, Resident Engineer constructing the Angeles Crest Highway, shares with Harry D. Johnson many unusual problems.

Big Hungry Horse Saving In Major Use of Pozzolan

RESEARCH in the Bureau of Reclamation's concrete laboratory in Denver, Colo., will result in a saving of $4,750,000 in the construction of the Hungry Horse Dam, now being built in northwestern Montana.

Bureau engineers will make their first major use of a soot-like fly ash, called "pozzolan," in constructing the giant structure. Between 30 and 40 per cent of the cement to be used in the 520-ft. dam is to be replaced by the new material, thereby saving approximately $1,250,000 in construction costs.

An estimated additional saving of $3,500,000 is to be achieved in building the multiple-purpose structure by the reduction of the amount of cement per cubic yard of concrete to be used, perhaps as little as one-half barrel of cement in each cubic yard of mass concrete in Hungry Horse Dam, plus pozzolan. This will be the lowest cement content ever used by the Bureau in a mass concrete dam, the lowest previous ratio having been one barrel per cubic yard at Grand Coulee.

Notwithstanding the monetary savings, it has been proved through field and laboratory research that better concrete and a better dam will result from the use of the new ratio and pozzolan, a report by Chief Engineer Leslie N. McClellan of the Denver Office shows.

The pozzolan to be used in Hungry Horse Dam is a waste product of combustion, and is obtained from the flues of coal-burning industrial furnaces in the Chicago area. Its cost delivered at the project is approximately $10 a ton less than cement. Substitution of a large quantity of pozzolan for cement in the big dam will not only result in a material saving in construction costs, but will also help relieve a critical shortage in the nation's cement production.

Studies show that in addition to the saving in cost, the use of pozzolan also will result in a better dam. Advantages gained from use of the fly-ash, which is essentially a siliceous material, include increased workability of the concrete, increased impermeability, and less segregation and bleeding. The most important advantage results from the fact that pozzolan generates less heat while hardening than cement. This reduces volume change in the mass concrete and cuts down the artificial cooling required.

The strange story behind the use of the sooty fly-ash in Hungry Horse Dam began some 2,000 years ago on a small island called Pozzolan off the coast of Italy. Builders of the ancient Greek aqueducts, parts of which are still standing, discovered that use of a volcanic ash, found on the island, in their cement mixes resulted in a stronger, more durable building material. However, little progress was made in the use of pozzolan until recent years, when research resulted in perfection of formulas and methods of using the material in construction of mass concrete dams. A natural pozzolanic material is being used in lesser proportion in Davis Dam, under construction on the Colorado River.

Highway Programs for Western States

The common problem is moving traffic efficiently over durable yet economical highways—Shown here are the approaches in use by the Western states to program, construct, and maintain roadways to handle unprecedented flow of traffic

By R. E. LIVINGSTON
Planning and Research Engineer
Colorado State Highway Department
Denver, Colo.

THE PROBLEM of programming low cost roads is one of major concern to every state highway department. It is the focal point of pressure groups from every section of the state. These groups realize that the interstate system and the principal Federal Aid primary roads, which are constructed to high standards, are usually programmed without any effort on the part of the small pressure groups.

But when the allocation of funds to secondary roads and the less traveled primary roads is attempted, the responsible administrative authority becomes the target of every group which has a pet road project. Many administrators have become so enured to pressure of this type that they accept it with the same complacency that a swamp dweller in Louisiana accepts the nuisance of the ever present mosquito. Others, because of their dislike of being forced to expend public funds on projects which they do not believe to be of sufficient urgency, have constantly searched for a method by which they might nullify the activities of pressure groups. If this purpose is to be accomplished, it will require the understanding and cooperation of the entire public.

Most administrators have found that the general public has an increasing knowledge of the difficulties of properly administering the highway systems of the state. If they can be convinced, by the presentation of factual information, that they are receiving fair treatment, most groups are willing to cooperate and to accept the inevitable conclusion that proper procedure ultimately results in equity and benefit to all.

Public education first

The first step in obtaining the cooperation and understanding of the layman in the large problem of allocating funds, is the establishment of a set of standards which conceive that all roads of equal importance should be constructed to the same standard and according to the urgency which applies to any given road in relation to all other roads of the same class.

When we speak of roads by class, the easiest and most readily determinable method of measurement is the traffic volume using the road. On this basis of thinking, the Colorado Highway Department has recently established, with the concurrence of the Public Roads Administration, a set of geometric standards for rural highway construction. This set of standards, in addition to the normal geometrics of design speed, maximum degree of curvature, maximum gradient and bridge widths and ratings, assigns lane width and surface type on the basis of traffic volume groupings.

When the people of the state have been informed that such a standard of development applies to all roads equally, much of the controversy and misunderstanding will be eliminated. As an example, if the people know that a road of less than, say 100 vehicles per day, is considered to be adequate when it has been graded and drained and provided with an ordinary gravel surface, they will then not concern themselves with attempting to have a road of this type included in a construction program of asphalt surfacing.

Assuming that the construction standards are set up and that the people are informed, it then becomes necessary to assign priorities to the existing systems on the basis of comparison between the construction standard and the existing condition. A number of states, by the Sufficiency Survey Method, have determined such priorities. In Colorado, it was determined that a modification of the Arizona method of sufficiency ratings would be applicable.

The Arizona system

The method reported by Mr. Moskowitz of the PRA in Arizona, considered that the condition of a stretch of highway could be rated numerically as to its adequacy. In order to take advantage of a numerical rating, which could be understood by practically everyone, it was assumed that a perfect highway would have a rating of 100. These 100 points were assigned to three major categories which were named "Structural Adequacy," "Safety" and "Service." These major headings were broken down further into their components. An example of the elements covered under the various headings is outlined below:

	Points
A. Structural Adequacy	
1. Observed condition	17
2. Maintenance economy	5
3. Remaining life	13
B. Safety	
1. Roadway width	8
2. Surface width	7
3. Sight distance	10
4. Consistency of alignment	5
C. Service	
1. Alignment safe speed	12
2. Passing opportunity	8
3. Surface width	5
4. Roadway width	5
5. Surface texture or rideability	5

It will be noted that the sum of all of the points equals a basic sufficiency 100. This basic sufficiency was corrected through the application of an adjustment based on the traffic volume employing any particular section of road. Obviously from a priority standpoint, roads having the same basic sufficiency as determined from the various physical elements would have to be adjusted so that the road with the greatest traffic volume would be first considered for construction. (See chart on next page.)

Subsequent to the report of this system of assigning sufficiency values, a number of the best qualified men in PRA made a number of trial evaluations on the basis of the Arizona system. They found that while theoretically good, it offered a number of difficulties from the standpoint of practical application. These difficulties were cleared up as well as possible and a bulletin was issued by District 9 of the PRA which showed the consensus of the modifications necessary in the Arizona system of evaluation.

Essential elements in Colorado

The Colorado study of the possible methods indicated that the above modification of the Arizona system would meet most of the requirements which were believed necessary. Listed below are the elements which the Colorado Department felt were necessary in any method to be used:

1. It should give numerical ratings which would reflect the relative adequacy of the particular section in relation to all of the other sections in the system.

2. It should be of a type which would be simple in its expressed results and not include items which might be difficult to evaluate.

3. It must be one which would be readily understandable by the personnel assigned to work with it and which would not involve a long training program prior to its use.

4. Since the method is going to be applied to an existing system of highways, it should not include any item concerned with the propriety of the system which it is to evaluate.

FIRST public presentation of the policy of the Colorado Highway Department on secondary road programming was made by Mr. Livingston at the 1949 Highway Conference of the University of Utah, and it is given here with the permission of the Conference, as an introduction to the presentation of discussions by each of the Western states on their policies.

All of the items except No. 4 are obvious in their selection. The reason for the fourth item was the fact that the system of roads in the state was predesignated and it was obviously impossible without a complete engineering study, such as the "Needs Studies" which are being performed in a number of states, to make an appraisal of the state highway system and its superimposed Federal designations to determine which of them should be retained and which should be deleted. The Department was concerned simply with determining the existing state of every road comprising this state highway system as it related to the ability of each section to handle traffic load.

Applications in Colorado

Several trial runs of the simplified Arizona method indicated a number of adjustments which would have to be made before it would be applicable to the Colorado problem. It had not been conceived at the time of the development of the Arizona method that anyone would try to apply the system to secondary or feeder roads. As a matter of necessity, the secondary system was just as much a matter of concern as the primary system. Anyone who has been close to highway matters realizes that most of the pressure exerted relates to the development of the secondary system. It was after the trials had been run that correction factors for such items as bridge deficiencies and lack of proper type of surface were added.

The method of performing the work is of sufficient interest that a brief discussion of the entire process is pertinent. The field crew consisted of two men with long experience and an extensive knowledge of Colorado highways—one being selected from the construction forces and one from maintenance forces. The reason for the use of only one field party was related to one of the fundamentals of the survey. The fundamental stated that the ratings as finally established must be relative. It was recognized that such a system did not lend itself to a rationalized result. Too much depended on the judgment of the field survey crew. If this was so, the best results would come from having the same men looking at every mile of road and in this way the ratings assigned would certainly be relative over the entire system.

Operations by field crews

The field crew was supplied work maps on which was indicated by legend the standard for each stretch of road on the system being rated. The standards included sight distance, both passing and non-passing, design speed which, of course, set the limits for horizontal and vertical curvature and maximum grade. The field inventory crew, traveling by automobile, tabulated the pavement and shoulder widths, deficient bridges, and deficiencies as they related to limited passing and non-passing sight distances. These tabulated items, when compared with the design standards, set values for everything but the items of "structural adequacy" and "rideability." These two items were in the realm of judgment. It was recognized that it is improbable that any two raters would arrive at the identical numerical value for the structural adequacy of any stretch of road. On the other hand, it was found in the field trials that a group of seven men, all having good knowledge of highway engineering properties, did arrive at a value for the item within very narrow limits.

After the field inventory crew had finished their work, their rating was brought to the office, edited for possible mechanical errors and corrections applied for traffic, lack of surface and deficient bridges and the final net rating for each stretch of road finally determined.

The ratings so established were displayed on maps employing both a graphic and a color legend. The reason for the dual display of the values was to present them in a manner which could be generally understood by practically all persons familiar with reading a map. For quick analysis the color legend seems to offer the greatest potential. The color system was quite simple. The roads having properties which resulted in an excellent rating were shown in green. Those which were below the standard considered to be appropriate were either orange or red.

Since the completion of the Sufficiency Rating Study, hardly any difficulty has been experienced in explaining to interested citizens the reason for the inclusion or non-inclusion of any section of road in a construction program. It is believed that the establishment of standards and a method of determining priorities will be two of the most important tools that the highway administrator can have to solve one of the most difficult problems in low cost construction.

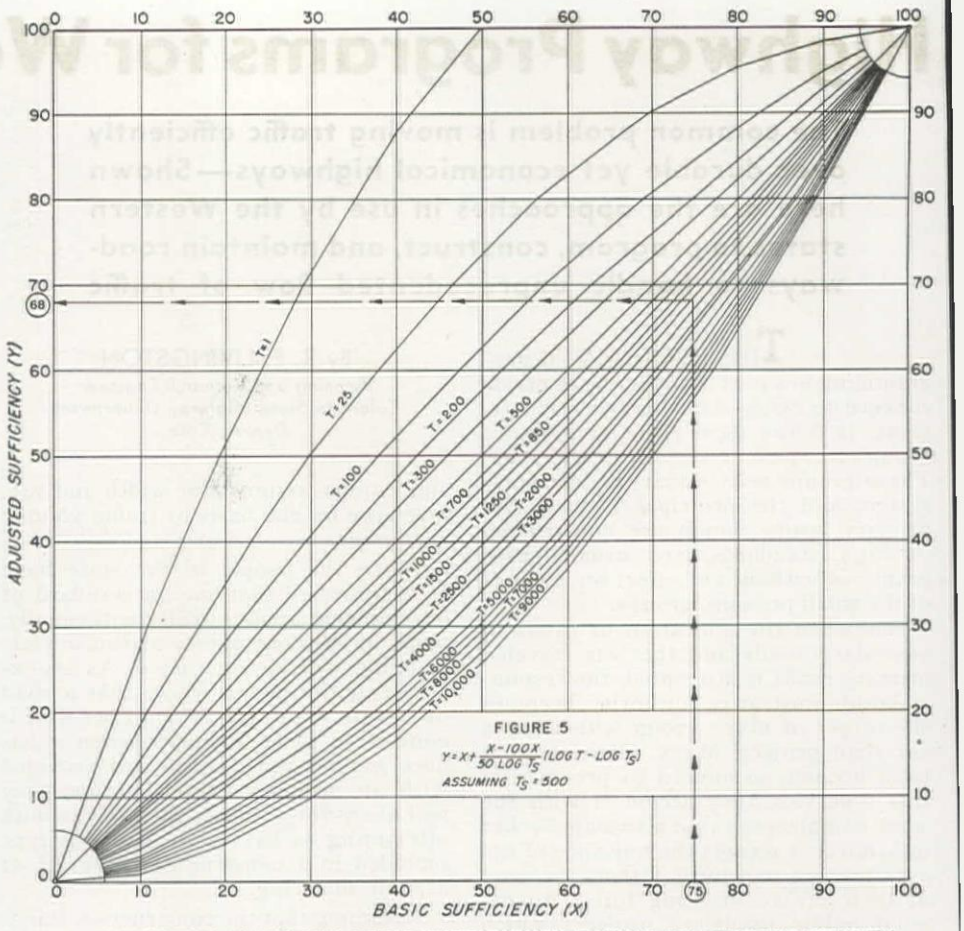


CHART FOR ADJUSTING BASIC SUFFICIENCY RATING FOR TRAFFIC DENSITY

Road Programming in Nevada

By W. T. HOLCOMB
State Highway Engineer
Carson City, Nev.

THE PROBLEM of construction programming is undoubtedly a universal headache, and Nevada is no exception. The fact that our highway construction is almost wholly limited to projects financed by Federal Aid with state participating funds simplifies the problem somewhat but, on the other hand, the intimate nature of state affairs occasioned by the small population and the familiarity with state happenings at all levels of government tends to offset any advantage which might thus accrue.

While it is true the Department is continually approached by local interest groups seeking advantages in the way of highway construction for their particular areas, as a rule it has been found that once these local bodies understand the problems confronting the Department they are willing to listen to reason.

The pressure exercised by these local groups is considered in the light in which, in the most instances, they are

conceived, that being a sincere effort to present their story in the hope of keeping on an even keel with their neighbors and not of obtaining any special or unwarranted advantage. The most effective means of meeting these groups seems to be a direct approach and, consequently, it has been the policy to meet with them informally in their local surroundings.

Local influence minimized

It is not often that local groups exert much influence in the actual programming of construction. Especially is this true of the Federal-aid Primary System. Nevada is a bridge-state, and a high percentage of the traffic traveling the primary roads has out-of-state origin and destination. Nevada has always realized its responsibilities toward these out-of-state tourists who supply, through Federal-aid, and through state gas tax a fairly high percentage of the money spent on Nevada's highways. Consequently, it has been the policy to concentrate the expenditure of construction funds in those areas most urgently in need of reconstruction to promote safety for the greatest number of through or interstate travelers, and at the same time reduce excessive maintenance costs.

The Nevada Primary Federal-aid System comprises approximately 2,200 mi., and up until now there has been little difficulty in determining the most desirable locations for improvement projects. The state has been and is still endeavoring to bring the most heavily traveled roads, including U. S. 40 and U. S. 91, up to interstate standards. There are still several sections of decidedly inferior road on these two interstate routes which must be improved at the same time that heavy expenditures must be made on other sections of the primary system.

Secondary funds divided by counties

The work carried on with Federal-aid Secondary funds has for the most part constituted new construction. When it first became apparent, after the passage of the 1944 Federal-aid Highway Act, that substantial sums would be available annually for the construction of farm-to-market and mine-to-market roads, the absolute necessity of providing some means of allocating these funds to the various political subdivisions became obvious. There were only three incorporated cities in the State of Nevada having population in excess of 5,000 and, consequently, practically every community in the state had roads eligible for improvement with secondary funds. There are seventeen counties in Nevada, and it was felt that a county basis was the appropriate breakdown for the allocation of secondary construction.

After considerable experimenting with various factors there was finally evolved a distribution formula based on the following: one-fourth on the ratio of the total area of each county to the total area of the state; one-fourth on the ratio of the rural population of each county (excluding as urban the population of all incorporated cities 5,000 or over) to the total rural population of the state; one-fourth on the ratio of the rural vehicle miles of travel in each county (exclusive of vehicle miles of travel on Federal-aid Primary roads) to the total vehicle miles of such rural travel in the state; and one-fourth on the ratio of the miles of rural road in each county (exclusive of miles of rural road on the Federal-aid Primary System) to the total of such rural road mileage in the state. These factors were combined into an average percentage and this percentage has been used in allocating Federal-aid Secondary funds.

Selection within the counties

Once having determined the percentage to be used in allocating secondary work, it was necessary to select a total mileage figure to which the percentages could be applied. There being insufficient time to make a comprehensive investigation as to future revenue expectancies, the Department arbitrarily selected a 2,500 mi. secondary system and considered that mileage as being within the ability of the state to construct and maintain. This permitted the setting up of a maximum mileage for each of the counties. Traffic figures and rural inventory records were then consulted and a list of roads in each county believed appropriate for improvement with secondary funds selected.

Armed with this information, the county commissioners of each of the seventeen counties were contacted, and the commissioners and the Highway Department together selected a partial Federal-aid Secondary System averaging approximately 50 per cent of the total mileage which would be available to each county under the 2,500-mi. limitation. Once the initial system was selected the Department then examined the status of improvement of the roads selected to determine what percentage of the total mileage eventually available to each county had been brought to satisfactory standards through previous expenditures of Federal-aid Secondary money, Federal Lands funds, Forest Highway funds, State funds, and some of the Work Projects money available during the depression days. Approximately 28 per cent of the 2,500-mi. system had been improved and the percentage of allocated mileage which had been constructed varied considerably between counties. The Department then set upon a procedure of attempting to provide some form of improvement in each county nearly every year, at the same time working toward the ultimate goal of bringing the percentages reflecting the relationship between constructed miles and allocated miles in each county into line with the average for the state.

It has been the practice to visit the county commissioners of each of the seventeen counties at least once each year to discuss with them Federal-aid Secondary construction in their respective areas. On such visits they have been informed of the amount of money earmarked out of that year's funds for expenditure in their district and it has been requested that they themselves assist in selecting the roads on which these funds shall be expended, with the condition, of course, that they be routes on the Secondary system. The procedure has been quite satisfactory.

Oregon System of Selection

By R. H. BALDOCK
State Highway Engineer
Salem, Oregon

I AM GLAD of this opportunity to bring out the methods in use by the Oregon Highway Commission for the evaluation of the comparative merits of the many projects proposed for improvement. In the first place, all requests of communities and organizations for the improvement of particular highways are always carefully considered, but the final adoption of any project on the state highway systems, both primary and secondary, depends to a great extent upon its rating by an economic analysis which shows the benefit to the road user in relation to the ultimate cost. These studies and comparisons are published by the State Highway Department under the title of Technical Bulletin No. 7, the Economics of Highway Planning.

It will be impossible to make a very satisfactory summary of Technical Bulletin No. 7 in a few words, since the book is a volume of more than 400 pages, but the theory behind it is the development of a method of determining the relative worth of any improvement, considering the cost of the project, the increase or loss of income and the money saving to the road user by reason of the construction or improvement. The final formula condenses to the expression

$$Q_c = 0.707\ [Q_s + Q_{bn} + Q_{bf}\ (1 - K_s K_3)]$$

Where Q_c is the composite quotient whose value shows the return to the road user for every dollar of cost, the other factors of the formula are:

$Q_s = I\,ar/K$, C_a = the solvency quotient

$Q_{bn} = B_n/K$, C_a = non-fuel benefit quotient

$Q_{bf} = B_f/K$, C_a = fuel benefit quotient

Where $I\,ar$ is the annual income from road-user funds,

B_n is the total annual non-fuel benefits to the road user,

B_f is the total annual fuel benefits to the road user,

C_a is the annual cost of the improvement based on a 30-year amortization period,

K is the percentage of cost to be paid from road-user funds,

K_s is the proportion of total fuel savings derived from traffic drained away from existing highway routes,

K_3 is the ratio of fuel tax to the total cost of fuel.

The annual cost is made up of the sum of the amortized value of the total estimated cost of the improvement, the annual maintenance cost and an operation cost.

The annual road-user income is calcu-

lated from the estimated traffic and the fees and taxes paid.

The annual benefit is made up of mileage savings and time-element savings. The mileage savings are calculated by the amount of traffic and its cost per ton-mile saved, an annual saving coefficient based on the improvement of the surface of the road, the saving by reduction of rise and fall, the saving on account of the improvement in curvature and the saving by elimination of traffic stops.

The time element savings are calculated by the saving in time by the various classes of traffic. The above mileage and time-element savings are divided between fuel and non-fuel benefits according to certain percentages which have been worked out for each component value.

The above is an extremely condensed explanation of the system of economic analysis of highways but may serve to show that a method of comparison of different projects exists and is being used.

Texas' Method

By JOHN DAVENPORT
Administrative Aide
Texas Highway Department
Austin, Texas

THE POLICY of the Texas Highway Department in selecting roads for inclusion on the Farm-to-Market or low cost secondary system is substantially as follows:

1. The program is laid out as soon as finances become available, for the full period of such appropriation. In the post-war program, for example, a three-year program was set up at once, with enough additional important projects to take care of any unforeseeable savings.

2. The state is divided into 25 major districts, with an engineer in charge of each. Mileage, based on proven formulas, is allocated to the districts, in accordance with available funds. The district engineer, knowing approximately the mileage available, meets with each county commissioners' court and determines the county's individual needs. Then knowing these pressing needs and the approximate mileage, he submits his recommendation to the highway commission.

3. The department is concerned with a connected statewide network, and spurs are avoided unless they may be subsequently extended to connection with another highway.

4. For economy, major stream crossings are avoided in routing.

5. A concerted drive to give each community in the state an all weather road to nearby trade centers is now nearing completion.

6. Traffic counts are important in approaching road needs, but are not always the determining factor.

7. After the program is set up, any inequitable situation may be changed by the commission.

California Selects Highways

By GEORGE T. McCOY
State Highway Engineer
Sacramento, Calif.

INSOFAR as the State Highway system is concerned, California does not classify its roads into primary and secondary categories, although a large mileage of state highways would undoubtedly fall in the latter category in the event such a classification were made.

Programming improvements on all state highways is based primarily upon needs as determined from study of factual data of traffic, physical conditions, and available funds. The long range planning provision of the Collier-Burns Highway Act of 1947 were largely based upon a list of critical deficiencies on the state highway system which had been submitted to the Legislature by the Division of Highways prior to enactment of the law. The cost of correcting these critical deficiencies is estimated at nearly one and one-half billion dollars. In the main, state highway budgets as adopted by the California Highway Commission are founded upon projects included in the list of critical deficiencies.

Outside aid always welcome

It is felt that because selection of projects for programmed construction and improvement rests upon traffic needs as indicated by factual data, California state highway budgets are relatively free from external pressure.

It must not, however, be construed that the State Highway Commission or the Division of Highways assume an autocratic attitude toward projected improvements. The facts are quite to the contrary. Individuals or groups are welcome to appear before the Commission during the meetings at which budgets are being considered.

It also must be clearly understood that in preparation of highway budgets the Division of Highways seeks consultation with many groups interested in traffic problems and the overall development of the state. It might well be stated here, that cooperation between the State and the State Chamber of Commerce, Automobile Clubs, Redwood Empire Association and similar groups is responsible to a large degree for smoothness and rapidity with which the California State highway programs advance.

Selection of secondary roads

The California State Legislature in enacting the Collier-Burns Highway Act of 1947, specified that each county of the state would designate the roads which it maintained and would in turn select a primary road system in each county which must not exceed 50% of the maintained mileage. The Act stipulated that each year the Road Commissioner shall submit a budget to the Board of Supervisors for its consideration and approval, and the State has no jurisdiction as to the roads on the county-maintained or primary systems which are to be included on the programs. This responsibility rests with the Road Commissioner and the respective Boards of Supervisors. Necessarily, the State has no control of the standards of construction to be followed on these projects.

The Federal-Aid Highway Act of 1944 approved December 20, 1944, stipulated that a system of principal roads not on the Federal Aid system should be selected jointly by the State, the County, and the Public Roads Administration. Under the provisions of that Act, a Federal-Aid Secondary System was selected which today consists of 5,287.4 mi. of county roads and 3,697.7 mi. of State highways, or a total of 8,985.1 mi.

At the 1945 session of the Legislature, a bill was enacted known as the County Highway Aid Act of 1945, which allocated 87% of Federal-Aid Secondary funds apportioned to the State of California by the Federal-Aid Highway Act of 1944 for use in financing improvements on county portions of approved Federal-Aid Secondary routes. The State also provided $12,000,000 in funds to match the Federal-Aid apportionments allocated to the counties. This provided a total fund of $25,489,279 for the 57 counties of the state.

In the selection of projects to be improved, the responsibility rested solely with the various Boards of Supervisors, with the provision that the proposed projects would be on the approved Federal-Aid Secondary System.

Since Federal and State funds were involved on the Federal-Aid Secondary projects, both the Public Roads Administration and the State had responsibilities relative to the determination of standards of design to be followed, and it was the State's recommendation to the counties that in the selection of appropriate designs they follow the standards of design set up for State highways having similar traffic characteristics. Without exception, the counties of the State adopted these recommendations relative to design and have thereby secured a large number of meritorious projects built according to standards in effect at this time.

The counties of the State have submitted to the State Division of Highways over 250 projects having a length of over 700 mi., with an estimated cost of approximately $30,000,000.

In New Mexico

By L. D. WILSON
Administrative Engineer
New Mexico State Highway Department
Santa Fe, N. Mex.

THE PROBLEM of programming secondary projects in New Mexico has practically been solved with the recent installation of a new system of studying this type of project.

New Mexico was besieged with delegations at its Highway Commission

meetings to such an extent that it was practically impossible to get any other business done.

Under a method devised and administered by the State Highway Commission, the responsibility for the selection of which road is to be built in each county rests on the shoulders of the County Commissioners.

A map of the secondary routes in each county is furnished the County Commissioners, along with a rough estimate as to how much money the Department might be able to spend in that particular county. The amount of money available for each county is determined by a formula taking into consideration the area, population, farm area and mileage.

Traffic count important

The County Commissioners are advised as to traffic counts on their roads and figures to aid them in determining the tonnage hauled in case of truck traffic. They are then requested to indicate on such map which roads they want improved or constructed and in which priority they want them built. The Highway Department then advises them as to how far the money will go on the roads selected and asks for their final decision in the matter. Through personal contact between officials of this Department and the different County Commissioners, a program for each county will be arrived at and the projects will be programmed by the state.

By using this method the pressure from local groups has been shifted to the County Commissioners who have the final say. Delegations are now referred to the County Commissioners on the theory that they should know more about what is needed in their respective counties than the state office does.

In New Mexico the counties furnish the rights of way for all highway construction and this system of programming should work in well with this provision.

Arizona Acts

By E. V. MILLER
Assistant Deputy State Engineer
Phoenix, Ariz.

IN ARIZONA there has been developed what is called the "Sufficiency Rating System" to rate all highways, both primary and secondary.

The Highway Department usually picks out the lowest rated stretches of highway in the state and makes estimates of cost for the rehabilitation of same and has these estimates and other information ready for discussion about this time of the year. A list of such high priority projects is then made up and submitted to the Highway Commission and after a field review of the entire highway system a digest is then made of the discussions and findings of both the Highway Commission, the District

Continued on page 139

Estimates Revised for West's Water

REVISED ESTIMATES of water-supply prospects for the Mountain and Pacific States, made by the Division of Irrigation and Water Conservation, U. S. Soil Conservation Service, on the basis of May snow-survey records, indicate general sufficiency. Notwithstanding subnormal precipitation, April run-off of most streams was abnormally high but did not reach flood proportions. Heavy snow packs remain at high altitudes and some danger of excessive stream flow remains in some important agricultural areas, especially the Columbia River Basin, where the maintenance of river discharge at safe levels will depend on the weather of May and early June.

Based upon May snow-survey records, the Soil Conservation Service revises its estimates of water-supply in the Western states—There will generally be sufficient water in most areas, but last-minute rains may thaw heavy high-altitude snow packs

Snow cover throughout most of the Columbia Basin is still above normal. May snow surveys show high water content in the remaining snow in western Montana, northern Idaho and along the Cascade Mountains in Washington and Oregon. Large volumes of water are still expected from most of these drainages. Warm weather was general elsewhere in the West during April, and run-off of many drainages was abnormally high, but subnormal precipitation helped forestall the flood hazard. While warm rains in May and early June could still cause many streams to rise above levels normally considered safe, the threat now appears to be generally in the usual, rather than unusual, stage.

Prospects are described in detail for the eleven states in the following paragraphs:

Arizona

Snow-stored water in the higher mountains is still above normal, and run-off continues at a fair rate despite subnormal April precipitation in the northern areas. Percolation of much of this run-off, with lessening of draft on ground water, is producing some correction of the ground storage depletions caused by previous heavy pumping. Storage in Salt River reservoirs is 40 per cent of capacity, or about 400,000 ac. ft.—twice last year's amount. San Carlos reservoir holds 250,000 ac. ft., as compared with nothing last year.

California

Prospective supplies in the Sierra have deteriorated about 10 per cent because of deficient April rainfall, but will meet requirements. The possibility of inundation of Tulare Lake lands by overflow of the Kings River seems to have disappeared. The State Division of Water Resources reports that storage in 22 reservoirs serving Sacramento and San Joaquin valleys is about 70 per cent of capacity, or 88 per cent of the normal for May 1. Run-off of snow-fed streams is generally high; that of streams not snow-fed is generally low.

Colorado

Run-off of most streams increased substantially during April, snow melt being heavy. As a result, estimates of summer flow are now 10 per cent lower than those made in *Western Construction News* last month. However, irrigation supplies are still expected to be above normal except for the extreme headwaters of the South Platte and Arkansas rivers. Reservoir storage remains satisfactory, having shown the usual seasonal increases.

Idaho

Run-off of key streams during April was above normal, but snow storage remains high. Irrigation, power, and navigation needs will all be well cared for, although irrigation began a month earlier than usual. Reservoir storage is held at low levels for this season, in anticipation of later heavy run-off.

Montana

Irrigation supplies will be good, with sustained stream flows throughout the summer. Most reservoir levels have been drawn down in anticipation of later filling as melting of high-elevation snow increases. Ground water tables throughout the state show a substantial rise from 1948 levels.

Nevada

Streams will flow about 15 per cent less than forecast in April, owing to almost total lack of precipitation. Should the dry spell continue it is likely irrigation supplies may be deficient in late summer, and reservoir storage may be low.

New Mexico

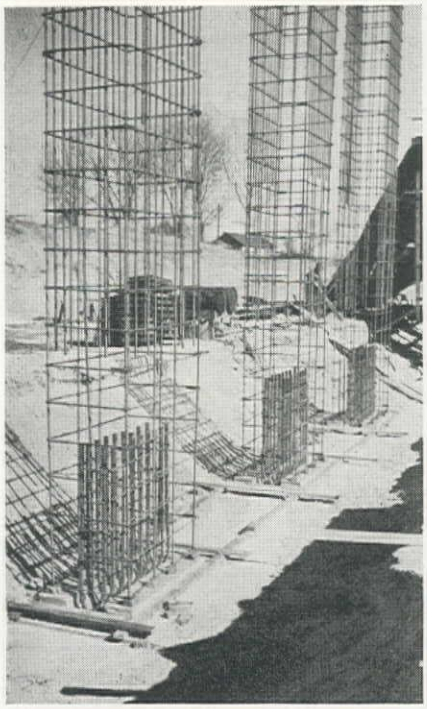
Run-off increased substantially late in April. While the peak flow of the Rio Grande is expected after mid-May, it will probably be less than the peak of 1941. In general, the outlook is for above-normal supplies, notwithstanding a lack of precipitation and the heavy run-off of April.

Oregon

Prospects remain generally good, despite the April shortage of precipitation. Late-season deficiencies are not expected if normal snow-melt and pre-

Continued on page 111

Denver Valley Highway—
New Route to Relieve City Streets



COLUMNS for 48th Ave. railroad overpass will soon support 60,000 vehicles each day.

Limited-access highway through Colorado's big city will be a boon to the region and an important link in the interstate highway net

By WAYNE M. SWAN
Engineer, International Engineering Co., Denver, Colo.

DENVER'S VALLEY Highway Project will form an important link in the interstate highway system by providing a north-south limited-access highway through the city. The Denver Planning Commission, U. S. Public Roads Administration, and the Colorado State Highway Department have cooperated in planning a freeway along the valley of the Platte River which will carry an ultimate capacity of 60,000 vehicles per day.

The preliminary report by Crocker and Ryan, a Denver consulting firm, cited the definite need for a limited-access highway through Denver. The freeway is warranted by present traffic and the rapid growth of Denver itself. In considering various routes an economic location was made offering ample interconnection with other possible future freeways. This route extends from the north city limits at 52nd Avenue between Acoma and Bannock Streets, along the Platte River to Buchtel Boulevard, then follows near the latter in a southeasterly direction. The Valley Highway also connects with proposed federal-aid jobs on the interstate route north and south of Denver. The report was discussed in *Western Construction News* for June, 1945.

The city of Denver is to furnish all the right-of-way, which was estimated at $2,000,000 in the preliminary report. Ultimate cost as estimated in the original Crocker & Ryan report was $14,500,000. This includes three major interchanges not included in the initial development which was estimated at $13,400,000 including the right-of-way. Increased costs of materials and construction would increase these figures. Estimated savings realized to motorists would pay for the entire cost of the project in fifteen years.

First unit under way

Present construction is under way on the northernmost 2.2 mi. The ultimate completion of the entire project may require ten years.

Drainage for the 2.2 mi. is partially completed. Contracts have been let for the structures and the actual highway construction. A force of about 200 men are presently engaged on these. Grading is twenty per cent complete.

Modern highway design

The highway as designed by Crocker & Ryan and the State Highway Department meets requirements of the Public Roads Administration and the Interregional Highway Committee. The freeway is designed for a speed of 50 miles per hour. Curves are held to a five degree maximum and spiraled where greater than two degrees. All side slopes are two-to-one or less. The roadway consists of two 24-ft. strips separated by a 44-ft. median strip which may later be utilized to add a third 12-ft. lane to each strip leaving a 20-ft. median strip. The roadway is to be built up with ballast as required by soil conditions, a 6-in. surfacing course, and a 2-in. plantmix asphaltic wearing surface.

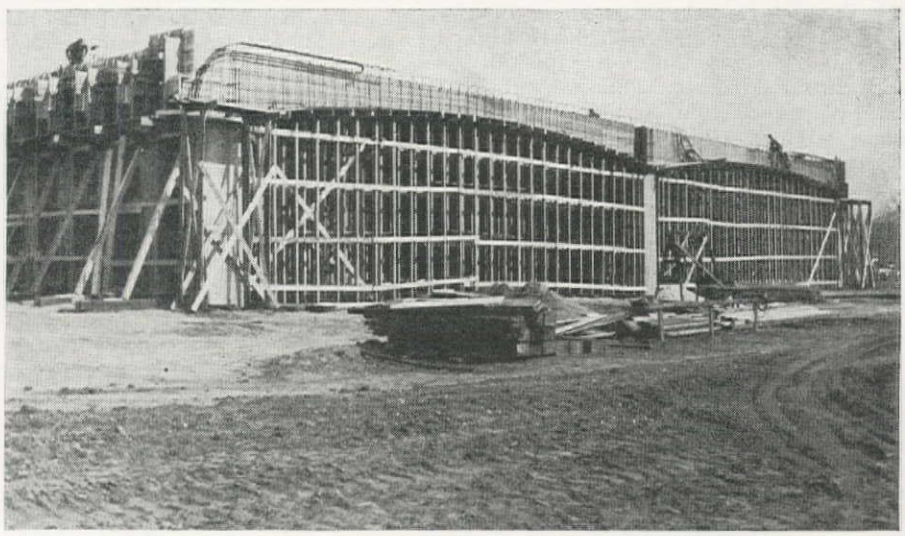
The highway grade is held to a maximum of four per cent with up ramps held to four per cent and down ramps six per cent. Ramps are to be 24 ft. wide, with 10-ft. shoulders, and are designed for 30 m.p.h. Speed change lanes are to be added to the main highway to facilitate uninterrupted traffic flow. The main strips will have a 3-ft. curb strip with a non-mountable curb on the inner edge and a 5-ft. lip gutter border on the outer edge. The shoulder will be consolidated for an additional width of 10 ft., to provide for disabled vehicles.

The interchanges are controlled by the location of existing major streets. Modified cloverleafs have been adopted for their economy. Present contracts include two major interchanges, one at 46th Ave. and the second at 38th and Fox. All bridges are to be rigid frame structures except the railroad underpasses which are to be steel plate girders. Adjacent twin structures are being utilized to obtain symmetry of design and avoid any connecting passage between the two roadways.

Storm drains are located along the outer edges of the roadways and are carried to a central drain in the median strip. Except where the roadways are superelevated, drainage flows will be to the outside of the roadways, and to the center of the median strip.

Modern lighting is proposed; either mercury-vapor or sodium-vapor lamps

TWIN RIGID FRAME structures (as at 44th St. below) are being utilized for all of the overpasses to obtain symmetry of design and avoid any connection between separated routes.



will be spaced at 180-ft. intervals, 30 or 35 ft. above the roadway. The median strip is to be planted with low shrubbery to eliminate the glare of oncoming headlights.

Construction contracts to date

All construction contracts let to date are for work on the first 2.2 mi. Work completed includes the installation of a 6-in. perforated steel pipe underdrain along the railroad yards, by R. L. Hanes & Associates. It was installed 17 ft. below the surface, and will be 8 ft. below the new railroad yard grade. Additional work entails taking a hump out of the yards by lowering 4,000 ft. of railroad tracks. The 200,000-cu. yd. excavation from this work will be used in highway embankments. By lowering the yard, the 48th Ave. railroad overpass will be nearer to the present existing grade.

Colorado Constructors, of Denver, have relocated nearly one-half mile of 72-in. sanitary sewer and placed a 36-in. pipe parallel to it. The smaller pipe takes the irrigation drainage from what was the "farmers and gardeners ditch."

Northwestern Engineering Co., of Denver, was granted the largest contract in state history, $2,225,000, for grading, drainage and construction. This includes nine structures and the following approximate quantities: 1,000,000 cu. yd. of excavation, 1,500,000 lb. of reinforcing, and 8,500 cu. yd. of concrete. The contract is for the completed highway less oil surfacing, lighting, and landscaping.

Six miles of concrete pipe, and gutters with drop inlets at the curb line will be required. Nearly 2,500 lin. ft. of storm sewer, ranging from 12 to 42 in. in diameter have been installed. Temporary taps to the city sewer system are to be made, but by plans, future drainage will go directly to the Platte River.

Numerous utility relocations were required. It will be necessary to build 6,000 ft. of railroad track, and an access road from 48th St. to the Burlington R. R. shops. One of the first jobs was the construction of a temporary detour across the highway location to carry the 48th St. traffic. The grading contractor's equipment is hampered somewhat by this traffic and a railroad line carrying about five or six trains a day.

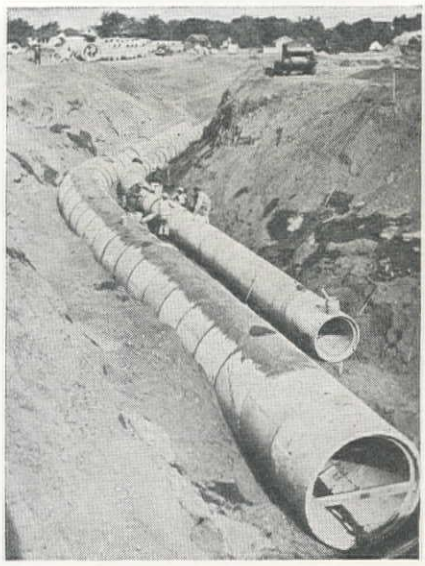
Frank M. Kenney & Associates, of Denver, have been awarded the contract for twin railroad overpasses at 36th Ave. The contract for twin railroad overpasses at 47th Ave. was let to the Western Paving Construction Company.

Garden soil makes poor roadbed

Unusual materials confronted the grading contractor on the Valley Highway Project. Truck gardens formerly occupied the highway location in the river valley. The rich topsoil would have been an unstable base for the roadways. It was removed and stockpiled for later use as a slope covering material for landscaping purposes. The grading contractor found pockets of unstable material up to twelve feet deep where the highway crossed former river bed locations. These had to be excavated, filled and compacted. An old brick and clay tile plant refuse yard adjacent to the highway location is serving as a borrow pit. Tests showed the material consisting of broken brick, tile and clay loam to be quite suitable for embankment fills.

Where the highway crosses 48th St. on twin rigid frame structures, the relocated railroad parallels 48th St. and passes under the south side. To build the structures, heavy clay approach embankments had to be placed first. Heavy compaction was required in order that the piling for the approach spans could be driven in the compacted material.

The Valley Highway Project is being developed by the mutual cooperation between the state, city and Federal agencies. Dan W. Ormsbee, urban engineer, and F. K. Merten, construction engineer, are in charge of the project for the Colorado State Highway Department. They are assisted by Ben F. Haynes, materials, and resident engineers Clarence Green and Boyd White. T. C. Ledgerwood is general superintendent in charge of construction for the Northwestern Construction Company.



INSTALLATION of 6 mi. of 72-in. concrete pipe for drainage of the freeway's first 2.2-mi. length helped to make the general contract the largest in the state's history.

Construction of Cachuma Reservoir Will Start After Vote on Contracts

APPROVAL of the form of a water service contract with the Santa Barbara County Water Agency for water from the Cachuma Reservoir of the Santa Barbara Project in California has been announced by the Bureau of Reclamation.

The contract provides for the furnishing of water from the Cachuma unit of the Santa Barbara Project to member units consisting of the City of Santa Barbara, the Summerland County Water District, the Montecito County Water District, the Carpinteria County Water District, the Goleta County Water District, and the Santa Ynez River Water Conservation District. The master contract between the United States and the Agency contemplates the execution of separate contracts between the Agency and the member units.

The Cachuma reservoir is estimated to cost $34,189,000 and pre-construction is now being carried on with an initial $1,000,000 appropriation. An appropriation of $6,100,000 has been requested for next fiscal year and construction is expected to get under way as soon as the contracts between the member units and the Agency have been voted upon.

The Santa Barbara County Water Agency was created in 1945 by the California State Legislature to contract with the Federal Government for the project, which will supply municipal water to the City of Santa Barbara and a supplemental supply of irrigation water for approximately 46,000 ac. of highly productive land.

The contract provides for a maximum rate of $25 per acre foot for irrigation water in the Coastal area, $10 per acre foot in the Santa Ynez Valley, and $35 per acre foot for municipal water. If the maximum rate prevails throughout the life of the contract, it is estimated that the cost of construction will be amortized in approximately 50 years.

Contract Awarded for Platoro Dam in Colorado

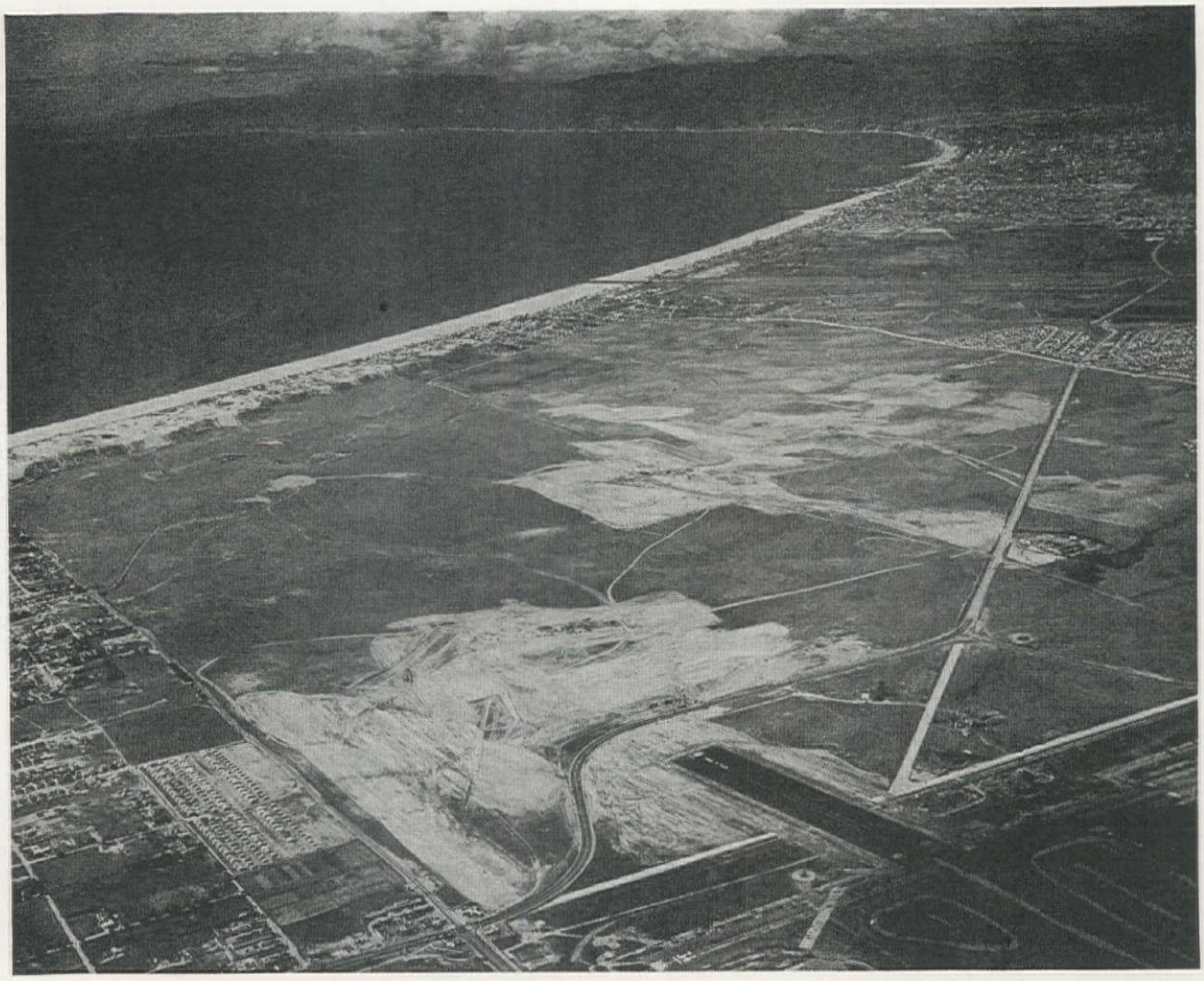
THE BUREAU of Reclamation has awarded the construction contract for Platoro Dam on the Conejos River, high in the Rocky Mountains of Southern Colorado to provide water storage for the Conejos Division of the San Luis Valley project. Low bidder on the construction of the earthfill dam was Hinman Brothers Construction Co. of Fort Collins, Colo., with a bid of $2,727,792.

The San Luis Valley project was authorized in 1940 and money was subsequently appropriated, but construction was held up by the war and other circumstances.

The 135-ft. earthfill dam across the Conejos River will create a reservoir of 60,000-ac. ft. capacity, the highest level of which will stand at 10,042 ft. above sea level. It will be the largest man-made lake at this height in the entire United States.

Award of contract was expedited following approval of the repayment contract by water users of the Conejos Water Conservancy District, in order to take full advantage of the comparatively short summer construction period. The area is so high that construction work cannot proceed on a year-round basis.

The contractor has 1,300 days to complete the work, and the reservoir is expected to store water for supplemental irrigation use by farmers in the Conejos Division of the San Luis Valley by 1953.



Los Angeles Airport Extended

Biggest land-leveling job in the West paves the way for one of the greatest airports in the country as Ball-Harms & Parker dig into contract

By STANLEY A. BALL
Partner, N. M. Ball Sons
Berkeley, Calif.

HEAVY EQUIPMENT keeps fuel burning at the rate of 18,500 gal. per day on the Los Angeles Airport job under the $3,363,731 contract held by the California firms of N. M. Ball Sons, Berkeley; Harms Bros., Sacramento, and H. Earl Parker, Inc., Marysville. The joint venture contractors are combining to build one of the greatest airport runway systems in the country and are proceeding at a 3 shifts per day rate that will slice off at least 100 days of construction time from the 450 days allowed in the original bid.

Already, prominent air line executives, including James Montgomery of Western Air Lines and Frank Donat of Trans World Airlines, have predicted that the Los Angeles Airport will be the nation's largest commercial air center within a period of 5 to 10 years. The airfield has grown from a small cluster of buildings and hangars fronting on one main landing strip 20 years ago to the present air terminal valued at some $25 million with numerous runways up to 6,000 ft. in length, employing more than 3,600 persons and housing two major aircraft factories employing 23,000 more. The present terminal ranks fourth in the nation and handled one-twentieth of all the 1948 air traffic in the United States. All these present terminal facilities are considered by the Board of Airport Commissioners as intermediate in nature and representing only a part of the over-all master plan that has been drawn up for the Los Angeles Airport of the future. The program for the air future of the city provides for all terminal buildings, efficient handling of passengers and air cargo, and the latest in electronic landing, safety, and navigational devices.

Expansion west

The expansion program will extend all east-west runways, including the airport's largest runway 25L-7R, now 300 ft. by 6,000 ft., and add three new runways and numerous taxiways. In the center of the newly leveled land and west of the existing facilities the new semicircular airport administration center will be built. Between the administration center and the Pacific Coast Highway will be the large maintenance shops, hangars, and buildings.

Site of the 12,000,000-cu. yd. job is directly west of the present airport and

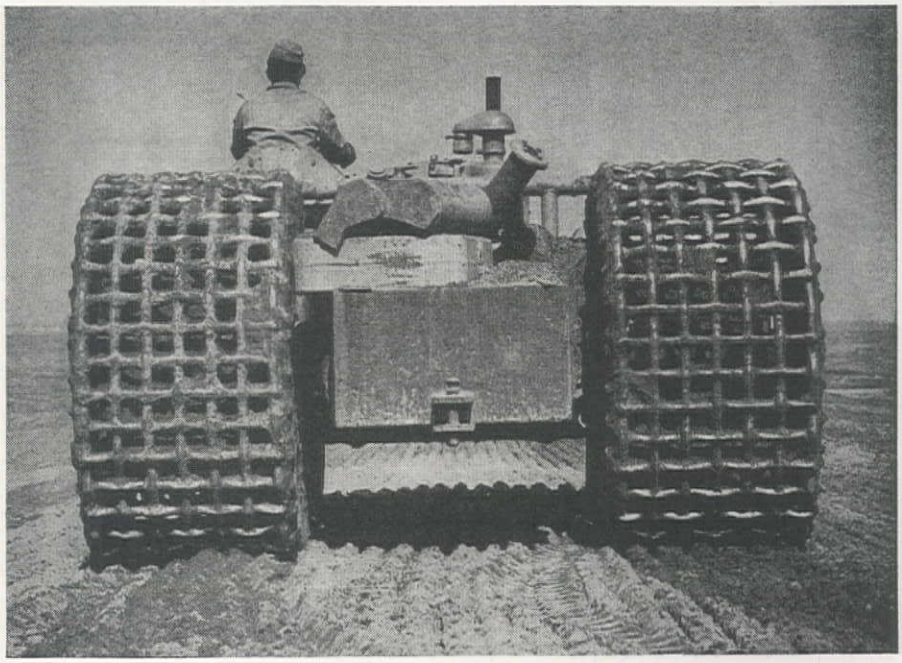
bounded roughly by Sepulveda Blvd. on the east, Imperial Highway on the south, Pacific Coast Highway on the west, and 94th St. on the north. Sepulveda Blvd. traffic directly crosses the runway extensions, and eventually this highway will be tunneled underneath the airport for 2,200 ft., eliminating completely the present detour around the end of the 6,000-ft. runway.

Heavy excavation

The contract for the grading of the extension of the Los Angeles Airport was advertised in the early part of September, 1948, and bids were taken in the following October and awarded to low-bidders Ball-Harms & Parker. Second and third low bids were $3,899,787 and $3,777,777. The Airport Commission awarded the contract to the combine on January 10, 1949, on schedule "A" under the approval of the Civil Aeronautics Administration. The project is being constructed to Civil Aeronautics Administration standards under a Federal-aid airport grant which amounts to approximately 54% of the total cost of the job. The Federal share of the project is being administered under the supervision of H. K. Friedland, District Airport Engineer for Southern California.

Schedule "A" consists of the following items: (A) 11,846,000 cu. yd. of common excavation. (B) Constructing storm drain complete in place. (C) Constructing timber bridge complete in place. (D) 4,130 lin. ft. of wooden guard rail. (E) 258 vertical ft. raising manholes to grade. (F) Constructing engineer's office. (G) 1,461 ac. of seed, and maintaining graded areas. The unit prices of the Ball-Harms & Parker bid are (a) $0.265 per cu. yd. (b) $274,232.00. (c) $65,145.00. (d) $2.45 per ft. (e) $21.00 per lin. ft. (f) $1,500. (g) $48.00 per ac.

Before starting any grading work it was necessary to develop an ample water supply for the job. One well owned by the airport was available, and three needed additional wells were drilled by M. R. Peck & Son, Gardena, Calif. Water was reached in the first well at 342 ft. and produced 510 g.p.m., the second well produced 540 g.p.m. at 302 ft., and the third produced 550 g.p.m. at 310 ft.



FAST and effective compaction on the fills was obtained by this specially-designed grid roller. It is especially suitable for the type of soil found on the Los Angeles Airport job.

Special rollers consolidate sand

The specifications required the contractor to secure a minimum compaction of 95% on all runway and taxiway areas and 90% on all other areas. For this particular job, involving sandy soil, it was found that rubber-tired tampers and specially-designed Gardner-Byrne rollers gave the most satisfactory results. The Gardner-Byrne Co., Los Angeles, grid roller is a new rig that is compacting the soil very well, although the hard sand wears down the grids considerably after several thousand hours of operation. The Diesel-powered roller is made from Caterpillar DW-10 parts and operates at high speed back and forth across the fills, compacting with its two heavy wheels and leaving a waffle pattern in the sand. By adding the proper amount of water and spreading in thin layers of 2 and 3 in. (specifications called for not over 6-in. layers) very little trouble was encountered in securing proper compaction. At the time of starting the contract there was 6% moisture in the ground.

As a job preliminary, the entire project was plotted in 1,000-ft. grids and divided in thirds among the Ball-Harms & Parker combine so that each one would have about the same yardage to move. In the 23-ac. squares, the cuts reach a maximum of 50 ft. and 625,000 cu. yd., and fills reach a maximum of 30 ft. and 375,000 cu. yd. The contractors hope there will be no settlement or wastage on this job.

Electric scraper introduced

Grading operations started this Feb-

SCRAPERS are leveling 140,000 cu. yd. per day, below. EARL E. BOSWELL, left, is Project Superintendent for the entire job, and ED ALT is General Superintendent for H. Earl Parker, Inc.

POWER WINCH and electrically-operated power control unit used on Lewis & Queen's LeTourneau Carryall scraper, above, was recently developed by Kay-Brunner Steel Products, Los Angeles.

ruary 1 by Lewis & Queen, San Francisco, subcontractor, and during the first month of operation 1,203,000 cu. yd. of dirt was moved. All equipment that is used on the contract had to be moved from Northern California and was slow in arriving on the job due to the severe cold snap experienced at that time. First step in the job was to rough grade a strip through the center in order to give runway clearance for the heavy Pan-American Airways stratocruisers.

The second month of operations saw 1,973,000 cu. yd. of dirt moved, and about ⅓ of the total 2 sq. mi. area of the job had been scratched. During the third month 2,320,000 cu. yd. of dirt was moved, completing 46.9% on the total contract. Earthwork is proceeding on a three-shift basis while soil moisture conditions are still good, and about 140,000 cu. yd. are being moved each day.

One of the new K-B C-90D electrically-operated power control units, recently developed by Kay-Brunner Steel Products, Inc., Los Angeles, controls one of Lewis & Queen's 25-cu. yd. Carryall scrapers. The unit, licensed under LeTourneau patents, was developed for tractors of 50 h.p. and up, and features swinging-top fairlead, self-energizing brake, and cone-type clutch.

Sheppard Tractor Co., Los Angeles distributors, opened up a complete parts house on the field so that there would be no delay to the contractors in servicing the equipment.

On a job of this size, many special features arise that in themselves would be considered heavy contracts. A perimeter ditch is being constructed around the field to take care of the drainage in the event of a flash flood. The ditch required 740,000 cu. yd. of excavation and cost $274,000.

It was necessary to build a temporary overpass over Lincoln Blvd., through the middle of the job, in order not to disrupt daytime traffic, as the contract called for 1,400,000 cu. yd. of material to cross the highway on the timber structure. About 1/6 of this yardage has been moved across the overpass to date.

Standard Oil Co. of Calif. is supplying all fuels and oil used on the job. Approximately 14,000 gal. of Diesel and 4,500 gal. of gasoline are used per day.

Up to the present time only three accidents were reported for a total crew of 670 men per day. These accidents were minor.

Organization

Heading the Municipal Airport Department in charge of the construction are: Colonel Clarence M. Young, General Manager; Woodruff De Silva, Airport Manager; Tommy Tucker, Airport Engineer; Otis Calhoun, Assistant Airport Engineer; Gordon Wikoff, Resident Engineer; and Al Boysen, Supervisor of Survey.

Constructors include: Stanley A. Ball, Project Manager; George Stevens, Office Manager; Earl Boswell, Project Superintendent; Jack Wilson, General Superintendent for Harms Bros.; Wayne Morris and Ed Alt, General Superintendents for H. Earl Parker, Inc.

Subcontractors include the five following: Lewis & Queen, San Francisco, grading, J. Melton and B. Patterson, Superintendents; L. Biasotti & Son, Stockton, Calif., grading, Al Regalia, Superintendent, and Paul Kuger and J. L. Peterman, Foremen; Baker Bros., Chico, Calif., grading, Harold Musser and Andy Kucan, Superintendents, and J. Aldax, Foreman; Gunner Corp., Pasadena, Calif., grading, M. W. Stanfield, Superintendent; and Far West Construction Co., San Francisco, storm drain and bridge, E. J. Gasperetti, Superintendent and Engineer.

EQUIPMENT AT AIRPORT

- 56 D-8 Caterpillar tractors.
- 38 Scrapers, 12 to 28 cu. yd., consisting of LeTourneau, Caterpillar, Wooldridge, and La Plant-Choate models.
- 33 Rubber-tired rigs, consisting of Caterpillar DW-10s, LeTourneau Tournapulls, Wooldridge Terra Cobras, and LeTourneau electric scrapers.
- 24 Water trucks.
- 2 Gardner-Byrne Grid Rollers.
- 14 Rubber-tired tampers.
- 4 Sheepsfoot rollers.

Portrait—

TAKE ONE tractor. Multiply by thirteen years. Result? Fifty-four tractors—if the man doing the higher mathematics is H. Earl Parker of Marysville, Calif.

For Earl Parker is a heartening reminder that the great American success story is still very much with us. In his case, the story could be titled "From Cat-skinner to Company President," or "How to Win Friends and Influence People in the Construction Game." At thirty-nine, Parker heads one of the West's fastest growing construction companies, under the name of H. Earl Parker, Inc. He hasn't had an idle minute in the past two decades, and, in the words of a once familiar radio figure, it looks like "This is only the beginning, folks! Only the beginning!"

Parker was born in Missouri, but his family moved to a ranch near Sonora, Calif., while he was still a child. Young Parker grew up with the air age, and as far back as he can remember his one desire was to be a flyer. It was the era of Lindbergh, of Byrd, of flying schools that mushroomed from one end of the United States to the other, operated, for the most part, by former pilots of World War I. When one of these schools opened near Stockton, under the name of Galt Technical Junior College, Parker was one of the hundred of high school graduates who applied for admission. Enrollment was limited to ten students from California, plus one from each of the other 47 states, and Parker was proud and thrilled to be among those admitted.

From airplane to cat

Unfortunately, the school followed a familiar pattern by going broke before Parker was graduated. More than ever, he wanted to fly. So, although this was a period when the armed forces were being cut to a minimum, he nevertheless put in a hopeful application with the Army Air Forces. Then he looked around for a job to carry him through the anticipated lengthy sweating-out period.

A couple of enterprising brothers named Harms, recently arrived in this country from Denmark, were embarking on their first modest contract, near Dorrington, Calif. This was in 1930. Parker applied for a job, and went to work as a laborer. For the next few years, he took everything that came along: cat-skinner, shovel operator, shift-boss, common laborer — Parker learned them all, the hard way, and eventually became a superintendent for Harms Brothers. By the time he finally received word that the Army Air Forces had accepted his application, he was married and well embarked on an entirely different career, one in which flying occupied only a secondary place.

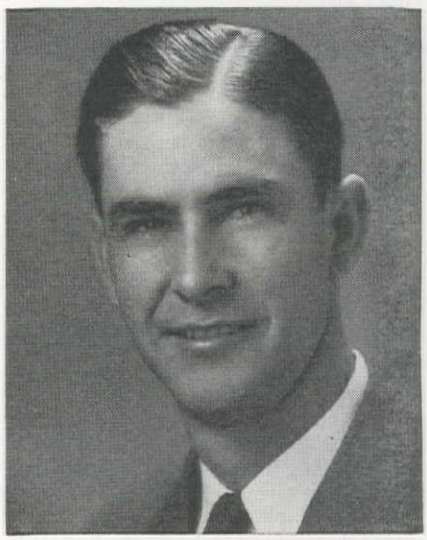
Cleo the Cletrac

In 1936, Parker bought—on time—his first tractor, a Cletrac Model 80, affec-

The American Success Story

New field techniques, a cool head, and an almost uncanny bidding ability have made the air-minded H. Earl Parker a success in the 13 years he has been in the fast and rugged contracting game

By BETTY THOMPSON
San Francisco, Calif.



H. EARL PARKER

tionately known as Cleo. He took Cleo to Marysville during the winter of '37, where floods were causing considerable damage. Arriving on the scene, he took on a small job which involved the renting of two other tractors. For the first time, Parker had that satisfying sensation of a man who is definitely headed some place, and knows where he is going.

It was at this period that he applied for his first bond, for $10,000. A young man by the name of Stan Hinman, who also was just starting out in the bond and insurance business, went out to make the usual call on a new client. His first glimpse of Parker came as the young contractor climbed down from the tractor he was driving, to shake hands. His face was so blackened with dust and sweat that his features were indistinguishable. On a purely dollars and cents basis, Parker's assets hardly warranted the request, but Hinman also weighed in certain intangibles, such as the quiet self-confidence that is one of Parker's characteristics, and okayed the bond. He has written all of Parker's bonding and insurance since that time, and has never once had cause to reverse that early decision.

In February, 1938, Parker got his first big job, a contract for moving 1,000,000 cu. yd. of dirt down in the Tulare Lake Basin, where floods were washing out levees. He bought two more tractors, rented twenty others, and started working seven days a week, twenty-four hours a day. It was here that Parker, for the first time, evolved the method of lining the bulldozers up, nine abreast, all pushing together, a procedure now commonly followed, since twice as much dirt may be moved this way. Conditions got so bad, with levees breaking one after the other, that at one time the man from whom he had rented his extra equipment begged him to move it out of the danger zone. Parker reminded the man, in no gentle tones, that he was running his own job, and continued with such effect that his levees were the only ones in the entire basin that held. There was only one casualty on the job. Cleo, the faithful first tractor, went over the bank and was so badly damaged she was sold for junk.

More valuable out of uniform

Naturally, his reputation was made so far as Tulare Lake Basin was concerned. He worked in the Basin for the next four years. Then came Pearl Harbor, and H. Earl Parker, Inc. started in on a series of contracts which kept them so busy that "the water in the radiators never got cool." Parker worked on, among other things, twenty-two different airports, a series of levees, and several Army projects, including Camp Roberts, Camp San Luis Obispo and the Sierra Ordnance Depot. At one time during the war Parker contemplated going into the Seabees, but when the Army heard of this, their comment was, "You're not going into the Navy; when we want you in the service we'll let you know."

On a job at Chico Air Base, he was ordered to have the field ready for use by March 15. These instructions came on the 19th of January. What had to be made into a hard-surfaced flying field, was nothing more than a sea of muck, and, according to Parker, as they moved the stuff they just piled it up on each side until the runway resembled nothing so much as a long tunnel. However, planes were taking off on March 15 according to schedule.

PRESENT at signing of Los Angeles Airport expansion contract, l. to r., STANLEY BALL, N. M. Ball Sons; CLIFF ANDERSON, Office Manager for H. Earl Parker; JENS HARMS, Harms Bros.; COL. CLARENCE YOUNG, seated, Airport General Manager; STAN HINMAN, and H. EARL PARKER.

The American success story

Today, Parker's company, while far from the West's largest, is still able to take on anything up to and including a $3,000,000 project—not bad for an organization that thirteen years ago consisted of one rickety tractor, and that mortgaged to the bank. It is interesting to reflect that every year hundreds of young men take jobs as cat-skinners and rodmen, but only one in many thousand is capable of building such a small start into anything approaching Parker's success. Men call him a "natural" contractor. He has an almost uncanny ability to estimate the cost of a job after walking through it once, and those estimates are almost always accurate. When he was first starting out, he wanted contracts and was willing to stick his neck out to get them. For that reason, many of his bids seemed precariously low. When, in 1947, he was $90,000 low an an $800,000 job for the Army Engineers, the general verdict was, "Parker is never going to scrape through on this one." The verdict was wrong.

Parker's organization is made up of young men, many of whom started out

with him. His general superintendent, for example, "Spike" Eliason, is also a veteran of that first job with the Harms Brothers. Regardless of previous experience, Parker starts out every new employee as a cat-skinner. "We have our own way of doing things," Parker explains. "A man who has worked as a superintendent for someone else has learned to do things his way. It may be a better way, but it isn't ours." Parker tries to keep all his men busy, winter and summer, removing the haunting fear of layoffs. He also has recently set up for them a voluntary health and hospitalization plan. He gives full credit for his accomplishments to the men who work with him.

A permanent organization

An organization built from the ground up in this fashion pays off. When the Parker company starts a job, the men are working together as smoothly and quickly on the first day as they are on the last, which keeps the schedule clicking along like clockwork. As a matter of fact, clocks play a considerable part in the way in which Parker runs a job. He has actually been seen timing his tractors with a stop-watch to be certain they were moving at the scheduled speed.

Parker has been extraordinarily successful, but it is the sort of success, built on hard work, that no one begrudges him. He operates on a principle of "make your word better than your contract. Do everything that is expected of you, and then a little bit more." He is quiet, unassuming and possessed of an unswerving determination to finish anything he sets out to do. He takes honest pride in the company he has built from scratch, but is equally honest when he says, "I wouldn't feel too bad if something happened and I went broke. I know I could always get a job, if not as a superintendent, then as a cat-skinner."

Parker is now on the road approximately three days a week, flying from job to job in his private Navion. He flies it himself, too, for although his meteoric career has left him no time for hobbies, except a bit of skiing, he has never gotten over his old urge to be an aviator, and his flying ranks not as a hobby, but almost as a necessary part of his life. He is a good pilot, according to friends, and a cautious one, who never has any difficulty finding passengers willing to ride with him.

And other activities

Parker has yet to take on a foreign job. So far, he has been kept much too occupied in this country. However, the outside area that interests him most lies due north, in Canada and Alaska. In fact, right now, he and the Harms brothers and their associates are operating in British Columbia, although in a rather new field for Parker. They are dredging for gold—successfully, too—in Medames Creek, Watson Lake, Yukon Territory, near Wills, B. C. They had to build 83 mi. of road to get the dredge in there, but it looks from here as if the job were going to pay off.

In 1946, Parker was elected president of the Northern California Chapter of

H. EARL PARKER and CLEO in 1937

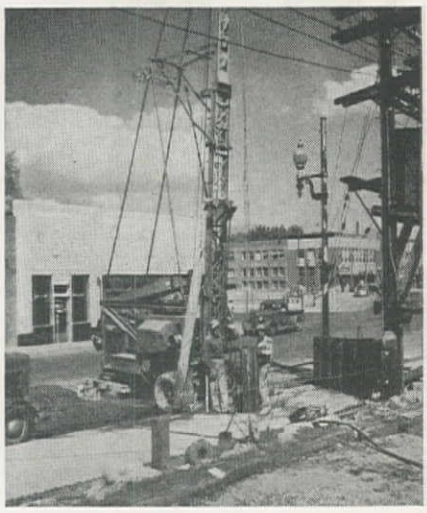
A.G.C., the youngest man ever to receive that honor, and at present is on its board of directors. He lives in Marysville, has two children, a boy and a girl, and is now building a new home. The darkest chapter in his life surrounds the first initial of his name, a secret he firmly refuses to divulge.

At present, the Parker company does about ninety per cent of the levee work in the Sacramento Valley. Its most recent project is a $3,500,000 joint venture for the Los Angeles Airport. Participants with Parker are the Harms Brothers and N. M. Ball Sons, all old friends. They are bonded and insured by another time-tried friend, Stan Hinman, who says, "Why, when we get together to talk business, it isn't work at all. We are actually having the time of our lives!"

Reno Water Well Pierces Downtown Area Sidewalk

IN THE NEVER-ENDING quest for fresh water, Westerners are known to go great distances or drill deep wells. In the center of Reno, Nev., John Champion, water well contractor, is drilling straight through a concrete sidewalk to get water for the air-conditioning unit of Reno's Riverside Hotel. The portable Bucyrus-Erie rig, powered by International Diesel, is cutting through sand and gravel soils at a rate of 12 ft. per day with a minimum of impedence to pedestrian and motor traffic. The rough soil is being cut by a 12-in. paddle bit mounted on a 1½-ton steel stem, 5 in. in diameter and 16 ft. long. Jack Karnes, left, and Lee Smith are shown steadying the 12-in., 10 gage steel casing in the shaft that pierces the sidewalk. They used a 14-ft. starter, and are following it with 4-ft. sections made from 8-ft. lengths overlapped and butt-welded. Approximate well depth is 300 ft.

JACK KARNES, left, and LEE SMITH guide well casing lowered through center of sidewalk.



The well is to supply an immediate need for water acceptable for air-conditioning. The Truckee River, although only two blocks away, will not be acceptable until construction on the city's new sewer system and treatment plant is completed. Bids on this project were opened on May 9, 1949. Reno, with unmetered service, has one of the highest water consumption rates in the country, sometimes reaching 700 gal. per capita per day.

Long Friant-Kern Canal Will Carry First Water

CENTRAL VALLEY Project water will pass southward through the Friant-Kern Canal for the first time this summer to irrigate farm lands in parts of Fresno and Tulare counties of California. Although uncompleted, the 153-mi. Friant-Kern "big ditch" will have been finished far enough southward to permit delivery of water as far as the St. John's River, a distance of 90 mi. from Friant Dam, in time to be of benefit during this year's irrigation season.

Approximately 100,000 ac. ft. of water will be available in Millerton Lake to turn into the Friant-Kern Canal this season. It will be delivered to districts which have executed regular long-term CVP water contracts and are favorably located to accept delivery from points on the canal above the St. John's River. It will be furnished as Class 2 water at the contract price of $1.50 an acre-foot.

Irrigation requirements of the Miller and Lux exchange contract totaling about 800,000 ac. ft., which ultimately will be met from the Delta-Mendota Canal, still must be met from Millerton Lake. This year's Friant-Kern deliveries will be over and above these requirements, as well as in addition to the interim contract supplies furnished to the Madera Irrigation District via the Madera Canal and to various irrigators along the San Joaquin River who have been receiving Millerton Lake water for a number of seasons.

Millerton Lake is expected to fill for the first time when the snow-melt run-off reaches its maximum this early summer. Recent installation of the drum gates on top of the Friant Dam spillway has increased the lake's storage capacity by 85,000 ac. ft., bringing the reservoir's total capacity to 520,000 ac. ft.

Construction Design Chart

CVIII... Allowable Loads on Corrugated Iron

By JAMES R. GRIFFITH
Dean of Engineering
University of Portland
Portland, Oregon

CORRUGATED IRON, familiarly known as "wrinkle tin," is a material of many applications. We may see it housing the dregs of society in the railroad jungle camps. It is as familiar to the designer and constructor of industrial buildings as a 2 × 4 timber is to the house carpenter. I have recently had my attention called to a new application of this material by the District Engineer of A.I.S.C. He has had several inquiries relative to the load bearing capacity of corrugated iron when used to form a concrete slab in a building. Apparently it was planned to leave the corrugated iron in place after stripping the shores.

The conventional table listing the characteristics of corrugated iron, are all similar to that on page 143 of the 1947 edition of STEEL CONSTRUCTION.[1] Therein, the maximum spans for corrugated sheets of various gages are listed for roofing and for siding. While all such formulae are in the same general form and have the same variables, some quote b in terms of curvilinear breadth of sheet, while others take it as the horizontal projection.

The Handbook of Culvert and Drainage Practice[2] gives the following approximate values for the physical properties of corrugated sheets:

Moment of Inertia, corrugations ½" × 2⅔"

$I = \frac{t}{30}$, inches^4 per inch of horizontal projection about axis at right angles to line of corrugation.

t = thickness of metal, inches.

Modulus of Elasticity of Ingot Iron

$E = 29{,}000{,}000$ lb.

Fiber Stress of Ingot Iron

Ultimate, 47,000 p.s.i.

At useful limit, 35,000 p.s.i.

The accompanying chart, utilizing the above data, gives the required information for corrugated iron sheets on simple spans. A single straight line intersecting the required scales, is necessary for a solution. Flexure is shown for a stress of $f = 12{,}000$ p.s.i., and also for $f = 20{,}000$ p.s.i., resulting in factors of safety of $\frac{47{,}000}{12{,}000} = 3.92$, and $\frac{47{,}000}{20{,}000} = 2.35$ respectively. I have drawn a solution line on the chart for a simple span 69 in. long, using 12-gage metal at a flexural stress of 12,000 p.s.i. It will be noted that the allowable load, uniformly distributed, is $w = 32.5$ lb. per sq. ft. As a check on this value, taking a unit width of 12 in., we then have:

12 gage, $t = 0.1046$ in.

$$I = \frac{t \times 12}{30} = \frac{0.1046 \times 12}{30} = 0.0419 \text{ in.}^4$$

$$\text{Sec. Mod., } S = \frac{I}{c} = \frac{0.0419}{(0.5 + 0.1046) \div 2} = 0.1385 \text{ in.}^3$$

$$\text{Moment, } M = \frac{wL^2}{8} = \frac{32.5 \times 5.75^2 \times 12}{8} = 1{,}610 \text{ in. lb.}$$

$$\text{Stress, } f = \frac{M}{S} = \frac{1{,}610}{0.1385} = 11{,}620 \text{ p.s.i.}$$

If the corrugated sheets are continuous over several spans, the allowable load may be approximately doubled for deflection as well as flexure. If figured on the basis of the end span of a continuous beam, the allowable load for flexure may be increased by 1.79, and may be increased for deflection by a factor of 2.41. The average of the two being 2.1, is responsible for the general rule permitting double the load where spans are continuous over several supports.

It is apparent, from the relative position of the solution line on the chart as compared to the deflection scale, that the deflection would be in excess of 1/270 under the assumed conditions. If a solution line is drawn from the determined load of $w = 32.5$ p.s.f., through the 12-gage mark on the deflection scale, an allowable span of 50.5 in. will be observed. By substitution in the formula for maximum deflection of a simple span under uniform loading, a value of 0.185 in. will be obtained. This value corresponds to the allowable deflection of $\frac{50.5}{270} = 0.187$ in.

[1] American Institute of Steel Construction.
[2] Armco Drainage & Metal Products, Inc.

16 JOBS...

150 TONS EACH

FRUEHAUF

..A NAME THAT CARRIES WEIGHT..

CONDICK COMPANY, Berkeley, contracted to move INTACT mammoth machines, 110 ft. long, 38 ft. high and 13 ft. wide at the base, used to line sections of the Central California Delta-Mendota Canal Project. Each machine weighed in excess of 150 tons. One such, as illustrated, is known to the trade as a "slipform." It is used in the concrete paving operation.

The hauling was done with a Fruehauf CPT50 Carryall Trailer and "Jeep" combination owned by the Donald F. Hagerty Drayage Co., Berkeley, together with a truck-tractor and two job-built, 16-wheel dollies.

Sixteen hauls were made and each time more than 75 tons of concentrated weight rested on the Fruehauf Carryall's trunnion rocking beam axles and 16 wheels.

The only alternative to the Trailer haul would have been to dismantle the 150-ton machines. This would have necessitated days of delay and heavy expense.

No wonder, therefore, that R. G. "Dick" Pimentel, partner with Con T. Shea in the firm that paid the bills says, "It is unnecessary for us to attempt to describe our satisfaction with Fruehauf units."

Fruehauf Carryalls are in 10- to 74-ton capacities. "Specials" to 100 tons. Semi- or full-Trailers, level or double-drop platforms. Truly, Fruehauf IS a Name That Carries Weight.

World's Largest Builders of Truck-Trailers

FRUEHAUF TRAILER COMPANY

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Hear Harrison Wood in "This Changing World"—every Sunday Afternoon over ABC. Consult your local paper.

FRUEHAUF Trailers

"ENGINEERED TRANSPORTATION"

FIRST IN TRUCK-TRAILER TRANSPORT!

Changes in Colorado's Highway Set-up

The Colorado Highway Department makes its primary comprehensive change since Federal Aid Act of 1921 and is tailored to fit the rapidly changing highway fields of construction and maintenance

THE HIGHWAY fields of construction and maintenance have undergone many decided changes since 1921 when Federal funds first became available under the Federal Aid Act. These changes have been required in order that the highway facilities provided might efficiently serve the traffic which used them. The same amount of change cannot be attributed to the administrative set-ups of the many states during the same period. The administrative organization of most state highway departments was made along lines which allowed them to take advantage of the financial assistance provided by the Federal Statute in 1921. There have been many expedient changes made from time to time in order to keep up with the heavier demands, but there were no really comprehensive studies made of the necessary administrative and organizational needs that were brought about by the load that has grown year by year. Practically all states have experienced organizational difficulties because of the rapidly changing highway transport picture.

Outside investigation sought

It has become rather common practice in both the fields of government and industry to bring in outside agencies to make a critical examination of management procedures. This practice has merit in that persons not familiar with the existing procedures will normally have a better perspective for such critical examination. Following this line of reasoning the Governor, the State Highway Engineer, and the Highway Advisory Board of the State of Colorado requested the Highway Research Board to make a study of the administrative set-up and the governing statutes of the Colorado Highway Department in the Fall of 1947. This was the first request of its type ever to be formally presented to this body.

After due consideration, the Highway Research Board agreed to undertake a study of the Colorado Highway Department and its governing statutes, and upon completion of this study to submit recommendations resulting therefrom. The Highway Research Board sent technicians of long experience in the fields of administration, construction, maintenance and legal matters to Colorado to perform the necessary ground work for the study. The period of the field work covered from October, 1947 to February, 1948. Facilities and personnel of the Highway Department were put at the disposal of the study group, as needed, to expedite their work. Mark U. Watrous, State Highway Engineer, instructed the personnel of the Department to answer honestly and meticulously any and all questions propounded, and to assist in every way possible the work of the study group, so that their findings might be given at the earliest possible date.

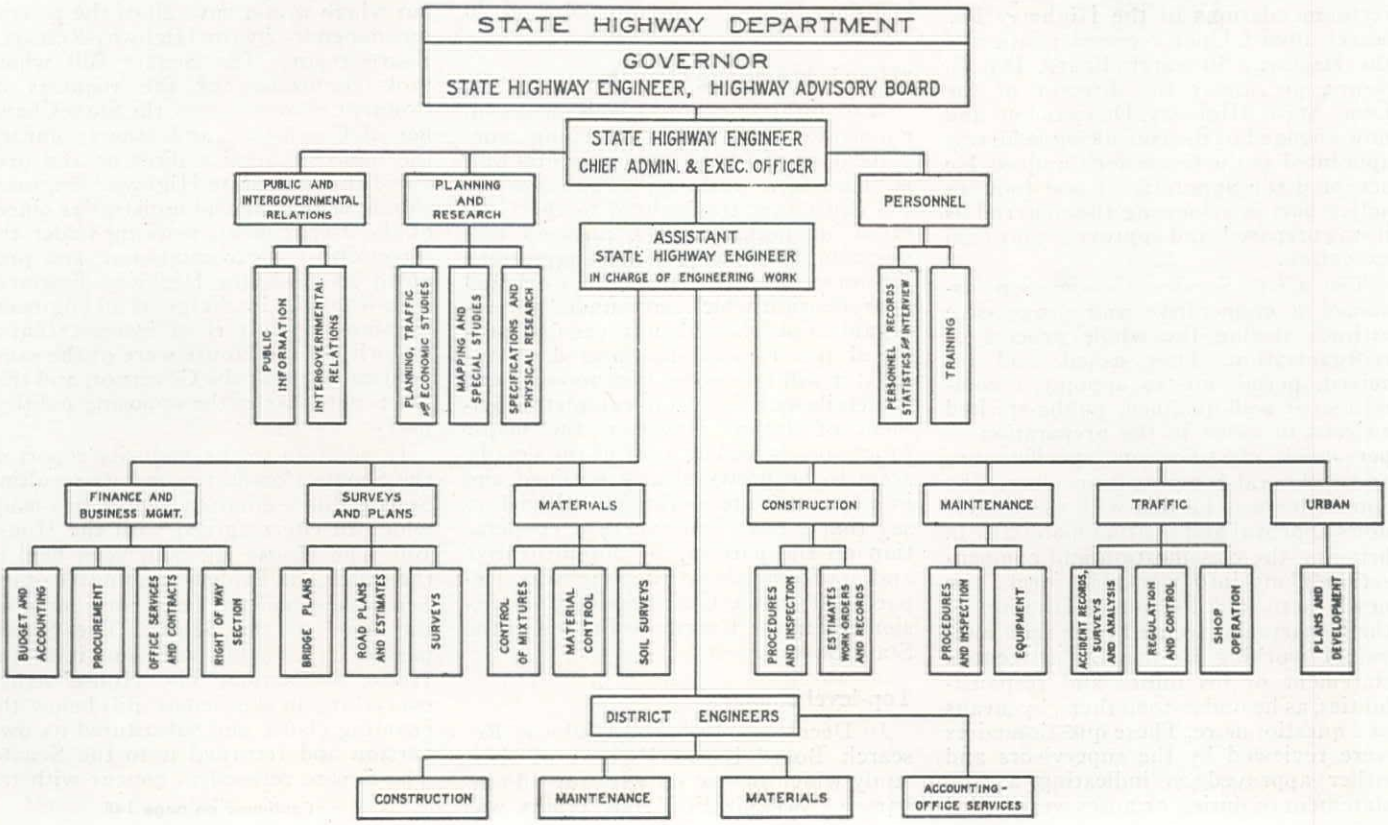
Preceding and during the progress of the study, a number of administrative changes were made in the Department. The changes referred to had been given due consideration from an efficiency standpoint and it did not seem reasonable to delay their inauguration until the findings of the study would be available. The study group were naturally informed of the changes.

Reorganization within the department

Two notable examples of such administrative changes were the creation of field districts in charge of a District Engineer, who was given complete authority for all maintenance and engineering within the boundaries of his district; and the creation of a personnel section charged with the responsibilities of recruitment and administration of all personnel employed in the Department. It was of considerable interest to note that these were two of the principal changes recommended upon conclusion of the study.

After the field study was completed, the technical staff assigned to the work by the Highway Research Board an-

ORGANIZATION PLAN
COLORADO STATE HIGHWAY DEPARTMENT



alyzed the data collected during the field period and submitted to the State the first section of their report, which dealt with purely administrative matters, and upon which action could be taken without any statutory changes.

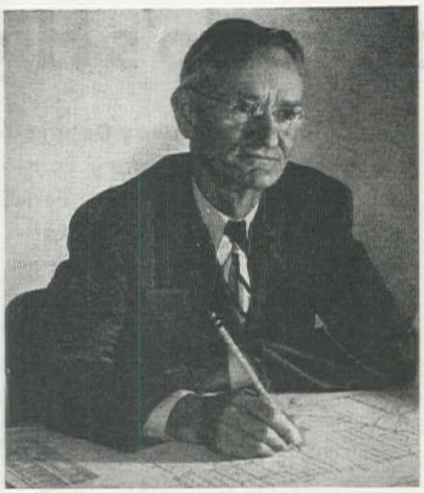
The organization chart indicates practical compliance with the organization recommended in this section of the report. It follows practically to the letter the recommended organization. The only deviations were the combining of functions in sections to avoid a top-heavy administrative section. An addition was the establishment of an Urban Division to handle the many intricate problems inherent in the urban developments. The need for this Division came about through the creation of a separate Federal fund for construction within the urban communities of over 5,000 population in the 1944 Federal Aid Act.

Intramural study

Upon receipt of the first section of the report, the Highway Engineer appointed a committee of Department personnel to prepare functional statements and staffing patterns for the units established under the new plan. This work was coordinated during preparation with the State Civil Service Commission, which has the obligation of overseeing classification and compensation plans for practically all State employees, including all Highway Department employees.

During the preparation of the functional manual and the creation of the required staffing patterns, the Governor declared that he believed it would be advisable to have an outside consultant, with long experience in highway engineering, to review the work being performed by the Highway Department staff with the end result that there might be assurance that the plan, as put into operation, would be consistent with the recommendations of the Highway Research Board. Upon recommendation of the Highway Research Board, Hal G. Sours, previously the director of the Ohio State Highway Department and now engaged in the consulting field, was appointed as the Governor's umpire. He accepted the appointment and took an active part in reviewing the material as it was prepared, and approved it for final execution.

The Civil Service Commission assumed a cooperative and progressive attitude during the whole process of reorganization. They asked, and received, permission to appoint a committee of well-qualified, public-spirited citizens to assist in the preparation of personnel classification specifications and collateral compensation plans. The committee was formed with the Governor's approval and assisted materially in bringing the classification and compensation plans into workable form. The newly activated Personnel Division of the Department secured from each individual working in the Department a statement of his duties and responsibilities, as he understood them, by means of a questionnaire. These questionnaires were reviewed by the supervisors and either approved as indicating a true statement of duties, or notes were added



MARK U. WATROUS, State Highway Engineer for Colorado, heads reorganization plan.

by the supervisor which indicated his understanding of the deviations in the employee's description from that of his own. These questionnaires were then used by the Civil Service Commission to assign proper classification and compensation for some 1,500 individuals working within the framework of the Department.

Upon completion of this classification, activation orders were written to the personnel selected to head the various administrative units. The activation order transmitted the manual which outlined for the selected supervisor, not only the functions of his own Section, but descriptions of the functions of all other units within the organization. This was done so that each supervisor might have a clear understanding of his own responsibilities, and the field in which his unit would operate, and to further make a clear definition of authority. Activation was completed in October, 1948.

"How is it working?"

A natural question which arises in connection with such a sweeping reorganization of a large governmental unit is "How is it working?" The report of the consultant transmitted to the Governor in January, 1949, answers this question. With only minor suggestions for improvement he states, "The original apprehension which surrounded the reorganization plan when it was first proposed has rapidly disappeared. Naturally, it will take some time to work out all details with respect to complete alignment of duties. However, the major functions, as well as most of the details, seem to be pretty clearly outlined and in most cases are working . . . I wish to say that I have had excellent cooperation on the part of the administrative and staff officials in the Highway Department, in the Civil Service Commission and in the Executive Branch of the State Government."

Top-level changes

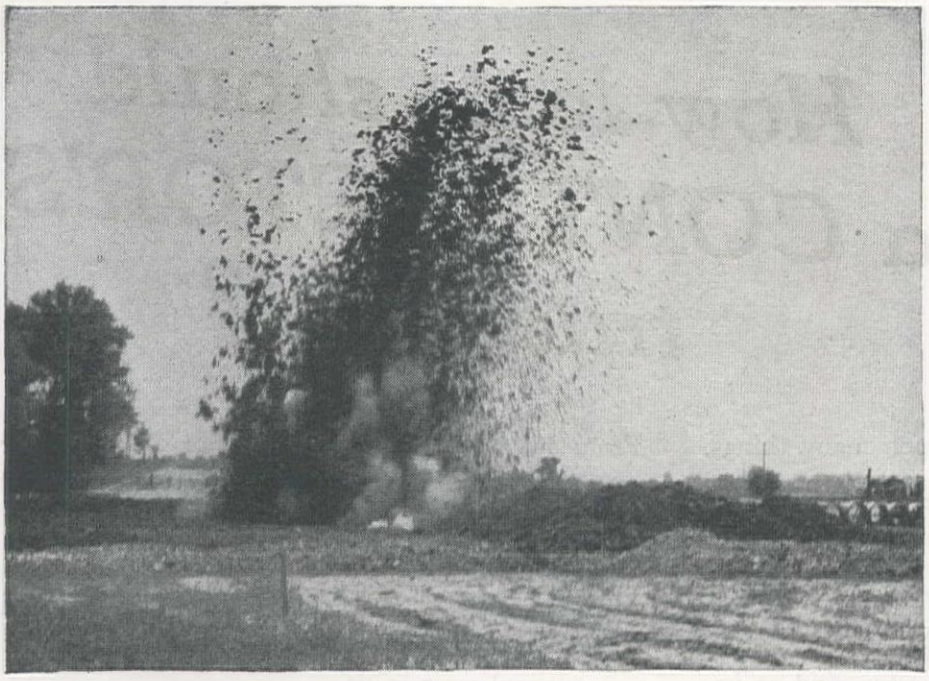
In December, 1948, the Highway Research Board issued Part II of their study which had to do with top administrative organization. The report was critical of the fact that the Highway Advisory Board was lacking in authority to accomplish the results that were expected of them. It suggested that this seven-man board should be replaced by a non-paid highway commission of three, which would have complete authority for administrative direction. It further recommended that a Director should be appointed, responsible to the commission, and outside the scope of Civil Service, to act as the administrative officer of the Department. In addition to these two principal items, the report outlined the necessary statutory and constitutional changes which would be required in connection with carrying out the recommendations.

Upon receipt of this report, the Governor requested that a bill, embodying recommendations of the report, should be drawn by the State Legal Reference Bureau for presentation to the Legislature which had just been convened. The Senate of the Legislature, by resolution, set up a study committee of their own to go into Highway matters generally and with particular emphasis on top level administration. This committee held open hearings and required the presence of Highway Department officials, officials of the County Commissioners Association and others to testify on Highway matters and top level administration.

In the meantime, the bill prepared at the Governor's request by the Legal Reference Bureau, was introduced in the House of the Legislature and given final approval for transmission to the Senate. The Senate Special Study Committee reported their findings and introduced a bill in line therewith, which deviated from the Highway Research Board recommendations and the House Bill by retaining a seven-man non-paid commission appointed on a district basis, but which would have all of the powers recommended by the Highway Research Board report. The Senate Bill which took cognizance of the requests of County Commissioners, the State Chamber of Commerce, and others, omitted the non-civil service director and provided that the State Highway Engineer should be the chief administrative officer of the Department, working under the direction of the commission, and provided an Assistant Highway Engineer who would be in charge of all engineering functions. It is of interest that a majority of the House were of the same political party as the Governor, and that the Senate was of the opposing political party.

In addition to the majority report of the Senate Committee and its resulting Senate Bill, a minority report was made which in effect agreed with the House Bill. The House Bill had been held in the Roads and Bridges Committee of the Senate and had not been considered on the floor of the Senate. The Senate passed its own bill and sent it to the House for action. The House struck everything in the Senate Bill below the enacting clause and substituted its own version and returned it to the Senate. The Senate refused to concur with the

Continued on page 148



RECORD FILL SETTLEMENT MADE WITH DU PONT 40% SPECIAL GELATIN

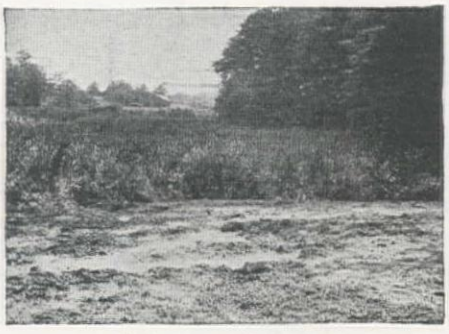
Toe-shooting method used at Sparrows Pt., Md., to settle fill 447 feet wide for Pennsylvania R.R.

A marshalling yard had to be built over a swamp. The depth of the unstable muck was as much as 27 feet, and the area to be filled 447' wide by 1,200' long. The problem was—how to settle this record width of fill—quickly and compactly—all the way down.

This was readily accomplished by the toe-shooting method of fill settlement, using Du Pont 40% Special Gelatin to displace the muck and drop the slag fill down to stable bottom. The extreme width of this fill necessitated firing relatively large shots with four rows of holes, so Du Pont "MS" Delay Electric Blasting Caps were used to keep vibration at a minimum, a new idea in fill settlement work.

This combination settled the slag fill quickly and completely—allowed the contractor to make rapid progress with one of the largest fill settlement jobs done up to now.

Whether your blasting problems are unusual or run-of-mine—see your Du Pont Explosives Representative for suggestions on how to do the job easier, safer, more economically.



Mud wave pushed out by settlement of fill

E. I. du Pont de Nemours & Co. (Inc.), Hoge Bldg., Seattle, Wash.—Midland Savings Bldg., Denver, Colo.—111 Sutter St., San Francisco, Calif.

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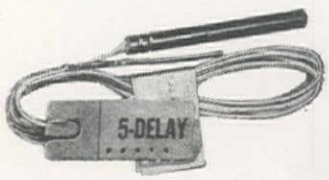
. . . a recent addition to the extensive line of Du Pont Caps, designed to eliminate risk of misfires due to arcing or "water hammer."



DU PONT "MS" (*millisecond*) DELAY ELECTRIC BLASTING CAPS

. . . reduce vibration . . . improve fragmentation . . . eliminate dynamite in muck. Come in nine delay periods with intervals clearly marked on tag.

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...THROUGH CHEMISTRY

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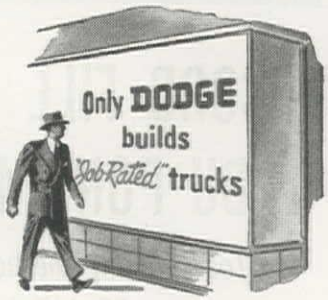

And remember . . . only Dodge builds "*Job-Rated*" trucks. Talk to your Dodge dealer!

For the good of your business—

Switch to DODGE "Job-Rated" TRUCKS

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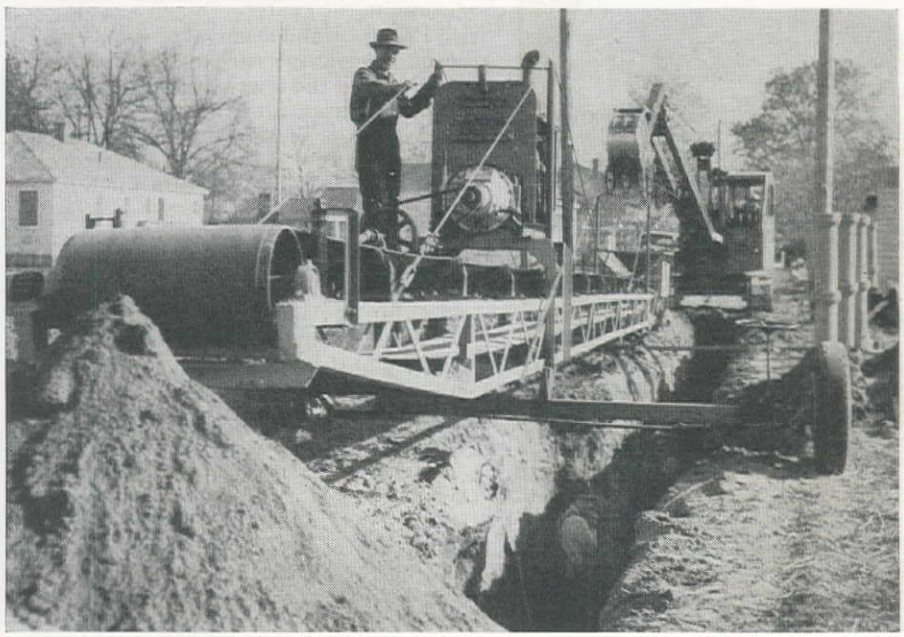
JOB AND SHOP TIPS FROM THE FIELD

Streets Repaired With One-Unit Rig

TO SEAL 2.5 million lin. ft. of cracks in city pavement each year, the City and County of San Francisco street repair department has three crack-sealing units which travel with ease over the many miles of streets. Each unit was specially built by mechanics in the department's own shop and holds all the bituminous material and aggregate needed for an average shift in the field.

Whitney Merrill, superintendent of street repair, needed a completely portable rig all on one truck, so he proceeded to build it. He took a 4-cu. yd. truck and added 3 ft. to the frame and driveshaft. In this space a second cab was built, back to back with the first, giving room for a five man repair crew to travel right with the rig. Behind the second cab a 60-c.f.m. air compressor was secured to run the pavement breaker or air jet, both carried right on the truck. The rest of the truck was divided into two bins, holding 5,200 lb. of rock and 3,000 lb. of sand. The truck also carries shovels and brushes, two wheelbarrows, two tool kits, and a 200-gal. bitumuls trailer delivering a standard 30 to 50-p.s.i. pressure on the tank.

The first of these rigs worked so well that two more were promptly built in the city's shop, and now all three crews have all the work they can handle, working five days a week the year around. Last year the city and county spent a total of $59,877 on over 2½ million lin. ft. of cracks, or an average of 2.3 cents per ft. on cracks that average 2 to 4 in. in width.



Conveyor Belt Backfills Trench in Narrow Alleys

TO ELIMINATE expensive removal of excavated dirt from narrow alleys, contractor Harry Carlyle, Walla Walla, Wash., devised an 80-ft. long conveyor belt to backfill the previously excavated trench. His backhoe loads dirt on the far end, the belt carries it to the near end where it is dropped into the trench, and workmen lay sewer pipe in the middle. The conveyor belt is mounted on one end of an extremely wide-axle carriage with rubber tires at the discharge end and a skid at the end nearest the excavating hoe. Lynn Carlyle is shown, in view at left, beside the engine that propels the 24-in. wide belt. After manholes have been installed, the backfilled trenches are leveled with a bulldozer. Except in the case of extremely deep trenches or other exceptional circumstances, the progress of trenching and pipe laying can just about keep even.

NEWS OF WESTERN CONSTRUCTION

JUNE 15, 1949

Consulting Board Suggests New Bay Crossing Solution

A TRIO of Eastern engineers, unfamiliar with Western traffic conditions and requirements, have made a report to a special committee of the Assembly of the California Legislature, proposing to solve the critical San Francisco Bay crossing problem by construction of a small bridge and tube along the line of the proposed "Southern Crossing," removal of interurban electric service over the present bridge and addition of four traffic lanes to the existing structure by adding cantilevered "wings" outside the cable supports.

This hodge-podge of alterations would be more costly than any of the previously proposed solutions of the problem. An estimated cost of $194,500,000 was announced by the engineers, Ole Singstad, O. H. Ammann, and T. T. McCroskey.

The Assembly had appointed the special committee to investigate the whole problem of bay crossings, after the State Toll Bridge Authority had announced it was ready to proceed with construction of a new "twin" bridge, almost an exact duplicate of the present structure, located 325 ft. northerly from it (as reported in WCN for Dec. 15, 1948) and had asked an appropriation of $893,000 to finance engineering design during the next year. The engineers from the East were employed by the special committee with the idea of securing advice from men entirely outside the heated controversy which has shaken the Bay area for the past three years, although Singstad had been employed by the Army-Navy Board and was credited with conceiving the trestle-tube plan it recommended.

The committee has held a series of public hearings, at which all persons interested were invited to present their views. The three engineers were present, and at the last of the public meetings, on May 24, presented their suggestions. Final recommendation by the special committee had not been made at press time, but it was generally anticipated that the requested appropriation would be refused.

In detail, the suggestions of the Eastern engineers are as follows:

Addition of cantilevered overhangs on each side of the present upper deck (passenger vehicle) roadway, to provide two additional lanes in each direction. The present upper deck would be changed from its undivided 6-lane plan to one of two lanes in each direction, with a safety island in the center.

Purchase and removal of the Key System, electric interurban line now using one-half of the lower deck, and substitution of buses for trans-bay commuter service; the section presently occupied by rails would be paved, thus affording two lanes in each direction for bus and truck traffic.

Construction of a 4-lane trestle-tube crossing from Army St. in southern San Francisco to Alameda, with an extension under Alameda Estuary through a tube, to downtown Oakland.

In addition, extensive approach systems and freeway connections are included, to bring the total cost of $194,500,000. According to the Toll Bridge Authority the proposed parallel bridge would cost $155,014,000, and the original Southern Crossing (6-lane) was estimated at $178,421,000. Engineers sponsoring the Reber Plan earth dam crossing believe it could be constructed for $145,000,000.

SUSPENSION CABLE SADDLE RESCUED FROM WATERY GRAVE

RESURRECTED from 140 ft. of Puget Sound water, into which it was jarred by the Northwest earthquake in April, the 22-ton cable saddle atop the east tower of the redesigned Tacoma Narrows suspension bridge, was replaced recently on its bedplates 509 ft. above low water. In falling, the saddle plunged through a work barge tied at the foot of the tower, completely demolishing it. Divers were called in by Bethlehem Steel Corp., the contractors, to locate the member. It was found virtually undamaged and was hoisted back into position by a Chicago boom on a tower leg.

Idaho Falls Is Chosen As Atomic Energy Site

THE ATOMIC Energy Commission has selected Idaho Falls, Ida., as headquarters for its Operations Office for the new national nuclear reactor testing station. The announcement was made by Leonard E. Johnston, Manager of Idaho Operations for the AEC.

Selection of Idaho Falls was made after a survey of several southeastern Idaho communities. A major factor in selection of Idaho Falls was its proximity to the testing station site combined with availability of housing, educational and hospital facilities for AEC personnel and their families.

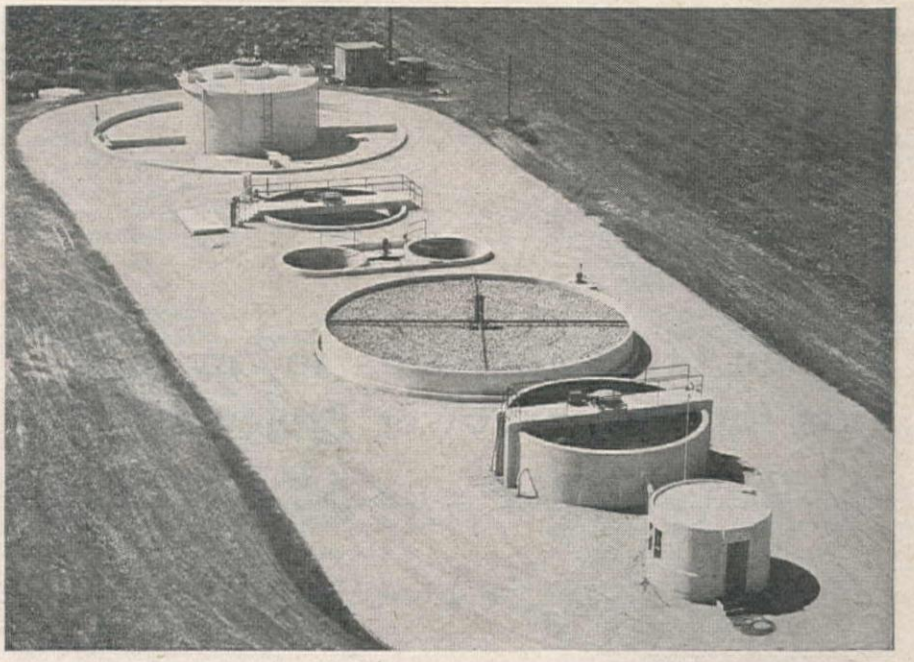
Completion of the new road west from Idaho Falls to the site will reduce the distance from the administrative office from the present 55 mi. to 36 mi.

Bion Phillipson, program director for the Idaho operations, stated that gradual development of the reactor testing station over a period of years will make it possible for Snake River Valley communities to absorb both administrative and operating personnel.

By the end of 1949 about 75 AEC employees will be stationed in Idaho and about 300 to 400 construction workers will be on the job at the site which centers around the Naval Proving Grounds near Arco.

By the end of 1950 about 200 AEC employees and possibly 2,000 construction workers will be employed.

Rail movement of freight to the site will be handled through Pocatello. A study also is being made to determine if some of the facilities of the Naval Gun Plant at Pocatello can be used for mining operations.



NEW LOOK GIVEN TO CITY'S STREAMLINED SEWAGE TREATMENT PLANT

SYMMETRY stands out in new plant for Castroville, Calif. Foreground in photo shows control-house structure, followed by primary clarifier, bio-filter, two aeration tanks, final clarifier, and sludge digestor with drying beds. Special features are the sludge handling equipment, aerator units, and recirculation facilities. Plant built by Charles MacClosky Co., San Francisco. Clyde K. Moseman was supervising engineer.

Mexican Engineers Attempt to Stop Land Destruction by Colorado River

THE COLORADO RIVER does not recognize international boundaries, and its control south of the border in Mexico does have some effect on flood control, drainage and the existing works in the United States. Mexico is now studying channel improvement of the river south of Yuma, Ariz., in the Mexicali Valley and flat delta country in Mexico south to tidewater on the Gulf of California. For this project, Mexican engineers are prepared to cooperate closely with officials of the United States. It was for this reason that last month a group of engineers from Mexico and the United States made a joint survey trip from Yuma to the river's tidewater. Principals in the group were Jose G. Valenzuela, engineer in charge of the lower Colorado area for the Mexican section of the International Boundary and Water Commission, and J. F. Friedkin, engineer for the United States section of the commission.

Biggest problem facing the Mexican engineers is to rectify the river's meandering channels in the Mexicali Valley and to dredge new channels where necessary to end destruction of valuable crop land which is still going on despite construction of dams upstream in the United States. During the 1941-1942 high water season, the river picked up large volumes of silt and spread it out in two- to four-foot layers over the valley. The river has continued since to spread over the area and has created a boggy swamp containing much tule growth, and the side-cutting action of the river has been accelerated. The Mexican government is planning to divert almost its entire share of Colorado River water at Morelos Dam when that structure is completed next year and channel control work must be completed before that diversion (see

SEATTLE'S 452nd ENGINEER CONSTRUCTION BATTALION ONE YEAR OLD

MEMBERS PRESENT at special ceremony are, seated, l. to r., LT. COL. BENJAMIN HAYES, JR.; MAJ. CHAS. ROSE; JAMES CAWDREY, Pres. Seattle Chap. AGC; MAJ. ROY GARDNER, Commanding Officer; E. B. HICKOK, Mgr. Seattle Chap. AGC; MAJ. RAYMOND WOODWARD, Unit Instructor; CAPT. HERBERT HUMPHRES. Standing, l. to r., CAPT. CHAS. E. DRYSDALE; 1ST LT. JEAN HOUPLIN; CAPT. ALFRED WAHTO; CAPT. JAMES DePARTEE; CAPT. WILFRED BERGMAN; CAPT. GEO. HAZEN; 1ST LT. WARREN HALLGREN; 1ST LT. JAMES HICKES; CAPT. NORMAN OLSON; 1ST LT. KENNETH PRICE; CAPT. ROBERT MAGNUSSUN; CAPT. JAMES MALLONCE; CAPT. ROBERT LEARER; 2ND LT. CHAS. McHUGH; CAPT. JAMES HJELM; CAPT. WALLACE DITTEMORE; CAPT. DAVID DIEHL; CAPT. ADELBERT WARREN; S/SGT. VEIKO WIHERA; CAPT. ANDREW WICK.

Western Construction News, Feb. 1949).

Several plans are being considered by the engineers for control of the river in Mexico. One would be to dredge a new and deep channel straight along the eastern edge of the Mexicali Valley. Another plan calls for dredging a new section of the present channel to put the river back on the approximate course it followed prior to the highwater caused by the spilling of excess water at Hoover Dam in the 1941 - 1942 flood season.

Whatever plan is consummated, handling of the river's water in Mexico may have a serious effect on structures to the north in the United States, and vice versa. Deepening of the channel in Mexico could threaten cutting action upstream as far as Laguna and Imperial Dams north of Yuma in Arizona. Evidence of close cooperation between the two countries guarantees that action in the future will result in the greatest advantage to both.

Bureau of Reclamation to Invite Bids for Water, Power Projects

INVITATIONS TO BID on construction work for the Bureau of Reclamation will be issued by that organization in the near future on the following dates and projects:

On June 15, earthwork and structures for about 16 mi. of the Courtland Canal near Superior, Neb., will be advertised; on June 20, invitations will be issued on relocation of 2 mi. of state highway at Palisades reservoir, about 56 mi. southeast of Idaho Falls, Ida.; on June 21, bids will be invited on construction of two concrete-lined equalizing reservoirs of 12- and 14-ac. ft. capacities, and 1 mi. of steel pipe lateral near Ogden, Utah; on June 24, earthwork and structures on 12 mi. of the Wyoming Canal, 20 mi. north of Riverton, Wyo., will be called, and on the same date bids will be invited on the stringing of conductors and overhead ground wire on the Davis-Parker and Davis-Hoover transmission lines, a total of 134 mi., between Boulder City, Nev. and Parker, Ariz.; and on June 27, construction of 70 mi. of concrete pipelines and structures for laterals, etc., for the distribution system in Coachella Valley, Calif.

Within the next two months, but without definite assigned dates at present, bid calls may be expected on the construction of earthfill dams on the Powder River in Montana, 2.5 mi. north of the Wyoming state line and on the Belle Fourche River in Crook County, Wyo.; a 26-mi. long concrete pipe distribution system near Delano, Calif. and the following four canal projects: 18.5 mi. of the Delta-Mendota Can near Newman, Calif., 17 mi. of the Su perior Canal, near Superior, Neb.; 6 mi. of the Potholes East Canal, nea Warden, Wash., and 6.5 mi. of the Can bridge Canal, near Arapahoe, Neb.

Also expected within the next tw months are the following transmissio lines and other electric facilities: 88 m of 115-kv. line between Sterling, Col and Ogallala, Neb.; 68 mi. of 115-k line between Oak Creek and Gree Mountain, Colo.; 63 mi. of 69-kv. lin from Yuma to Holyoke, Colo.; 26 mi. c 115-kv. line from Loveland to Longmon and Lafayette, Colo.; 41 mi. of 69-k line from Bismarck to DeVaul, N. Dak. 72 mi. of 230-kv. line between Elvert and Tracy, Calif., and stringing of con ductor and ground wire on 57 additiona miles of the same line between Orovill and Elverta; a switchyard at Tracy Calif.; and sub-stations at Sidney, Neb Tucson, Ariz., and Prescott, Ariz.

Other coming projects include: pumping plants on the Wellton-Mohaw Canal east of Yuma, Ariz., and 5 pump ing plants on the C line canal of th Boise Project near Caldwell, Idaho relocation of 13.6 mi. of highway at Cas cade reservoir 16 mi. from Cascade Idaho; and buildings of various types a Shadehill Dam camp 13 mi. south o Lemmon, S. Dak., at Needles, Calif., an at Delano, Calif.

FIRST WATER FLOWS IN CALIFORNIA'S SECOND MOKELUMNE AQUEDUCT

CEREMONIES were held April 27 at Orinda Filter Plant for the 2nd Mokelumne Aqueduct built by East Bay Municipal Utility District (see *Western Construction News* for March 15). This water traveled entire line, although during construction cross-connections shunted water from completed sections to parallel 1st Aqueduct. *Western Construction News* Editor, right foreground; R. C. KENNEDY, EBMUD assistant chief engineer and assistant general manager, leaning on rail.

$9 Million Asked for Arizona Highway Work

UNDER CONSIDERATION thi month by the Arizona Highway Com mission is a 1949-1950 budget calling fo $9,000,000 in new money for road con struction and improvement in Arizona These are funds that will become avail able immediately after the start of th next fiscal year on July 1, and do no include $5,067,000 budgeted for admin istration purposes, engineering an maintenance work, etc. Of the new money, $5,100,000 will be federal aid money, divided as follows: state primary roads, $2,109,000; secondary roads, $2, 000,000, and urban roads, $1,200,000. In addition to the new money, several mil lion dollars worth of construction con tracted during the last year will be con tinued.

In presenting the proposed budget W. C. Lefebvre, state highway engineer said the state could look forward to considerably greater highway progress dur ing this year than it was possible to ac complish last year when road construc tion was slowed because of the unavail ability of federal funds.

In setting up the new budget each year, Arizona's highway commission and engineer have the counsel of the Arizona Statewide Highway Planning Committee, consisting of 14 members, one from each county in the state. This committee provides assistance by advising on the allocation of available road money by

Continued on page 111

HOW a — LINK-BELT SPEEDER Will Boost Your PRODUCTION

Back of every Link-Belt Speeder design feature is a wealth of experience which says, "This principle assures efficient action and freedom from trouble. Hence—this principle protects the profits by avoiding excessive operating and upkeep expense".

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routes. Before beginning work on the budget, the entire commission and engineer made a state-wide tour to inspect proposed major projects so as to thoroughly familiarize themselves before discussion. The new budget will be finally adopted before June 30.

"Just Settlement" For Flooded Land

INDIAN TRIBES on the Fort Berthold, N. D., reservation, to be flooded out by the reservoir at the now partially-completed Garrison Dam, will receive a "just settlement" for loss of their lands. But the public lands committee of the U. S. House of Representatives is still trying to define the "just settlement" in terms of dollars.

Under terms of a contract approved last year by the Army Corps of Engineers and the three affiliated tribes on the reservation, the Indians would have received $5,105,625 outright but also would have retained the right to sue for additional money before the court of claims. Now, in an evident attempt to settle the controversial question without further litigation, Representative Lemke of North Dakota has introduced a measure that would give the tribes in addition to the contract figure above $3,000,000 as a land readjustment fund and $6,500,000 as additional indemnifying compensation. Under the Lemke measure, the $14,605,625 would be a final settlement and the Indians would have no further right to sue for additional money.

The Indians are now claiming the sum provided under the original contract with the Army Engineers is far from sufficient to recompense for their losses, but Maj. Gen. Lewis A. Pick, Chief of Engineers, testified that "nobody held any gun at the head of anyone to sign anything."

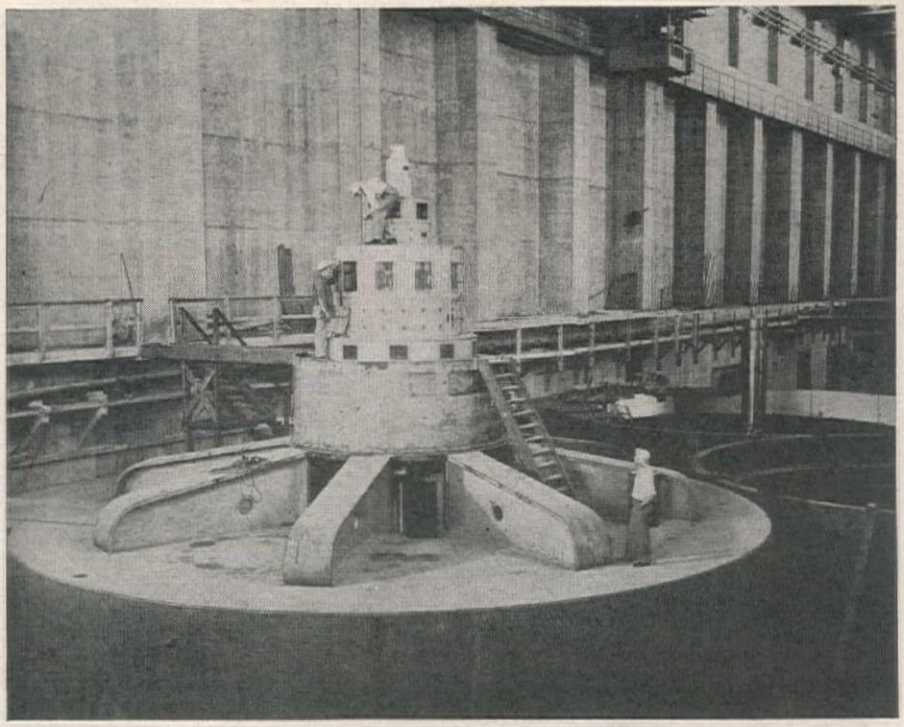
Utah Builder Completes Big Veterans' Hospital

VETERANS ADMINISTRATION this month opened its 128th hospital—a modern, 152-bed general medical and surgical hospital in Grand Junction, Colo.

The new six-story structure—erected by the Olson Construction Co. of Salt Lake City, Utah, at a cost of over $3,400,000—admitted its first patients exactly two years and three months after ground was broken on the 40-ac. site near the heart of town.

Included are a suite of operating rooms adaptable to any major surgical procedure; instrument washers that can clean and sterilize an entire set of surgical instruments in 15 minutes; a stainless steel kitchen with electrical equipment that does everything from peeling potatoes to washing and sterilizing dishes, and drinking fountains with knee controls for nurses with hands full of equipment.

The hospital also is equipped with small kitchens in each ward so that patients may get between-meal nourishment; a laundry capable of turning out 2,400 pieces of flatwork a day; a complete dental clinic, and Special Services facilities such as a recreation hall, library and chapel.



WORLD'S BIGGEST HYDROELECTRIC UNIT OPERATES AT GRAND COULEE

BUILT by Westinghouse Electric Corp., unit R-1 in the east powerhouse at Grand Coulee Dam was turned on May 20. The generator gives the power plant at the world's largest concrete dam the greatest installed hydroelectric rating in the world. Visible in the background is rotor shaft of unit R-2, and at right is the stator of unit R-3.

New Mexico Fights to Keep Two-Cent Gas Tax

OFFICIALS of the New Mexico Highway Department are fighting to retain a two-cent per gallon gasoline tax increase as opponents are trying to force a referendum on the issue to submit it for approval by a public vote. The state's attorney general has opined that the tax increase is not referable, but the fight continues nevertheless in the state's legislature.

New Mexico's Highway Engineer, Burton Dwyre, doesn't seem too worried about the possibility of a referendum but did point out the harm that removal of the source of revenue could do to the highway department's program. He stated that in 1949 and 1950 at least $9,000,000 in state funds would be needed to match federal grants of $16,100,000 on the state's customary 44-56 ratio. Before the tax increase, the department could reasonably expect to collect only $7,365,000 annually, but this would all be gobbled up by maintenance and operating expenditures, no state funds would be left to match federal funds, and the department would in effect become a maintenance organization. About $2,000,000 each year are expected to be realized from the new tax.

Revised Runoff

. . . Continued from page 91

cipitation occur. New run-off records will be established in scattered areas and flow of many streams is expected to be unusually high.

Utah

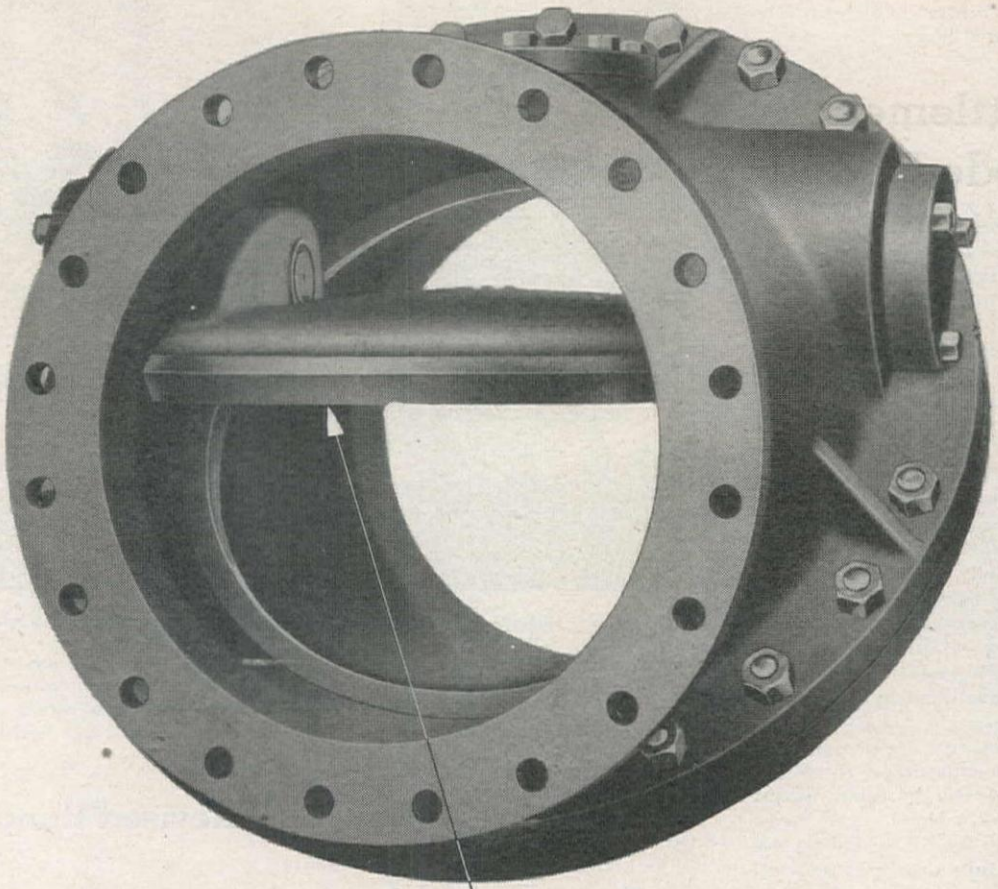
Prospects were not changed significantly during April. Most reservoirs are full or nearly full, but very little melting has occurred above 9,500 ft. Possibility of high water stages in some streams still exists, although April melting was orderly.

Washington

In line with prospects elsewhere in the Columbia River Basin, prospects for irrigation, power and navigation appear very good. High water is still possible in the Yakima and Wenatchee drainages, as heavy mountain snow packs still remain, notwithstanding the above-normal run-off during April.

Wyoming

Estimates of summer flow made in April have been reduced by 10 per cent, except for the Wind and Popo Agie rivers, for which a 15 to 20 per cent drop is expected. As in the other Rocky Mountain states, warmth and low precipitation characterized the April weather. Run-off was heavy. While this did not result in floods, later run-off will probably be reduced in consequence. Satisfactory reservoir storage reported in April is unchanged except for seasonal increases.



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Chapman Tilting Disc Check Valves are obtainable in either iron or steel. For complete information send for catalog No. 30.

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OBITUARIES . . .

James H. Davis, 62, Assistant State Highway Director of Washington for many years, died April 26 of a heart attack at his home in Olympia. Davis was a civil engineering graduate of Washington State College, and served with the Washington Department of Highways for 27 years as assistant director and during intervals as acting director.

* * *

John F. Kelsay, 57, with the Army Engineers for 16 years, died recently in Oregon City, Ore. He spent the years from 1914 to 1918 in Alaska, and was employed by the Oregon State Highway Commission from 1922 to 1925. From 1925 to 1933 he was the Klamath County Engineer, and from 1933 to his death was with the Army Engineers.

* * *

Marshall J. C. Andrews, 69, who surveyed the Great Northern Railroad eight-mile tunnel through the Cascade Mountains, died in Tacoma, Wash., April 28. He was Chief Engineer on the Great Northern line from Wenatchee to Oroville, and also assisted in surveys for Grand Coulee Dam and facilities of the Bonneville Power Administration.

* * *

Parker R. Lange, 56, Assistant Superintendent of construction with the East Bay Municipal Utility District of Oakland, Calif., died of a heart attack May 4. He was a graduate of Cornell University, and had been with the Utility District since 1941.

* * *

A. L. Cutler, 80, Denver, Colo., building contractor, died April 30 after a long illness.

* * *

Thaddeus Officer, 78, retired contractor and builder of Los Angeles, died April 28.

* * *

Clarence H. Thomas, 65, contractor in Alhambra, Calif., for 31 years, died May 7.

Asphalt Institute Has First San Jose Forum

LATEST INFORMATION on the uses of asphalt was made available to many California city and county engineers and road supervisors at the first San Jose Asphalt Forum held May 19. William A. Bugge, Managing Engineer of the Pacific Coast Division of the Asphalt Institute, sponsors of the San Jose Forum, was chairman for the one-day meeting and guided the lively discussions. Among the principal speakers were Norman Angell, President of the Asphalt Institute, who spoke on the Institute's activities; Fred S. Scott, Union Oil Co., and James M. Lackey, the Asphalt Institute, who spoke on the manufacture, tests, and uses of asphalts; James B. Mullin, General Petroleum Corp., and John C. McLeod, Stancal Co.,

SPEAKERS were, l. to r., WILLIAM BUGGE, Pacific Coast Managing Engineer, Asphalt Institute; NORMAN ANGELL, Pres. of the Institute; and FRED SCOTT, Union Oil Co.

who spoke on emulsified asphalts; Donald E. Stevens, California Research Corp., Design of Asphalt Paving Mixtures; and C. V. Kiefer, Shell Oil Co., The Uses and Abuses of Seal Coats.

After a presentation of the papers, an open forum on recent developments in the asphalt world brought out many new problems and their solutions. The discussions included modern airport design and the jet-plane problems incurred in the hot, high-velocity jet exhausts, effects of spilling aircraft fuel, airfields for light planes, asphalt curbs and gutters for highways, and subsealing Portland cement concrete pavements.

Report Favors Higher Northwest River Jetty

A FAVORABLE report has been made on the proposed improvement at the mouth of the Quillayute River in Washington in the interest of shallow draft navigation.

In view of the importance of the Quillayute River as a harbor of refuge and base of operations for fishing and other small craft, it is recommended by the Corps of Engineers that the easterly jetty be raised from the present 5 ft. to a height of 15 ft. above mean lower low water, with a crest 10 ft. wide. It is also recommended that the existing project channel be dredged to a depth of 10 ft. below mean lower low water, enlarged to 100 ft. wide and to extend from deep water in Quillayute Bay upstream for 2,000 ft. A mooring basin is recommended to extend upstream from the project channel for a distance of 2,400 ft. The width of the Boat Basin will vary from 300 to 425 ft., and it will be dredged to a depth of 10 ft. below mean lower low water.

It is estimated that the first cost of this project will be $375,000 for new work, with $65,750 estimated for annual maintenance.

Idaho Highway Construction Plans to Take $14.4 Million

PLANS for $14,469,000 in highway and bridge construction in Idaho this summer have been blueprinted by the Idaho State Bureau of Highways. Two biggest items in the proposed work are $889,000 in emergency relief projects, a result of spring floods, and a $1,500,000 bridge across the Clearwater River at Lewiston. The emergency relief projects are mostly on the North and South Highway and the Lewis and Clark Highway in central Idaho.

Greatest portion of the new construction will be federal aid projects. Presently under contract in Idaho are construction and repair projects totaling $4,273,280.

DUMPCRETE HAULS CONCRETE FOR BRIDGES ON ROUGH ARIZONA ROADS

H. L. ROYDEN, contractor of Phoenix, Ariz., on a remote bridge job at Big Sandy Wash on the Wickenburg-Kingman highway in Arizona, is using 2-cu. yd. Dumpcrete bodies mounted on trucks to haul centrally-mixed concrete over rough construction road. The mix is chuted directly into the bridge forms from the lightweight bodies, which have a low enough center of gravity to make the rough travel possible.

PERSONALLY SPEAKING

R. J. Newell, Regional Director for the Bureau of Reclamation at Boise, Idaho, who first went to work for the Bureau in 1903 when it was less than a year old, will retire from Government service on July 1. Newell is 69 years old, seven years beyond the usual retirement age for Government employees. He became Regional Director in 1945 when Frank A. Banks resigned to devote full time to construction on the Columbia Basin Project. First employed by the Department of Interior in 1903 in what was then the infant Reclamation Service, he left the Bureau in 1908 to take on several engineering assignments with private organizations in Idaho. After serving with a group of engineers who investigated flood control in China, he reentered the Bureau in 1923 and served as construction engineer on major projects in Oregon and Idaho. When the Bureau was reorganized into regions in 1943, he was named assistant regional director to Banks in the Columbia River Basin and became regional director in 1945. In this capacity, he has been in charge of all the postwar planning and construction work of the Bureau in the Columbia Basin and was also the second chairman of the Columbia Basin Inter-Agency Committee.

Newell's successor as Regional Director at Boise will be **Harold T. Nelson,** employee of the Bureau for 13 years and presently assistant regional director. Nelson was first appointed as a junior engineer in 1936, coming from the engineering faculty of Montana State College. He was construction engineer on the Roza Division of the Yakima Project in Washington and was transferred to Boise as assistant regional director in 1946.

* * *

James E. Morrison, formerly of the Seattle city water department and later superintendent of utilities and city engineer for Renton, Wash., recently was chosen city manager of Ellensburg, Wash. The council-manager form of city government was adopted by the Ellensburg citizens at a special election held last August.

HAROLD T. NELSON

Brig. Gen. Samuel D. Sturgis, Jr., took over on May 20 the duties of Division Engineer, Missouri River Division, for the Corps of Engineers. A veteran of World War II with a long service record in Corps of Engineers' river development work, General Sturgis was accompanied to Omaha, Neb., from Washington, D. C., by **Maj. Gen. Lewis A. Pick,** whom he succeeded in the Missouri Basin. As Division Engineer, General Sturgis is charged with carrying out the Corps of Engineers part of the Pick-Sloan Plan for flood control, irrigation, power development, and other public uses of water resources for the Missouri Basin.

* * *

H. H. Roberts has accepted the position of Chief Engineer for Consolidated Builders, Inc., at Detroit Dam, near Mill City, Ore. His previous assignments include: Chief Engineer for Ozark Dam Constructors, Bull Shoals Dam, Ark.; member of the firm of Moffatt, Nichol & Roberts, Engineers, Los Angeles; Chief Engineer for Contractors, Pacific Naval Air Bases, U. S. Naval Advance Base Depot, Port Hueneme, Calif.; Engineer for Guy F. Atkinson Co., Neah Bay Breakwater and Mud Mountain Dam, Washington; Engineer for Mason Walsh Atkinson Kier Co., Grand Coulee Dam; and Engineer for Stone & Webster Engineering Corp. on the Rock Island Dam, Wash.

* * *

Clarence Decker, Assistant City Engineer of Great Falls, Mont., since 1948, has been appointed City Engineer of Kalispell by the Kalispell city council, as of June 1. He was with Corwin & Co., Great Falls consulting engineers, from 1944 to 1946, and then spent two years in Alaska on military construction jobs. Before 1944 Decker spent several years with the Montana State Highway Department.

* * *

R. P. Newland, formerly Washington State Highway District Engineer in Spokane, will go to Olympia to join the staff of the department there. Newland was Maintenance Engineer for the Montana State Highway Department before coming to Spokane. At the end of Governor Arthur B. Langlie's first administration he left the Spokane office to work for the Portland Cement Association.

* * *

Samuel E. Vickers, City Manager of Vallejo, Calif., will take office July 1 as City Manager of Long Beach, it was announced by B. W. Chace, Mayor of Long Beach. Vickers will succeed **Carl B. Wirsching,** who is leaving the position because of war wound disabilities.

* * *

Walter Norton is the owner of a new ready-mix concrete plant at Yuma, Ariz., known as the Arrow Concrete Co. **Homer Hanson,** formerly with Stewart Construction Co., is in charge of the plant.

* * *

Raymond D. Nixon, Superintendent of the Trinidad, Colo., municipal light and power department, took on addi-

BRIDGE-PLANNER TUDOR TO ORGANIZE ARMY BRIGADE

RALPH A. TUDOR, Colonel in the Engineer Reserve and Chief of the Division of San Francisco Bay Toll Crossings, is shown receiving formal notification of his selection to command a Brigade of Engineers in California, fourth of twelve to be established throughout the United States and largest in the Engineer Reserve program. The brigade will be composed of construction, port and aviation groups and battalions as well as service and maintenance units, and is being sponsored by the California Department of Public Works at the request of the Army. Shown at the notification proceedings in Governor Warren's office are, left to right: COL. DWIGHT JOHNS, South Pacific Division Engineer; COL. FRANK WILLIAMS, Unit Instructor at Sacramento; C. H. PURCELL, California Director of Public Works; GOVERNOR WARREN; BRIG. GEN. FREDERICK BUTLER, Commanding Officer of the 6th Army's Central District; COL. TUDOR; MAJ. GEORGE O'BRIEN, Engineer Instructor at Large, and COL. HARRY ANDERSON, Department Engineer.

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A few case histories picked at random from thousands of field reports speak for themselves . . .

Case History No. 2
CATERPILLAR DIESEL TRACTOR D-8

After 4,000 hours on a heavy duty motor oil, engine was due for overhaul. Changed to CIRCLE © Motor Oil, and full power was restored. Desired engine performance continues to date at 4,720 total hours.

Case History No. 3
KENWORTH TRUCK (CUMMINS NH ENGINE)

After using CIRCLE © Motor Oil 74,600 miles, engine was inspected at 270,100 miles with original liners and pistons. Maximum liner wear .003" to .0055". Ring wear after 162,000 miles negligible. No ring groove deposits or piston varnish.

Case History No. 41
KENWORTH TRUCK (GENERAL MOTORS 6-71 DIESEL)

Run 45,000 miles on heavy duty oil using "premium" diesel fuel; 7 piston rings were completely stuck, ports on one side half to fully plugged; heavy air box deposits. Changed to CIRCLE © Motor Oil. At 60,900 miles, using "regular" diesel fuel, all rings free, pistons, air box and ports clean and engine producing maximum power.

Case History No. 14
15 DIVCO TRUCKS (CONTINENTAL ENGINES)

Door-to-door delivery service. Engines failing at 15,000 miles with premium-type motor oil. Change to CIRCLE © Motor Oil cleaned up engine deposits in 3 drains and extended life an additional 14,000 miles to date.

CIRCLE © Motor Oil is designed especially to counteract harmful deposits caused by high sulphur content characteristic of West Coast diesel fuels. It does this because it contains new-type additives, never before obtainable. Results are equally superior in preventing deposits due to adverse operating conditions in gasoline and butane equipment.

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tional duties as City Manager of that city. He was recently appointed by the city council, and will continue to act as power and light superintendent.

* * *

Luce F. Martin, Missoula, Mont., veteran engineer for the U. S. Public Roads Administration, was honored recently upon his retirement by a dinner attended by the Montana Contractors Association and state officials. Among the guests at the Helena dinner were **Gov. John W. Bonner,** State Highway Engineer **C. E. Stahl,** and former State Highway Engineer **Scott P. Hart.** Martin will retire June 30 after nearly 30 years with the PRA.

* * *

George Shearer, Washington State Highway District Engineer at Vancouver, will again serve as District Engineer in Seattle, it was announced by State Highway Director **O. R. Dinsmore** recently. Shearer will replace **Walter Winters,** now with the Asphalt Institute in Denver. **D. D. Forgey,** Construction Engineer in Seattle, will replace Shearer in Vancouver as District Engineer.

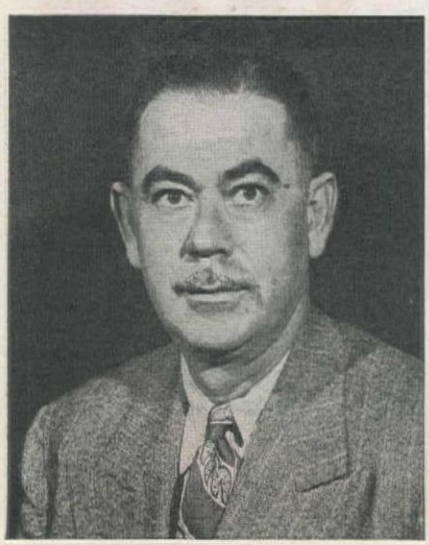
* * *

Lawrence L. Lee, formerly Assistant Chief Engineer of the Salt River Valley Water User's Association in Arizona, has joined the A. O. Smith Corporation of Phoenix, Ariz., as Sales Engineer and Hydraulic Consultant.

* * *

Donald S. Walter takes over June 15 as Regional Engineer for the Bureau's Pacific Northwest headquarters at Boise. Walter is currently construction engineer in charge of completing Anderson Ranch Dam in southwestern Idaho, and was previously in key positions at Hoover Dam, Friant Dam and Grand Coulee Dam. He replaces **Grant P. Gordon,** who resigned to accept a position with the Guy F. Atkinson Co., contractors of San Francisco. Gordon joined the Bureau in 1927 and became Regional Engineer in 1947. His resignation was effective May 15.

DONALD S. WALTER



SUPERVISING THE JOBS

ELMER CROSS

Elmer Cross is the superintendent for Hanrahan Young & Nelson, Inc., subcontractors to Morrison-Knudsen Co. for structures on the Delta-Mendota Canal near Tracy, Calif. **Red Cameron** is assistant superintendent and **Jonas A. Sandstrom** is concrete superintendent. Carpenter foremen include **Lester Mueting, Alva Dawson, John A. Boykins, George A. Jourdenais, Howard Holmes** and **Don Fentless.** Other foremen are **Richard W. Graeber** and **John A. Murphy. H. W. Russell** and **Leonard Bates** are inspectors for the Bureau of Reclamation.

* * *

K. O. Taylor is the superintendent, **C. E. Pehl** is project manager and **G. W. Saul** is assistant superintendent for Bechtel Corporation and Morrison-Knudsen Co., Inc., on the construction of Big Creek Powerhouse No. 4 for the Southern California Edison Co. in Madera County, Calif. **G. E. Crippen** is the job engineer, **W. G. Phelps** is field engineer and **R. L. Phillips** is office engineer. Other assistant superintendents are **Bud Snowball, C. T. Miller** and **C. H. Barnett. V. O. Berstler** is master mechanic and **G. Van Ostrand** is chief-of-party. **F. M. Hampton** is the job office manager and **C. H. Eliason** is paymaster.

* * *

Paul Christian is the general superintendent and **I. L. Gebhard** is project manager for Everist Construction Co., Westley, Calif., on construction of 6.3 mi. of canal on the Columbia Basin project in eastern Washington. **J. T. McKee, Jr.,** is the job engineer, and **Wes Rogers** is concrete lining superintendent. **George Yast** is excavation superintendent.

E. W. Duhame Co. of Phoenix, Ariz., have under construction a number of major structures in and around Phoenix. **Carl Smith** is the firm's superintendent and **Bert Owen** is foreman on construction of the Newberry Store at Mesa. Smith is also supervising construction of a building for a branch of the Valley Bank in Phoenix. **Roy Sanders** is the superintendent on construction of a telephone exchange building in Mesa, and also at the Kraft Cheese Company building in Phoenix. Bert Owen is also supervising construction of a brewery in Phoenix.

* * *

D. W. Griffith is general superintendent and **W. A. "Bill" Choate** is general foreman for Judson - Pacific - Murphy Corp., Emeryville, Calif., subcontractors for work on a steel bridge north of Fresno, Calif. **Ray Jipson** is in charge of riveting work. **T. J. Dunn** is resident engineer for the California Bridge Department. Erickson, Phillips and Weisberg of Oakland, Calif., have the general contract for the bridge at $652,064.

* * *

Frank S. Young, for many years with the West Construction Co. and Morrison-Knudsen Co. as assistant superintendent and foreman, and later with the Army Engineers in Alaska as general foreman on Shemya and Attu Islands, is now located in Kingman, Ariz., where he is incapacitated with a hip injury. He was for a time a foreman on the Davis Dam Project until unable to continue work.

* * *

George Britton is superintendent on all construction for S. J. Cook, contractor of Los Angeles. Principal projects under construction by the firm include the Union Avenue School, a $220,000 job, and the Crescent Heights School, both in Los Angeles. **C. F. "Russell" Hanvelt** is carpenter foreman on the former job, and **Jim Murray** is carpenter foreman on the latter.

* * *

Morris D. Plumer is superintendent for Frank Pinkerton, contractor of Corona, Calif., on the $350,000 contract for a new auditorium being built at the Union High School in Brawley, Calif. **Guy B. Oetty** is carpenter foreman on the job and **Virgil Rogers** is labor foreman.

* * *

Adolph Bauer is the superintendent for A. Teichert & Son, Sacramento, on construction of the Owens Dam Flood control project for the Army Corps of Engineers near Merced, Calif. **Ben**

Aguistapace is master mechanic and Barney Carter is carpenter foreman. Charles Homan is foreman and Ed Nelson is the job office manager. For the Army Engineers, William Clark is resident engineer, Ed Young is assistant resident engineer and Robert Burk is in charge of the testing laboratory.

* * *

Frank Bell is the superintendent for B & R Construction Co., San Francisco, on construction of a $262,000 reinforced concrete school at Martinez, Calif. Jim Wade is the carpenter superintendent, and John Carhart is the labor foreman. Bell was with Morrison-Knudsen for two years before joining the B & R construction firm.

* * *

Earl Gregg is the superintendent and J. C. Sheeley is project manager for J. H. Wier & Son, Inc., who have the $307,781 contract for construction of the substructure of an Idaho State Highway bridge at Lewiston. Foremen on the job are Ted Pape, Glen Fuson and Aaron Brown.

* * *

On construction of new school buildings in Brawley, Calif., O. L. Carpenter, contractor of San Diego, Calif., has Rupert Goff, superintendent on construction of the Myron Wilter School and Hadalgo School, and E. N. Wear superintendent on construction of the Barbara Worth School.

* * *

Russell F. Long is superintendent for Mark Cockrill Co. of Phoenix and Jack Slough is general foreman on construction of the sewage disposal plant at Mesa, Ariz. The firm also has a contract for 6 mi. of 24-in. sewer line in Mesa and Edward Hallmark is in charge on this job. William F. Kopfler has charge of engineering for Yost & Gardner of Phoenix on the job.

* * *

D. G. Hall is superintendent and W. J. Darkenwald is project manager for the Morrison-Knudsen Co. and M. H. Hasler joint-venture construction on the Delta-Mendota Canal near Tracy, Calif. George Adair is paving superintendent, and Art Grey and James Ricker are the job engineers. John Garman and Rip Edwards are general foremen. Other foremen include "Swede" Hall on the paver and Mel Stoddard on excavation. Frank King is the job office manager and G. "Bart" Bartlett is purchasing agent.

* * *

Chips Sarmento is superintendent and Alvin Sarmento is foreman for S. F. Amoroso Construction Co., San Francisco, on reinforced concrete work for the Calif. Div. of Highways and located on Oak St., between Gough and Franklin Sts., in San Francisco.

* * *

Ray Darnell is project manager for Darnell-Askevold Construction Companies for the cableway at Goshen-Palisades Dam in Idaho. The $585,516 contract was let by the Boise office of the Bureau of Reclamation. David B. Simon is general superintendent, Thomas P. Judge is engineer, and Roland Kephart is assistant engineer on the job.

* * *

Charles Kollerer is general superintendent for Cahill Bros. Construction Co., San Francisco, on construction of a new planetarium being built by the Calif. Academy of Science in Golden Gate Park. The job will probably be completed by March, 1950.

* * *

T. G. Moore is superintendent and B. B. Armstrong is project manager for Armstrong & Armstrong on grading, paving, curb and gutter work at Roswell, N. Mex. under a $301,000 contract.

* * *

L. E. Ridnour is master mechanic for the Utah Construction Co., San Francisco, on construction of the Kennecott Copper Co. copper refinery to be located at Garfield, Utah. When completed this plant will be the first of its type in the West, refining copper concentrates to commercial metal.

* * *

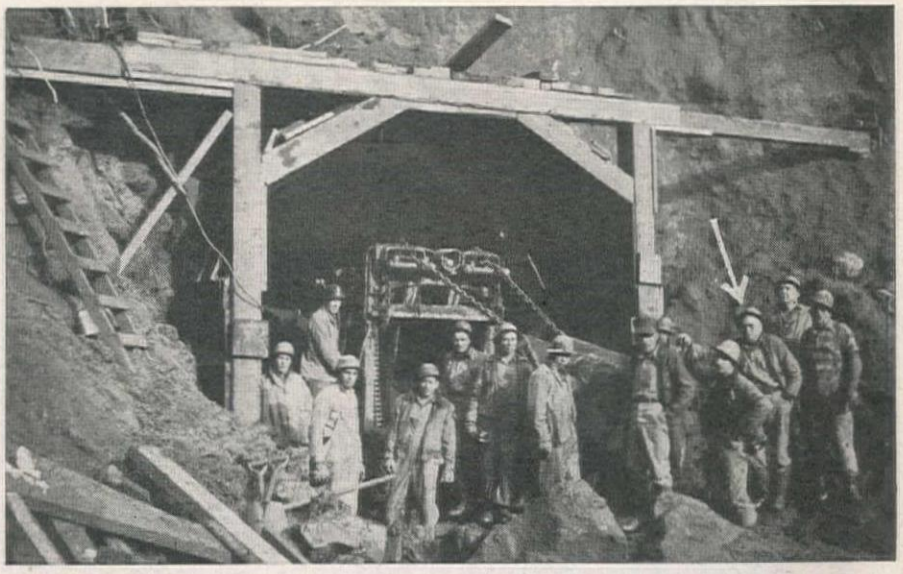
Earl Barnard is the superintendent for John Delphia, who has the subcontract for excavation work on a portion of the Delta-Mendota Canal near Tracy, Calif. Foremen are Lee Goodson and Bill Hogue.

* * *

Vincent Kelly is the project manager for Brown-Ely Co. of Corte Madera, Calif., for street improvements in Corte Madera. Frank W. Aitken, Jr., is resident engineer on the job.

* * *

Milt Woodland is superintendent for Olof Nelson Construction Co., Las Vegas, Nev., on construction of storm drain sewers in Las Vegas. Foremen on the job are Ed Pearson and Archie Hadlock.



PAUL C. GUINN, arrow, Superintendent for The Arundel Corp. and L. E. Dixon Co., and more popularly known by many tunnel men as "The Bunyan," holed through his 55th tunnel at the Toketee Falls Hydroelectric Project, 85 mi. east of Roseburg, Ore., for the California Oregon Power Co. Assisting were ROY SKAGGS, ROSS EDDINGTON, and this crew.

CONSTRUCTORS on Los Angeles' Hyperion Treatment Plant job are, l. to r., W. E. "HANK" BOUCK, batch plant Superintendent for Guy F. Atkinson; AL NEMITZ, Job Superintendent for Atkinson on primary settling filter, drier, and fertilizer storage building; and ROY J. GRUENDLER, Project Manager for Newbery Electric Co.

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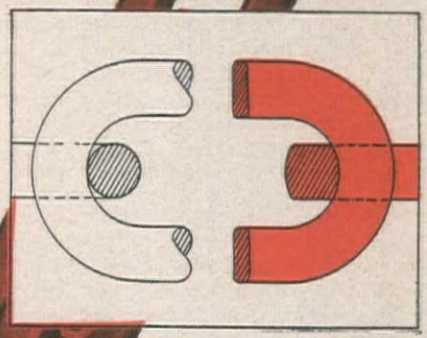

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NEWS BRIEFS

JOBS LIMITED AT HUNGRY HORSE—Employment at Hungry Horse Dam in Montana will reach a peak this summer, but no labor shortage is anticipated. In fact, the problem of the contractors is to keep job-seekers from flowing in. Local union men get the available jobs first and unemployment of construction men in the vicinity reached 2,000 early this spring.

$7,000,000 COLUMBIA BRIDGE PROPOSED—A resolution has been introduced in Congress to allow the Federal government to bear $3,500,000 of the cost of a $7,000,000 bridge across the Columbia River between Pasco and Kennewick, Wash., to provide access to the atomic energy plant at Hanford. The bridge would replace the present 2-lane highway bridge across the river.

NEW GENERATORS SLATED AT HOOVER DAM—Arizona has designated November, 1952, and January, 1953, as scheduled time for completion of two new generators at Hoover Dam, and the Bureau of Reclamation has requested an appropriation of $4,645,000 for construction of the 82,500-kw. generators. Power from the generators would be delivered by the Bureau over its Davis Dam distribution system to the Arizona cities of Phoenix, Tucson and Yuma.

REHABILITATION OF TIETON DAM SCHEDULED—Repairs to the spillway, stilling pool and downstream channel at Tieton Dam at Rimrock Lake near Yakima, Wash., will be carried out this summer. Concrete in the spillway of the 28-year old dam is crumbling badly, necessitating repair, and a portion of the retaining wall and floor of the stilling pool collapsed some years ago during a period of heavy discharge over the spillway. The stilling pool and transition into open channel will be excavated to solid rock and capacity of the existing channel will be substantially increased.

TOO MANY WORKERS AT DETROIT DAM—Employers at Detroit Dam on the North Santiam River near Salem, Wash., are urging, "Don't go to Detroit to find a job!" Large numbers of men will not be required at the damsite for at least six months, and possibly until 1950. But construction workers are already trekking to the site in their house trailers so that parking space is at a premium.

TALE OF A CURIOUS CAT—Curiousity has killed another cat, and also left some Arizona and Nevada communities without power from Hoover Dam generators for an hour. This caticide occurred when the inquisitive pussy climbed aboard a transformer bank in the Hoover powerhouse and short-circuited 16,500 volts. It took a week to repair the damage. The singed feline is probably telling some "power"-ful big stories in cat-heaven.

DREDGING OF PORTLAND HARBOR BEGINS—Dredging of the harbor at Portland, Ore., to a depth of 35 ft. began last month under direction of the Army Corps of Engineers. Initial work is being financed by funds left over from this year's appropriation for maintenance dredging, although the Engineers are certain the Secretary of Army will approve an advance of $350,000 from the Port of Portland Commission for the work. About 3,000,000 cu. yd. of material must be removed, requiring three months.

LOS ANGELES FIGHTS FOR RIGHTS TO COLORADO WATER—Furor continues within the ranks of the directors of the Metropolitan Water District of Southern California, managers of the Metropolitan Aqueduct which brings Colorado River water to Southern California communities. Two months ago, the directors voted to postpone action on an application from Pomona and other neighboring communities of Los Angeles for admission to the District. Now, a bill is on its way to the California Legislature that would limit Los Angeles to a maximum of 12 votes of the 29 on the board of directors. The bill is claimed as a

:prisal against Los Angeles since a majority of the directors om that city voted against the Pomona application. Los ngeles' representatives are claiming their section is being isenfranchised since Los Angeles' taxpayers subsidized 65 er cent of the cost of the aqueduct.

WATER WILL DIG GARRISON DAM PILING IOLES—A new pile-driving system is being tried at Gar- ison Dam, Army Engineers' huge structure on the Missouri iver in North Dakota. The method uses water forced into he earth under 200-lb. pressure and at a rate of 1,400 gal. er min. to open up a hole. Mud is then pumped down the haft to keep sand from filling it and the piling is dropped nto the mud, dropping 20 ft. under its own weight. A 110-ft. riving tower is being used to sink as high as fifty 110-ft. iling daily.

ARIZONA ASKS FOR BRIDGE CANYON DAM POWER—In a letter to Secretary of Interior Krug, the Arizona Power Authority formally applied for the entire utput of power from the proposed Bridge Canyon Dam on he Colorado River, which would be a key structure of the Central Arizona Project. The letter contended that Ari- ona's share of power from Parker, Davis and Hoover dams vas inadequate even to meet present needs.

REPORT OUTLINES TRANSMOUNTAIN DIVER- SION IN COLORADO—The preliminary draft of a report by the Bureau of Reclamation on the proposed Blue-South Platte Project in Colorado and federal agencies. The project would divert 430,000 ac. ft. of Colorado River water across the Continental Divide for use in the Missouri River Basin and would require a tunnel 18.4 mi. long. Three reservoirs having a combined capacity of 549,000 ac. ft. would be required on the eastern slope of the Rockies to regulate the flow and store the water. The amount of water would be charged to Colorado's allocation of 3,885,000 ac. ft. of water from the river fixed by the recent approval of the Colorado River Basin Compact.

WEBB COMPANY SELLS ARIZONA HOUSING PROJECT—Pueblo Gardens housing project in Tucson, Ariz., one of the nine largest such developments in the coun- ty, has been sold by the Del E. Webb Construction Co., its constructors, for about $3,000,000 to the Central Housing Investment Corporation of New York. Before the sale, 700 of the planned 3,000 residences had been completed. The Webb company retains the water company which serves the subdivision and will also construct a huge shopping center in the immediate future.

A COMPREHENSIVE SURVEY is under way of the Idaho highway system by the Public Administration of Chi- cago, Ill. Idaho's legislature, in its recent session, set up a highway interim committee and appropriated $50,000 for the study of the state's highway system at all levels. First phase of the investigation is being conducted in Chicago using material gathered in a preliminary study by state forces. It will be several weeks before actual field work is under- taken by the Chicago firm and before a report can be made to the interim committee.

PRESSURE-WELDING OF RAIL FOR CASCADE TUNNEL BEGINS—Four miles of rail in Great Northern Railway's 7.79-mi. Cascade Tunnel in Washington will be pressure-welded into continuous line. The company is re- placing this length of 110-lb. rail with 115-lb. stock. An Oxwald pressure-welding machine is welding the new rail into sections a quarter-mile long and these are being moved into the tunnel on flatcars coupled together. Continuous rail will be installed in the remainder of the tunnel in 1950.

SEVEN COMPANIES AT DETROIT DAM—A previ- ous release on the combine of contractors awarded the $28,- 230,509 general contract for construction of Detroit Dam on the North Santiam River in Washington contained only five of the total seven firms who are joining for the con- struction. Actually, Consolidated Builders, Inc., is a combine made up of all the following firms: General Construction Co., Seattle; J. F. Shea Co., Alhambra, Calif.; Kaiser En- gineers, Inc., Oakland; Walsh Construction Co., San Fran- cisco; Utah Construction Co., San Francisco; Pacific Bridge Co., San Francisco, and Bates & Rogers Construction Corp., San Francisco.

Contracts . . .

Summary of Major Construction Contracts Awarded Last Month

One of the largest highway contracts in California's history was awarded last month when **Guy F. Atkinson Co.** and **Charles L. Harney,** 575 Berry St., San Francisco, were awarded the $2,819,379 contract for highway grading, construction of three grade separation structures and two undercrossings, a pedestrian undercrossing, lighting and traffic signals, etc., on the Bayshore Freeway in San Francisco County, between Augusta St. and 25th St. About 1.3 mi. of the freeway are to be graded and paved with Portland cement concrete on cement treated subgrade and plantmix surface on cement treated base. The separation and undercrossing structures will be of steel and concrete.

Fredrickson & Watson Construction Co., 873 - 81st Ave., Oakland, Calif., were awarded a $1,337,819 contract for 3.3 mi. of grading and paving with Portland cement concrete on bituminous treated subgrade and construction of grade separation structures on the Eastshore Freeway between the south city limits and High St. in Oakland.

Goodfellow Brothers, Inc., Wenatchee, Wash., were awarded a $871,589 contract by the Washington Highway Department for grading, draining and surfacing with bituminous penetration macadam and constructing a reinforced concrete girder bridge along 4.4 mi. of State Highway No. 2 in Douglas County, Wash.

Award of a $618,289 contract to **Peter Kiewit Sons' Co.,** Longview, Wash., for grading, surfacing and oiling 21 mi. of the Willamette Highway between Oak Ridge and Odell Lake in Oregon has been recommended by the U. S. Public Roads Administration.

A $1,107,646 contract was awarded to joint-venturers **United Concrete Pipe Corp., Ralph A. Bell** and **Westbrook and Pope,** 2331 Fair Oaks Blvd., Sacramento, Calif., by the California Division of Highways for highway improvements in Place County between Auburn and Applegate. About 6.1 mi. of 4-lan divided highway are to be graded, and two reinforced concret overhead structures over the tracks of the Southern Pacific C are to be constructed.

S. J. Groves & Sons Co., Minneapolis, Minn., were awarded $503,161 contract by the Montana State Highway Departmen for grading, graveling, draining and roadmix oiling of 8.2 m of the Conrad-Shelby Road in Toole County, Mont.

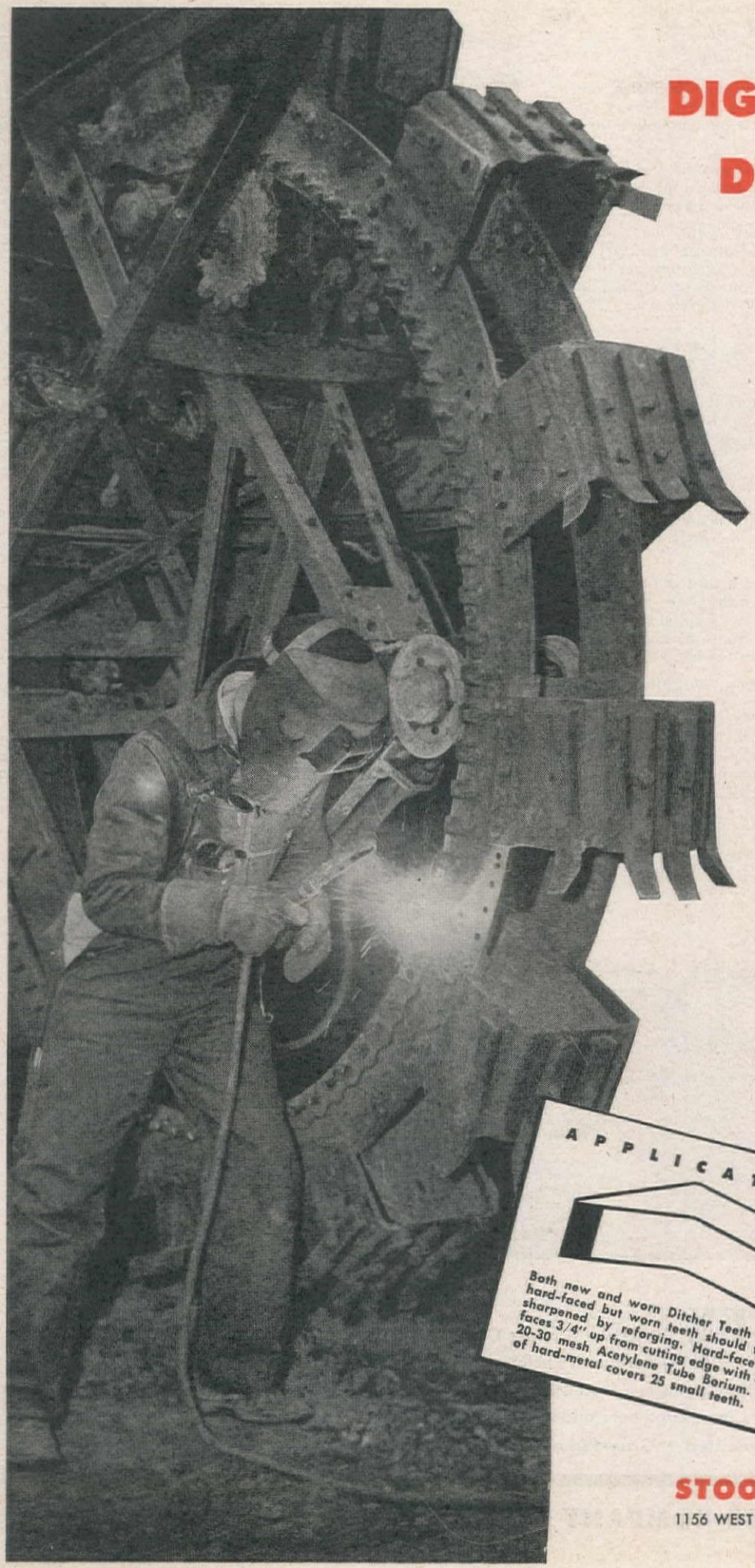
Hess Construction Co., Inc., P. O. Box 5003, Long Beach, Calif was awarded a $507,088 contract by the Public Roads Adminis tration for improvement of approximately 6.4 mi. of Forest High way No. 68-E, near Mill Creek in San Bernardino County.

Two large contracts were awarded last month by the Colorad State Highway Department. **Peter Kiewit Sons' Co.,** 4149 Soutl Denver Station, Denver, Colo., was awarded a $392,769 contrac for the grading, surfacing and oil processing of 15.8 mi. of Stat Highway No. 59 from the Baca County line to near the town of Springfield. **Brown Construction Co.,** 1530 East Abriendo Pueblo, Colo., was awarded a $284,244 contract for construction of an overpass and grading and concrete paving on 0.6 mi. o State Highway No. 1 near the north city limits of Colorad Springs.

N. Fiorito Co. of Seattle, Wash., was awarded a $368,227 contract by the Washington State Highway Department for the grading and paving with Portland cement concrete of 3.8 mi. o State Highway No. 2 in King County.

A number of additional large contracts were awarded by the California Division of Highways last month. Among the larger awards were the following: To **J. E. Haddock, Ltd.,** 3538 East Foothill Blvd., Pasadena, the $467,770 contract for improvement of 4.3 mi. of highway on Rosemead Blvd. in Los Angeles; and to **J. R. Armstrong,** Box 216, El Cerrito, the $305,382 contract for grading and plant mix surfacing of 5.6 mi. of Route 107 near Walnut Creek in Contra Costa County.

Peter Kiewit Sons' Co., Longview, Wash., was awarded a $2,589,133 contract by the City of Portland, Ore., for construction of the Peninsula Tunnel Unit of the Intercepting Sewer and Sewage Treatment Project for the city. The tunnel will



DIG *fast...* DIG *deep...* DIG *long!*

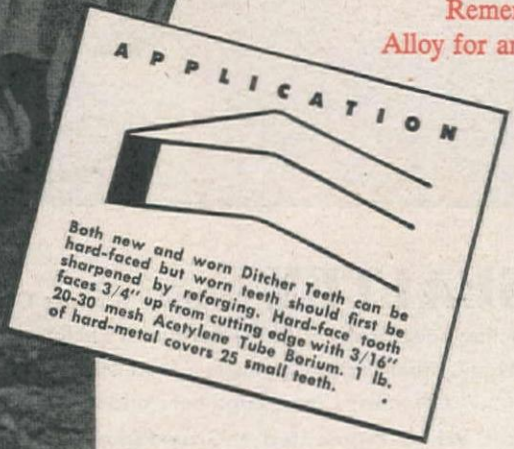
TUBE BORIUM

keeps ditcher teeth sharp, out-to-size, on the job

Keeping the teeth sharp on a ditch digger was quite a dental problem for one operator until he discovered Tube Borium. Now he reports 40 times longer service from a single hard-facing, and teeth are tipped a second and even a third time, with additional savings.

Drive sprockets and driving lugs on the bucket wheel are two other good bets for hard-facing. Simply weld a few ounces of Stoody Self-Hardening to the pressure faces. It quickly restores tooth size and shape and generally doubles service life over similar unprotected parts.

Remember, there's a Stoody Alloy for any wear problem involving abrasion, even when combined with impact, corrosion or heat.



STOODY COMPANY

1156 WEST SLAUSON AVENUE, WHITTIER, CALIFORNIA

connect with the St. Johns, Columbia Slough and Columbia Blvd. units of the project, which are already completed.

Ventura Pipe Line Construction Co., 901 Olive St., Ventura, Calif., was awarded a $597,140 contract by the U. S. Bureau of Yards and Docks for construction of about 5 mi. of water distribution pipelines with storage and pumping facilities, and about 3 mi. of natural gas pipelines at the U. S. Naval Air Missile Test Center at Point Mugu, Calif. Construction time is 240 calendar days.

Stockton Construction Co., Box 2087, Stockton, Calif., was awarded a $491,800 contract by the City of Fresno for construction of the Jensen Avenue Collector Sewer in Fresno.

Stanley H. Koller, 1694 Pomona St., Crockett, Calif., was awarded the $572,387 contract by the East Bay Municipal Utility District at Oakland for construction of a raw sewage pumping plant and grit chambers and installation of machinery and equipment in the District's new building at 34th and Wood Streets in Oakland.

Macco Corp. and **Morrison-Knudsen Co., Inc.**, 14409 South Paramount Blvd., Clearwater, Calif., were awarded a $3,245,375 contract by the San Francisco District, Corps of Engineers, for construction of a rubble breakwater approximately 1,700 ft. long, removal of pinnacle rock, repairs to existing breakwater and stockpiling stone for future maintenance at Crescent City in Del Norte County, Calif.

Hinman Brothers Construction Co., Box 517, Fort Collins, Colo., was awarded a $2,727,792 contract by the Bureau of Reclamation for construction of Platoro Dam on the San Luis Valley Project. The earthfill dam will be located on the Conejo River about a mile upstream from the town of Platoro.

San Diego Gas & Electric Co. has awarded a contract to **Utility Construction Co.**, 9830 Atlantic Ave., South Gate, Calif., for construction of approximately 51 mi. of 16-in. welded high pressure gas line from the San Diego County line to Mission Valley in San Diego. Approximate cost of the project is $2,500,000.

With a bid of $8,947,520, a joint venture firm consisting of **Guy F. Atkinson Co.**, 223rd St. and Santa Fe Ave., Long Beach; **A. Teichert & Son, Inc.**, P. O. Box 1113, Sacramento; **Bressi & Bevanda Constructors, Inc.**, P. O. Box 439, North Hollywood, Calif., and **David G. Gordon Co.**, Denver, Colo., was awarded the contract by the Los Angeles Department of Water and Power for construction of Tunnels 1, 2 and 3 and Surge Chambers 1, 2 and 3 on the Owens Gorge Project in Mono County, Calif. The three tunnels will be of 10-ft. diameter, and their lengths will be 37,200 ft., 10,400 ft. and 16,400 ft. respectively.

The largest contract yet approved for a canal building job on the Columbia Basin Project in eastern Washington was awarded last month to **J. A. Terteling & Sons**, Boise, Idaho. For $8,029,762, the firm will construct a 16¾-mi. extension to the East Low Canal, the 6½-mi. Rocky Coulee Wasteway and two earthfill dikes to protect the canal structures from seasonal run-off water.

The general contract for construction of seven 3-story apartment buildings and a community building was awarded by the Board of Trustees at the University of Denver to **N. G. Petry Construction Co.**, 3144 Navajo St., Denver, Colo. Estimated cost of the project is $2,000,000. The buildings will be located at 2000 E. Evans Ave. in Denver.

R. J. Daum Construction Co., 1002 W. Coal Ave., Albuquerque, N. Mex., with a bid of $2,881,114, was awarded the contract by the Albuquerque District, Corps of Engineers, for construction of a steel frame industrial type building at Sandia Base near Albuquerque.

Barrett & Hilp, 918 Harrison St., San Francisco, with a bid of $2,269,488, was awarded the contract for construction of Franklin High School at the end of East Miner Ave. in Stockton, Calif. The buildings will all be of reinforced concrete construction, one and two stories. Facilities will include 28 classrooms, auditorium, theater, cafeteria, four gymnasiums, a library building, and four shop buildings.

Swinerton & Walberg, 225 Bush St., San Francisco, were awarded the $1,500,000 contract by Western Electric Co. of New York City for construction of a one-story reinforced concrete distributing plant building on East 40th St. in Denver, Colo.

Trewhitt-Shields & Fisher, 926 Parallel Ave., Fresno, Calif., were awarded a $1,078,600 contract for construction of a two-story and basement reinforced concrete hospital building at Tulare, Calif.

Work has begun on a $5,000,000 housing development project in the West Charleston area of Las Vegas, Nevada. Owner and contractor is L. G. McNeil, president of the **McNeil Con-**

Cut Labor Costs up to 90%

You too.. can grow Bigger, Better crops for less, with Concrete Pipe

MADE RIGHT IN YOUR OWN DISTRICT

Farmers everywhere tell us that concrete irrigation pipe has cut their labor costs from 75 to 90 per cent. And also —
Cut down on their pumping charges . . .
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struction Co., 5860 Avalon Blvd., Los Angeles. The project will cover 240 acres.

MacDonald, Young & Nelson, 351 California St., San Francisco, were awarded the general contract by Lucky Stores, Inc., for construction of a warehouse and office building on a 15-ac. site in San Leandro, Calif. Estimated cost of the project is $1,500,000.

Williams & Burroughs, Inc., and **Carl N. Swenson Co.**, 10 California Drive, Burlingame, Calif., were awarded the general contract at $2,570,715 by the California Department of Public Works for construction of a receiving and treatment unit, a bakery-commissary unit and an administration building at the Camarillo State Hospital at Camarillo, Calif. The building will be of reinforced concrete construction.

With a bid of $1,140,452, **F. E. Young Construction Co.**, 2141 Main St., San Diego, was awarded the contract for construction of a new hospital building for the Pioneer's Hospital District at Brawley, Calif. The building will be of reinforced concrete, 88-bed capacity.

The Regents at the University of California in Berkeley have awarded the general contract for construction of a steel and concrete addition to the physics building on the Berkeley campus to **Parker, Steffens & Pearce**, 135 South Park St., San Francisco, at $716,800. Total cost of the project will be $987,814.

Empire Construction Co., 344 Harriet St., San Francisco, was awarded a $742,000 general contract by the California Division of Architecture for construction of reinforced concrete power house, shops and a physical education building on the San Francisco State College campus. Total cost of this portion of the project will be $886,224.

Mountain Fuel Supply Co., 36 South State St., Salt Lake City, Utah, will begin construction soon on a 20-in. natural gas pipeline between Salt Lake City and Coalville, Utah. Cost of the project is estimated at $1,750,000.

A $4,900,413 contract has been awarded by the U. S. Department of the Interior to **W. A. Smith Co.** and **Brown & Root, Inc.**, Houston, Texas, for rehabilitation of 144 mi. of railroad between Potter and Clear in Alaska. The work includes right-of-way widening, grade raising, track laying, culvert renewals and bridge rehabilitation.

TRADE WINDS

News of Men Who Sell to the Construction West

Western Distributor News Round-up

D. G. Gibson, General Manager of CONSTRUCTORS EQUIPMENT CO. of Denver, Colo., announces the appointment of **W. M. Irwin** to the firm's sales staff. He will headquarter at Colorado Springs. Other changes in the sales staff include the transfer of **Leon Bartram** from Casper, Wyo., to Grand Junction, Colo., and the transfer of **J. A. Clay, Jr.,** from Colorado Springs to Denver, where he will handle industrial and government sales. The firm was recently appointed distributors for T. L. Smith Co. of Milwaukee, Wis.

☆ ☆ ☆

BOEHCK ENGINEERING CO., INC., of Houston, Texas, have been appointed as distributors to handle sales and service of Warco motor graders and Hercules road rollers in the Houston territory for the W. A. Riddell Corp. of Bucyrus, Ohio. **E. R. Boehck** is president of the Houston firm and **John A. Beck** is vice-president.

☆ ☆ ☆

RAY CORSON MACHINERY CO. of Denver, Colo., have been appointed distributors for the equipment lines of Marion Power Shovel Co., Davey Compressor Co., Lewis-Browning Manufacturing Co. of San Antonio, Texas, Sicard Industries, and Chem-Therm Manufacturing Co. of Pasadena, Calif. **Herman Klipsfel** has been named to the company's sales force and will make his headquarters at Pueblo, Colo.

☆ ☆ ☆

THE STANDARD MACHINERY CO. of San Francisco announces the appointment of **E. J. Marriott** to their sales staff. Marriott was formerly a partner in the firm of Tamco of San Francisco. Previous to this he was chief engineer for Gallagher-Toftman Corp., San Francisco. During the war he was a mechanical engineer in the Corps of Engineers.

☆ ☆ ☆

THE CATE EQUIPMENT CO. of Salt Lake City, Utah, have appointed **Jack Yoksh** to their sales staff. Yoksh spent eleven years for Gardner-Denver Co. in both South America and on the West Coast and is a graduate of Colorado School of Mines. The company was recently appointed distributors for Chain Belt Co., for whom they will distribute conveyor equipment and other products.

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ENGINEERING SALES SERVICE, INC., of Boise, Idaho, have been appointed distributors for the construction equipment lines of the C. S. Johnson Co. and the Oliver Corporation.

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The COAST EQUIPMENT CO. of San Francisco announces the appointment of **W. F. "Bill" Reed** to their sales staff.

☆ ☆ ☆

Vern Taylor, formerly with Caterpillar Tractor Co., has joined the sales staff of THE LANG CO. of Salt Lake City, Utah.

Garn Carter was recently appointed by the firm to handle sales in southern Utah.

☆ ☆ ☆

MERRILL-BROSE CO. of San Francisco have been named LaPlant-Choate distributor for Northern California, according to **E. R. Galvin,** Executive Vice-President and General Sales Manager of LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa. Their territory includes that part of California north of and including the counties of Mono, Madera, Fresno, and Monterey. In addition to the LaPlant-Choate line, The Merrill-Brose Co. is also distributor for Bucyrus-Erie, Browning Crane and Shovel Co., Leschen Wire Rope, The Yeoman Brothers Co., Cleaver Brooks Co. and others.

GLYN WHITE, left, La Plant-Choate Western representative, and GEO. B. BROSE, vice-president of Merrill-Brose Co.

☆ ☆ ☆

H. W. MOORE EQUIPMENT CO. of Denver, Colo., were recently appointed distributors for the equipment line of La-Plant-Choate Manufacturing Co.

☆ ☆ ☆

LIBERTY TRUCK & PARTS CO., of Denver, Colo., have been appointed distributors for the construction equipment line manufactured by Hetherington & Berner, Inc.

☆ ☆ ☆

J. R. (Joe) Whalen, has been appointed Asst. Sales Manager of PETERSON TRACTOR & EQUIPMENT CO., San Leandro, Calif. He has been with this company for the past five years. He worked in the parts department for three years and for the past two years has handled floor sales.

☆ ☆ ☆

E. A. ALTSHULER & ASSOCIATES, Western manufacturer's agents located at Los Angeles, have added a marketing specialist and advertising designer to their staff to give manufacturers a more complete service in the promotion and sales of their products. The firm feels that growing competition in the light construction industry demands closer integration of sales, marketing and merchandising and promotion of their product. Specialty of the firm is the introduction and promotion of architectural products in the eleven Western

States. Offices are located at 1605 Cahuenga Blvd., Los Angeles.

☆ ☆ ☆

George C. Elliott is now sales representative for CALAVERAS CEMENT CO. in the Fresno, Calif., area. He is headquartering in the Fresno Builders' Exchange. Before joining the Calaveras sales staff, Elliott was in the construction business in Fresno.

☆ ☆ ☆

Manufacturer Activity in The Pacific Northwest

Robert E. Blasen, formerly lieutenant colonel in the U. S. Army Corps of Engineers and more recently an application engineer for WESTINGHOUSE ELECTRIC CORP., at Seattle, Wash., has been appointed sales manager for the company at Spokane, Wash. As Spokane manager, he succeeds **H. B. Hodgins,** who has headed sales activities for Westinghouse in Spokane since 1943. Hodgins has been transferred to Salt Lake City, Utah, as sales manager there.

☆ ☆ ☆

R. L. Frazier is the new manager of the Spokane, Wash., office of JOY MANUFACTURING CO.

☆ ☆ ☆

Earl Rouse has been assigned field representative for UNION WIRE ROPE CORP., Kansas City, Mo., in Washington, Oregon and western Montana. Rouse, a graduate of the firm's thorough-going training school in its factory, laboratory and offices, will work out of the Portland,

TRADE WINDS

ROUSE BEDFORD

Ore., branch office where **C. D. Schooley** is District Manager. **D. L. Bedford,** also a graduate of the firm's sales engineer training school and who has worked in every department of the company culminating in his appointment as Chief Metallurgist, has been transferred to the sales department. He will headquarter in Sacramento, Calif., and will serve the states of California and Nevada as sales representative.

☆ ☆ ☆

The new location for industrial truck sales and service of HYSTER CO. in Seattle, Wash., is 753 Ninth Ave., according to **Ray Ronald,** Western Division sales manager. Territory covered by the Seattle store includes most of Washington, northern Idaho and western Montana. The store is one of several new Hyster distributorships located in various parts of the United States.

☆ ☆ ☆

California Manufacturers Expanding Activities

Expanding of facilities in the West Coast plant of U. S. MOTORS in Los Angeles is under way to add some 38,000 sq. ft. of space. One building of rigid type steel frame construction containing 20,000 sq. ft. of floor area has been completed and is being used for warehousing completed motors and for shipping. A second unit of the same type of construction is being completed to contain 18,000 sq. ft. of floor area and house a machining department for processing gear cases, Varidrive motor frames, adapter brackets, motor brackets and vertical motor parts. The U. S. Motor plant now occupies almost a square city block at 200 East Slauson Ave. in Los Angeles.

☆ ☆ ☆

NATIONAL SCREW & MANUFACTURING CO. OF CALIFORNIA has opened a new and modern plant at 3423 Garfield Ave. in Los Angeles. Specialty products of the company are headed and threaded fasteners.

☆ ☆ ☆

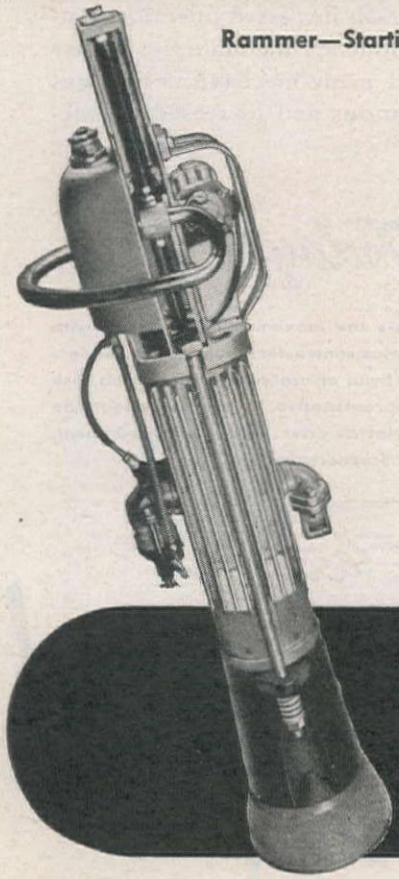
Elevation of two executives to corporate vice-presidential posts and appointment of a third as a divisional vice-president has been announced by **Harold Boeschenstein,** president of OWENS-CORNING FIBERGLAS CORP., Toledo, Ohio. **L. R. Kessler** was named vice-president of the

EASY, INEXPENSIVE SOIL COMPACTION

The New BARCO RAMMER

Rammer—Starting

Rammer—Jumping



The new Barco Rammer is faster and more effective than any other type of tamper. It is easier on the worker, enables him to get more work done in less time, and at *lower cost.* Although rollers may do the compaction on large projects, they cannot reach locations close to abutments, culverts, walls and so on. But the new Barco Rammer remedies this situation, gives specified compaction. On large backfill tamping where a ditcher is used, the Barco Rammer works quickly and effectively. Today, with Federal, State and City authorities, as well as private corporations devoting more and more attention to these problems, the best answer is the Barco Rammer —the *entirely new* machine with the *entirely new method* of securing soil compaction. For more information write Barco Manufacturing Company, 1819 Winnemac Avenue, Chicago 40, Illinois. In Canada: The Holden Co., Ltd., Montreal, Canada.

BARCO

GASOLINE RAMMER

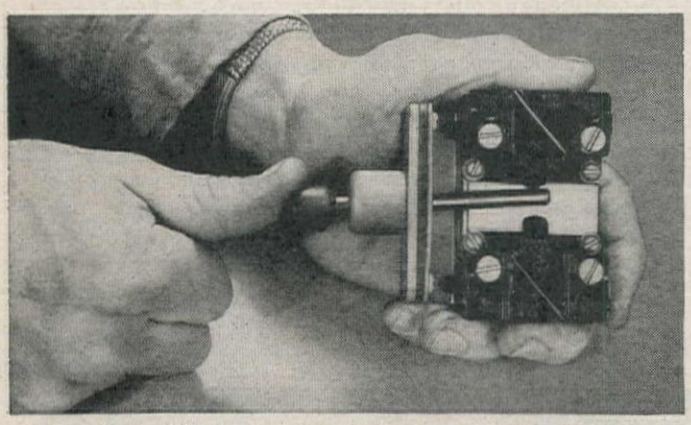
FREE ENTERPRISE—THE CORNERSTONE OF AMERICAN PROSPERITY

maneuvering a monster...

Electrically

New LeTourneau Scraper Moves 16-ton Loads at Touch of a Button

Control panel of LeTourneau's Model "C" Tournapull; a fingertip movement instantly applies power to motors which steer the vehicle, operate hoist, apron or tailgate.



Two General Electric switchettes make up switch assembly on control panel, above. Other G-E switches limit travel on steer, hoist, apron and tailgate motions by cutting power at the proper instant, eliminating stresses and strains.

The trend toward electrification of construction equipment has even invaded the mobile-tool market; witness the giant earth mover with electric power-steer and electrically operated hoist, apron and tailgate. Contractors using this new tool will move more yards per day at lower cost per yard because the electric drive offers fast, accurate, effortless control. This means instant response, quick reversal, increased operator comfort and efficiency. Gone are the multiple, clumsy manual controls and many mechanical linkages which slowed operations and increased maintenance costs.

Ask him Today!

Electric drive, which offers the maximum in reliability with minimum maintenance, helps contractors build more for less . . . faster. Whether you build or use construction tools, ask your General Electric representative to tell you about the inherent advantages of electric drive. *Apparatus Department, General Electric Company, Schenectady, N. Y.*

Electrified Construction
BETTER PRODUCT
LOWER COST

GENERAL ELECTRIC

660-3

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities

corporation and general manager of the Pacific Coast Division with headquarters at Santa Clara, Calif., where a new Fiberglas plant, now under construction, is scheduled to start production next month. **Ben S. Wright** was appointed vice-president of the corporation and general sales manager with headquarters in the Fiberglas general offices in Toledo. **W. C. Winterhalter** was named vice-president and sales manager of the Pacific Coast Division, located in Los Angeles. Production at the Santa Clara plant will include, at the outset, Fiberglas thermal and acoustical insulation. It is contemplated that facilities there will be expanded to produce Fiberglas mats used principally for pipe wrap and roofing. This will be the first of the firm's plants to be located in the West.

☆ ☆ ☆

Promotion of **J. D. Potter** as an Assistant Treasurer of COLUMBIA STEEL CO., West Coast subsidiary of United States Steel Corp., has been announced by **E. H. Daniel,** Treasurer. Potter will remain at Columbia Steel's Los Angeles office where he has been Credit Representative for the firm's Southern District.

☆ ☆ ☆

ESSICK MANUFACTURING CO. of Los Angeles has entered into a sales, operating and financial alliance with T. L. SMITH CO. of Milwaukee, Wis. **Bryant Essick,** President of the Los Angeles firm, has been elected a Director of the Milwaukee company and the Essick firm has acquired a substantial block of the T. L. Smith common stock. No change is contemplated in the management or the policies of the T. L. Smith Co., and Essick will be active in the Smith Company only in an advisory capacity. Essick and **Harold E. Smith,** President of the Smith Company, jointly state that there is no intention of consolidating the two firms, both of which distribute their equipment nationally through retail machinery distributors. However, inasmuch as the lines are non-competitive, cooperation and unification of sales efforts are already being started. The Essick company manufactures a well-known line of evaporative air coolers in addition to its line of small construction machinery equipment. T. L. Smith Co. recently began manufacture of the largest heavy duty concrete mixer in the world (see New Equipment Section). Large specialized equipment of this sort and concrete truck mixers are its principal products.

☆ ☆ ☆

H. B. Hodgins, Manager at Spokane, Wash., since 1943, has been transferred to Salt Lake City as Manager of Sales Activities for the WESTINGHOUSE ELECTRIC CORP. He succeeds **Stanley M. Johns,** Salt Lake City Manager since 1944, who has been transferred to Los Angeles to manage sales activities in the Southern California area.

☆ ☆ ☆

Emmett G. Simmons has been appointed District Manager of THE LeROI COMPANY, with headquarters in San Francisco. He replaces **William Bancroft** who has joined the sales staff of LeROI-RIX MACHINERY CO. of Los Angeles. Simmons was formerly district manager of the Denver territory for The LeRoi Company.

☆ ☆ ☆

Stanley M. Johns, native of Los Angeles and recently manager of the Salt Lake City, Utah, office for the WESTINGHOUSE ELECTRIC CORP., has been named manager for Westinghouse in the Southern California area. Johns succeeds **Walter G. Willson,** Westinghouse manager at Los Angeles since 1942, who for reasons of health has requested and been granted a transfer to Phoenix, Ariz., as manager there.

☆ ☆ ☆

William C. Hagens has been appointed wholesale manager for WHITE MOTOR CO. in the San Francisco area. He has been with White for a number of years, having served in the retail outlets at Los Angeles, Salt Lake City, Utah, and Portland, Ore. At the same time, **Joe C. Knapp,** formerly with the Los Angeles branch office, and more recently in the San Francisco branch sales department, is transferred to Portland to take over the combination wholesale and retail assignment. Hagens has been managing in that city.

☆ ☆ ☆

Frank B. DeLong, vice-president in charge of sales for COLUMBIA STEEL CO., died at the wheel of his automobile on May 27 in Oakland, Calif. He had been a vice-president of the company since 1939.

☆ ☆ ☆

PACIFIC ELECTRIC MOTOR CO. opened a new 30,000-sq. ft. office and shop building on a 2-ac. site at 1009 Sixty-sixth Ave. in Oakland, on June 3. The plant layout has been made on a production line basis.

CONCRETE TERMITE DRILL CO., Pasadena, Calif., has moved to a new plant at 2086 Foothill Blvd. Extension, in the same city.

☆ ☆ ☆

Robert A. Olen, general manager of the FOUR WHEEL DRIVE AUTO CO., has announced the resignation of **Robert L. Koehler** as Director of Sales after twelve years of sales administration work with the company, and the appointment of **M. O. Stockland, Jr.,** as Koehler's successor with **G. F. DeCoursin** as Stockland's assistant. Koehler has become a partner in the FWD PACIFIC COMPANY of San Francisco with **Oscar E. Betow** and **John E. Battes,** both formerly connected with FWD. FWD Pacific Company has purchased the Los Angeles FWD sales and service branch and will distribute FWD trucks and allied equipment throughout California. Stockland, with the firm for 27 years, has been Koehler's assistant since the war.

☆ ☆ ☆

RICH STEEL CO. has opened a new plant and warehouse at 2435 E. 37th St., Vernon, covering 16,000 sq. ft. of floor

space, and including a drive-through entry and exit to make truck-loading simple. The company offers space for public storage of steel by manufacturers, in addition to its regular services.

☆ ☆ ☆

Firms Expanding in the Intermountain Region

GOODALL RUBBER CO. has opened a new branch sales office at 1033 Santa Fe Drive, Denver, Colo. **Henry Walker,** who has headed the Chicago branch for several years, will be in charge of the new facilities, designed to give prompt service to Goodall customers in the mountain country.

☆ ☆ ☆

W. R. Pavela, branch manager of the FRUEHAUF TRAILER CO. at Salt Lake City, Utah, has been advanced to the position of regional manager. In his new capacity, he will be in charge of Fruehauf activities throughout Utah, Montana, southern Idaho and Wyoming. He remains the branch manager at Salt Lake City.

R. A. "Bob" Fessenden, well known to motor carriers throughout the Northwest, has been appointed manager of the Fruehauf branch at Billings, Mont. Previously in the sales department, he succeeds **Marshall Norman,** who has been granted a leave of absence because of ill health. **Elmo Aagard,** another member of the organization at Billings, has been made a member of the trailer sales personnel.

☆ ☆ ☆

Manufacturing News From the East and Midwest Regions

E. W. Pat Smith has been named special assistant to the general sales manager of OWENS-CORNING FIBERGLAS CORP., New York City, according to **Ben S. Wright,** general sales manager. Until recently, Smith was vice-president for sales of Philip Carey Mfg. Co. He will work in his new capacity with Owens-Corning's branch offices and sales divisions on the distribution of Fiberglas products into industrial, building and related fields. The firm is expanding its product line and markets for its noncombustible, acoustical board and tile, roof insulation, duct installation and blowing wool, pipe covering, underground pipe wrap and related materials.

☆ ☆ ☆

John W. Humphrey has been elected to the presidency of the PHILIP CAREY MANUFACTURING CO., Cincinnati, Ohio, manufacturers of asphalt sheets, roofing, paints, etc. He was formerly executive vice president and joined the com-

TRADE WINDS

pany in October, 1948, after establishing an outstanding business record in the field of management with General Motors and others. **L. W. Clarke,** former general sales manager, was elected vice-president in charge of sales. He joined the firm in 1935.

☆ ☆ ☆

George M. Woods has been appointed manager of the Transportation Section Industry Engineering Department at WESTINGHOUSE ELECTRIC CORP., Pittsburgh, Pa. He has been associated with transportation engineering since he joined the corporation in 1911, and he succeeds **H. E. Dralle,** who has accepted a position with the Westinghouse Engineering and Service Department.

☆ ☆ ☆

Recent personnel changes in the sales department have been announced by LE ROI CO. of Milwaukee, Wis. **Thomas V. Shea,** formerly Eastern district manager, has been named general sales manager. With several years of experience with other construction equipment manufacturers, he succeeds **J. M. Dolan,** who is now vice-president and general sales manager of the Hydraulic Press & Equipment Mfg. Co. of Mt. Gilead, Ohio. **J. E. Heuser,** for many years in original equipment manufacturer and distributor sales, is now in charge of all industrial engine sales. Formerly representing Le Roi in the foreign sales department, **"Dick" Dutton** replaces Shea as eastern district manager.

☆ ☆ ☆

F. H. Boor, for more than 23 years Chief Engineer of Fairfield Mfg. Co., gear manufacturers in Lafayette, Ind., has announced his resignation from that company in order to devote his full attention to the technological study of gears, their designs and applications. Boor is the holder of several patents covering special tooth forms and gear cutters, and he is recognized as one of the foremost gear authorities in the country. Headquartering at 927 Highland Ave., Lafayette, Ind., his services are available for technological study of gear designs.

☆ ☆ ☆

J. P. Williams, Jr., Chairman of the Board of Directors of KOPPERS CO., INC., Pittsburgh, Pa., has retired from active management of the company. He has been actively associated with the company since 1920. He became President of the firm in 1933 and Chairman of the Board in 1944. **General Brehon Somervell** is currently President of the firm.

☆ ☆ ☆

LINCOLN ELECTRIC CO., Cleveland, Ohio, has announced the election of three additional members to its Board of Directors. The new directors are **G. F. Clipsham,** Assistant to the President; **William Irrgang,** Director of Plant Engineering, and **L. K. Stringham,** Director of Welding Development.

☆ ☆ ☆

Charles R. Tyson, president of JOHN A. ROEBLING SONS' CO., Trenton, N. J., manufacturers of wire products, announces the appointment of **Herbert D. Rathbun** as secretary and treasurer of the company. Rathbun has been with Roebling since 1938. He succeeds **Archibald W. Brown,** who recently retired after 47 years of serv-

TRADE WINDS

ice with the firm and remains on the board of directors. Tyson also announced the appointment of **Clarence W. Snyder** as comptroller and assistant secretary, and **H. Russell Brown** as assistant treasurer and assistant secretary.

☆ ☆ ☆

George L. Staudt has been appointed advertising and sales promotion manager of HARNISCHFEGER CORP., Milwaukee, Wis. He was formerly director of advertising for Standard Register Co. of Dayton, Ohio.

☆ ☆ ☆

Wade A. Eskridge, formerly district manager of oilfield territory with headquarters at Tulsa, Okla., has been appointed Service Manager of the TWIN DISC CLUTCH CO., Racine, Wis. His new duties will include supervision of Twin Disc factory branches and overall supervision of the firm's greatly expanded service program on clutches, marine gears and hydraulic drives.

☆ ☆ ☆

The FOUR WHEEL DRIVE AUTO CO. of Clintonville, Wis., recently announced the appointment of **M. O. Stockland** as Director of Sales. **Jack Kelly** was appointed District Sales Supervisor for the Southern California and Arizona territory and **F. H. Vivian** for the territory of Northern California and Nevada. Other recent appointments made at Clintonville include **Art Danly,** Advertising Manager, and **S. F. Wick,** in charge of Sales Promotion.

☆ ☆ ☆

Ralph G. Caouette has been appointed General Manager of the Pittsburgh Equitable Meter Division of ROCKWELL MANUFACTURING CO. Before joining Rockwell, Caouette was industrial engineer for Minneapolis-Moline Implement Co. at Moline, Ill., and he advances from the position of Manager of Industrial Engineering for all of the Rockwell plants.

☆ ☆ ☆

Dr. W. A. Bain, since 1947 assistant to the technical director of the KELLEX CORP., subsidiary of the M. W. Kellogg Co., and leading engineers in the field of nuclear energy, has been promoted to the post of Director of Chemical Research of that company.

☆ ☆ ☆

Walter Geist has been re-elected to his eighth term as President of the ALLIS-CHALMERS MANUFACTURING CO., Milwaukee, Wis. All officers and directors of the firm were also re-elected, including **Marshal L. Noel,** vice president and general sales manager of the Allis-Chalmers' tractor division, and **J. L. Singleton,** vice-president and director of sales for the company's general machinery division.

☆ ☆ ☆

John M. Palmer, sales manager of the Lee Clay Products Co., of Clearfield, Ky., was re-elected to the presidency of the NATIONAL CLAY PIPE MANUFACTURERS, INC., at the association's annual meeting in Chicago. **D. M. Strickland** of Atlanta, Ga., and **John D. Cook,** Chicago, were re-elected vice-president and secretary-treasurer, respectively. The one-day meeting featured discussions of the construction outlook as it affects the clay pipe industry and reports on the steps which

New FULLER TRANSMISSION OIL FILTER

Saves YOU Money on PARTS LABOR DOWNTIME

Fits standard, large SAE short length power take-off opening (six-bolt)

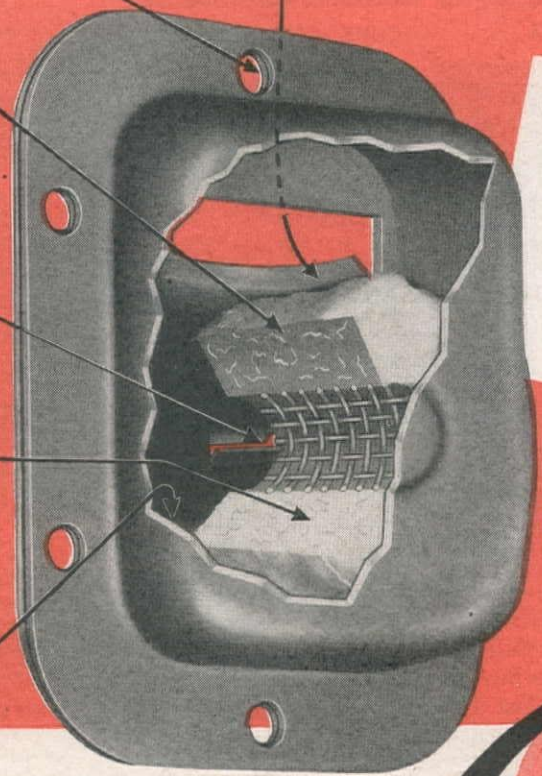
Pressurized oil circulation through filter

Removes grit, grime, metal chips and other abrasives

Oil returns to transmission case thoroughly cleaned

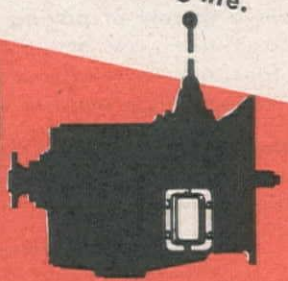
Replaceable filter element

Sump for heavy particles



by:

Removing grit and other abrasives, thus lengthening bearing and bushing life.



FULLER MANUFACTURING COMPANY, TRANSMISSION DIVISION
KALAMAZOO 13F, MICHIGAN
Unit Drop Forge Division, Milwaukee 1, Wisconsin

WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS)
1060 East 11th Street, Oakland 6, California

Fuller TRANSMISSION OIL FILTER

will be taken within the industry to meet anticipated increase in clay pipe demand. A 27 per cent increase in sewerage construction in the United States was cited as the reason for continued heavy demand for clay pipe during 1949.

☆ ☆ ☆

Correcting a former announcement, CHAIN BELT CO. of Milwaukee, Wis., announces the appointment of **William A. Clayton** as Eastern District Sales Manager for the Construction Equipment Division of the firm, rather than Eastern Sales Representative.

☆ ☆ ☆

F. A. Flodin, President of the LAKE SHORE ENGINEERING CO., Iron Mountain, Mich., has announced formation of a Conveyor Division of the company to manufacture and sell Tote-All and Coaltoter lightweight, power-driven portable belt conveyors for handling bulk and packaged materials. These machines were formerly manufactured by Material Movement Industries, Inc., Skokie, Ill. **Horton Conrad,** President of the latter firm, has been appointed to direct sales of the new Conveyor Division.

TRADE WINDS

☆ ☆ ☆

The appointment of **Charles E. Heywood** as Service Engineer of the ELASTIC STOP NUT CORPORATION OF AMERICA, Union, N. J., has been announced by **E. F. Nason,** General Sales Manager of the firm. Heywood was previously associated with the Chance Vought Division of United Aircraft as Standards Engineer and is widely known as a result of his years of service with the Headquarters' Staff of the Automotive Engineers.

☆ ☆ ☆

Harvey C. Fruehauf was elevated to the post of chairman of the board of directors and **Roy A. Fruehauf** was elected president at the annual meeting of the FRUEHAUF TRAILER CO. The new chairman, who helped build the Fruehauf company from a wagon blacksmith shop at the dawn of the automotive industry into the world's largest builders of truck-trailers, thus will share future management of the firm with his brother. A third brother, **Harry Fruehauf,** is first vice-president. Roy Fruehauf has served at virtually every executive level and has distinguished himself in a variety of capacities both in the field and in the production headquarters.

☆ ☆ ☆

George A. W. Bell, Jr., has been named district sales manager for SCHIELD BANTAM CO., INC., Waverly, Ohio, his territory to comprise the Western states. Bell has some 25 years of experience in the construction and machinery fields with both manufacturer and distributor organizations. Chief item to be distributed in the West will be the firm's one-third cu. yd. truck mounted shovel which features interchangeable booms and buckets. Bell will maintain headquarters at 35 Lewis Ave., Billings, Mont.

☆ ☆ ☆

Conway B. Briscoe, maintenance and construction engineer at the John F. Queeny plant of the Organic Chemical Division of MONSANTO CHEMICAL CO., St. Louis, Mo., has been appointed Director of Public Utilities for the City of St. Louis. He has received a leave of absence from Monsanto for the tenure of his appointment.

☆ ☆ ☆

HERCULES MOTOR CORP., Canton, Ohio, has opened a new factory sales and service branch in Odessa, Texas. The new outlet augments the factory branches and retail stores already in operation at Los Angeles and Houston and Kilgore in Texas. A complete stock of Hercules engine parts and power units will be maintained at the new store.

☆ ☆ ☆

C. Neal Barney, vice-president, secretary and general counsel of WORTHINGTON PUMP & MACHINERY CORP., New York City, passed away at his home on Scarsdale, N. Y., on April 24 at the age of 73. Barney joined Worthington as chief counsel and secretary in 1918; was appointed secretary-treasurer in 1932, and was elected vice-president and secretary in 1942.

☆ ☆ ☆

Edward L. Lockman has been named manager of tank lining and roll covering sales for UNITED STATES RUBBER CO., according to **Frank M. Urban,** merchandise director of the company's mechanical goods division. With U. S. Rubber since 1934, Lockman was assistant manager of these sales for eight years.

☆ ☆ ☆

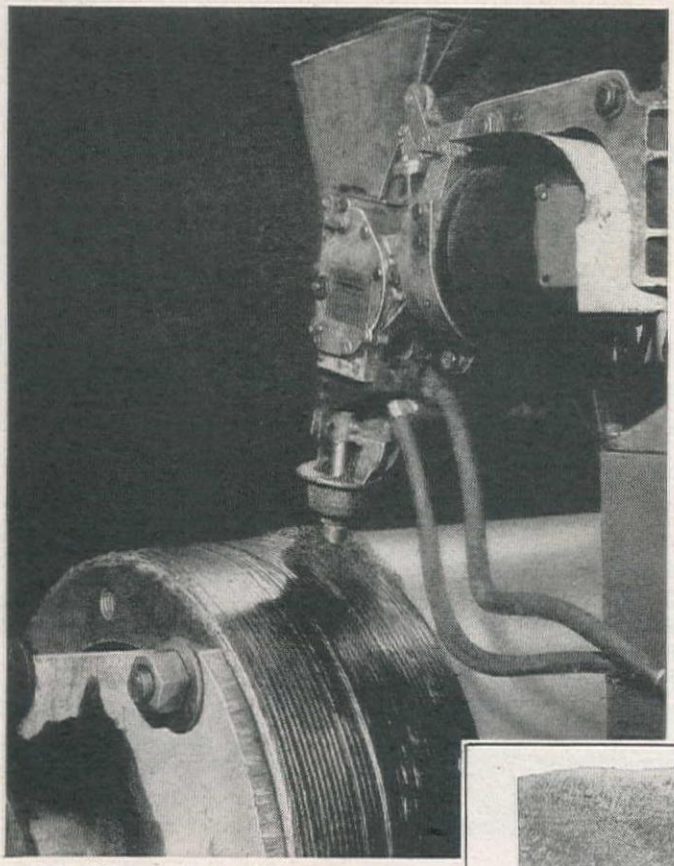
Amos Johnson, for many years a prominent figure in the welding industry, has recently joined the field sales department of STOODY CO., manufacturers of hardfacing alloys. He has been assigned to assist Stoody distributors in Minnesota and the Dakotas.

Give New Life to Worn Parts

. . . *Rebuild Them by UNIONMELT Welding*

This automatic process saves time and money—welding is fast—parts are returned to service quickly—new surface is often superior to original—

Almost any part that can be suitably positioned can be rebuilt by UNIONMELT welding. It has been used successfully on parts such as steel mill rolls, guides, mandrels, journals; wheels for locomotives, cars, and cranes; pipe molds, and press plungers and cylinders.



Rebuilding a 24 in. diameter press plunger.

Deposits of almost any thickness can be made of—

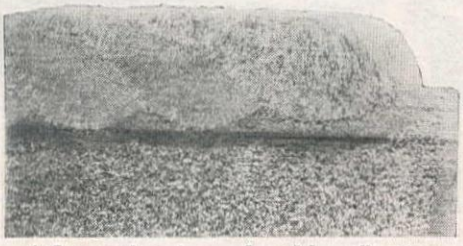
High carbon, flame-hardenable steels

Wear-resistant and hard-facing materials

Corrosion- and heat-resistant steels

With UNIONMELT electric welding, clean, dense, uniform weld metal can be deposited at the highest known welding speeds. There is no glare, flash, or spatter during welding. If a finished surface is needed, only minimum machining is required because of the smoothness of the weld deposit.

There are many LINDE methods of joining, rebuilding, forming, cutting and treating metals. LINDE Engineering Service can help you in production, construction, and maintenance. Just call the nearest LINDE office.



A flat surface is produced by offsetting each bead.

Linde
Trade-Mark

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

General Office: New York, N. Y. Offices in Other Principal Cities

In Canada: DOMINION OXYGEN COMPANY, LIMITED, Toronto

The words "Linde," and "Unionmelt" are registered trade-marks of The Linde Air Products Company

STAR PERFORMERS

★ ★ ★

The country's largest motorized circus employs a fleet of 40 GMCs to haul all its equipment . . . and these star performers deliver their valuable cargoes to daily destinations on exacting, pre-set schedules.

GMC trucks are preferred for tough, rugged going . . . they are given top billing by thousands of truck operators whenever the job calls for high level dependability and performance.

GMCs have won this acclaim because they are products of the world's largest commercial vehicle manufacturer . . . because they are built with truck engines and chassis . . . because they provide a full measure of everything truck owners and drivers want.

This goes for heavy construction transport, as it does for all other hauling. For here, as elsewhere . . . in engines, models and chassis types designed and engineered to meet the needs of every job . . . GMC performance is star performance—every time.

GMC TRUCKS

The Key to Greater Truck Value

GASOLINE • DIESEL

GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION

Arizona Acts

. . . Continued from page 91

ngineers, and those who are respon-
ble for budgeting. It is obvious that
me of the lowest rated roadways of
ie state are within urban areas, and this
often due to the volume of traffic more
ian the actual road condition. There-
re such projects are deferred in favor
f other highway projects that may have
higher rating, but which are more im-
ortant in the over-all picture than is
ie purely local situation.

This year it has been found that a
ting of 55 or under is relatively critical
nd the department is attempting to put
is year's new money on those projects
iat have ratings of 55 or under, if at all
ossible.

ot applicable to new roads

When studying the possibility of a
ew route, it is obvious that a rating
ould not apply because in that instance
iere would be no road except the one
pon which it would be necessary to
avel to get from one place to another.
here are several instances in the state
here cut-off roads to save considerable
ileage are under construction. In these
ases the procedure is to make an eco-
omic study of the necessity of such a
ut-off, or by-pass route, and arrive at
benefit ratio to determine whether or
ot such a road should be built.

daho's Mode

By JAMES REID
State Director of Highways
Boise, Idaho

THE FEDERAL law requires
hat routes and projects be selected in
onsultation with local authorities.
daho follows this requirement very
trictly and no project is advanced to
he construction stage without a con-
erence with the local authorities in-
olved.

The usual method is to hold a con-
erence with county commissioners and
ighway district commissioners at one
f their regular sessions. This usually
esults in the selection of priority ratings
or sequence of construction of projects
n their area. Little difficulty has been
xperienced in reaching a satisfactory
greement and unless the local board is
hanged by election or other causes, the
greed priority is seldom changed.

At the present time there are 36,226.6
ni. of road in Idaho, of which 24,835
ome under the county or highway dis-
rict administrations. In addition, 3,035
ni. of the state highway system come
nder the terms of the Federal Aid Sec-
ndary program. From 1934 through
943 approximately $4,424,495 of Fed-
ral funds were expended on secondary
oads.

In the years 1946 to 1948 expenditures
n the secondary system have amounted
o approximately $9,330,000 and of this
rogram approximately 60% has been
ompleted or is under contract.

Previous to 1938 secondary mileage was distributed throughout the state without benefit of definite policy, but in that year ratios were established, including four factors: (1) Area in farmland; (2) Rural population and population in towns of less than 1,000; (3) Value of farms and buildings; (4) Assessed valuation except for towns of over 1,000. These factors were applied to an agreed secondary road mileage of 3,386 mi. Traffic volume on these roads was distributed as follows: (1) Less than 50 vehicles a day, 826 mi.; (2) 50 to 99 vehicles a day, 1,101 mi.; (3) 100 to 499 vehicles a day, 1,238 mi.; (4) 500 and over vehicles a day, 221 mi.

The thickness of base and surfacing provided on these roads is decided on the basis of traffic volume, seasonal trucking of logs and other heavy materials and engineering factors. The state does not consider it economical to under-design secondary projects any more than primary roads.

Wyoming Way

By R. G. STAPP
Chief Draftsman
Wyoming Highway Department
Cheyenne, Wyoming

THE 1945 LEGISLATURE passed a bill for a "State-County Road Program." Its principal provision was that the State Highway Commission

should cooperate with the counties the state in the construction of coun roads including bridges and culverts. A such cooperative work is to be pe formed under the immediate control an supervision of the Commission and is be commenced promptly upon the re quest of the Board of County Commi sioners after they have entered int written agreement with the Highwa Commission. The work is considered a a supplement to Federal aid road pro grams in the county. Three-fifths of th construction expense is to be paid b the State Highway Commission an two-fifths by the county. Maintenanc after construction will be solely th responsibility of the county. The Legis lature made $600,000 available to sta the program, and established the prin ciple that the money should be divide among the counties in accordance wit the ratio of rural population of th county to the rural population of th entire state, and the total population o the county in relation to the total popu lation of the state.

The 1947 Legislature reaffirmed it belief in this program by making an other $600,000 available, but changing the percentage of county contributio to 25%. To date about sixty contract have been let for construction unde this program and the standards re quested by the county commissioner have been adopted in acceptance of th work, thus guaranteeing satisfaction i the local area. Costs have varied widely naturally, according to the requirement of the local situation, but the averag cost of these state-county roads ha been $4,390 per mi.

In Washington

By O. R. DINSMORE
Director of Highways
Olympia, Wash.

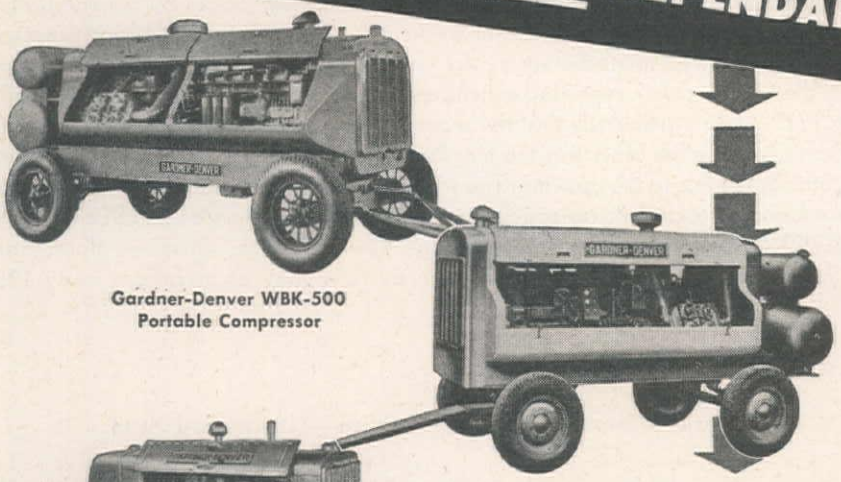
THE STATE of Washingtor is divided into six highway districts each under the supervision of a district highway engineer. The priority of proj ects is established at the district level This permits a more uniform construc tion program in the respective districts

A complete inventory of roadway and structure needs of the entire highway system was completed as of Jan. 1, 1948 This inventory listed all of the deficien cies of the existing highway system and estimated costs for bringing the system up to present design standards. Special project work sheets were used in deter mining the highway deficiencies and roadway and bridge needs. The esti mated highway revenue for a two-year period conforming to the period cover ing the legislative appropriations is divided between the various districts on the basis of their actual needs as com pared with the needs of the entire state, for programming purposes.

The factors considered in determining priority are as follows: condition of the existing traveled surface; excessive maintenance costs; traffic congestion; accident record; number of deficien-

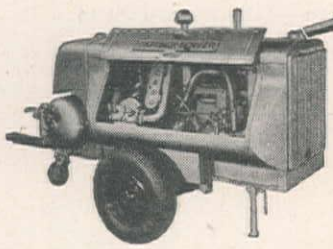
Continued on page 156

AN ALWAYS DEPENDABLE AIR SUPPLY . . .



Gardner-Denver WBK-500 Portable Compressor

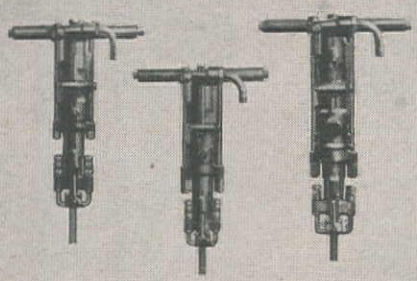
Gardner-Denver WHF-210 Portable Compressor



Gardner-Denver WHD-105 Portable Compressor

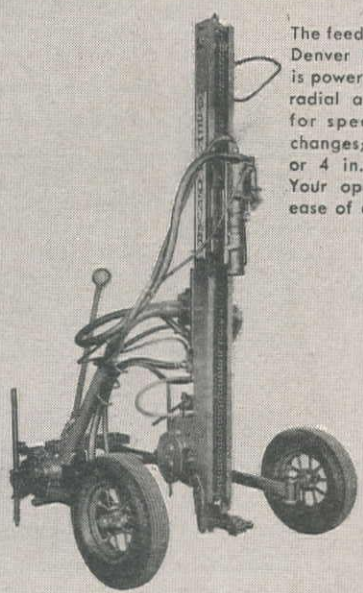
No matter where you send a Gardner-Denver Portable Compressor, you can be sure of a steady, uninterrupted air supply. For regardless of climate or altitude, the complete water jacketing of all cylinders "weather-conditions" them against over-heating — and from cold, unlubricated starts in sub-zero weather. For complete information, write Gardner-Denver Company, Quincy, Ill.

. . . FOR THE RIGHT AIR TOOLS



There's a Gardner-Denver Sinker that's "correct" in size and power for every type of ground. Shown here are the three most popular models: the high-speed S45 for secondary drilling or medium rock—the S55, most popular 55-pound sinker on the market—the S73, 67 pounds of speed and power for deep holes or the hardest formations.

Powerful Gardner-Denver B87 Paving Breaker has exclusive throttle safety latch — can be easily moved around the job without shutting off the air. Easily converted to a sheeting driver.



The feed of the new Gardner-Denver URM99 Wagon Drill is powered by a five-cylinder radial air motor. Designed for speedy, six-foot steel changes; carries a 3½ in. or 4 in. bore derrick drill. Your operator will like the ease of control.

The Gardner-Denver T23 Backfill Tamper is balanced for easy "walking" over the fill — has valve and exhaust that won't "freeze" in cold, damp weather — contains integral oil reservoir that assures complete lubrication.

Gardner-Denver Model 28 Clay Digger makes digging easy in clay or hardpan—can also be equipped with axe blade for trimming or cutting timber, or with moil point or chisel for light demolition work.

GARDNER-DENVER SINCE 1859

WESTERN BRANCH OFFICES:

Butte, Montana; Denver, Colorado; Los Angeles, California; Salt Lake City, Utah; San Francisco, California; Seattle, Washington; Wallace, Idaho; El Paso, Texas.

UNIT BID SUMMARY

THE TREND IN CONSTRUCTION COSTS on highway and bridge jobs around the eleven Western states is shown graphically in the following pages by the comparison of current unit bids with unit bids of ten years ago. The 1949 unit bids are presented first and are followed immediately by the unit bids for a comparable job in approximately the same locality, reprinted exactly as they appeared in issues of this magazine during 1939. Note particularly that the sharpest increases in highway costs have been for structures, while the other two main construction factors, excavation and surfacing, have contributed less to the upswing. The why and wherefore, and the implications, are discussed and analyzed in an article prepared by the editors of WESTERN CONSTRUCTION NEWS and appearing on page 82 of this issue, where we claim that a drop in highway construction costs as large as 10% may occur before early 1950.

In Arizona, 1949—

Arizona—Coconino County—State—Grade and Surf.

W. J. Henson, contractor of Prescott, Ariz., with a bid of $438,054, was low for construction of 10¾ mi. of the Flatstaff-Winslow Highway. The work begins about ½ mi. west of Canyon Diablo and extends westerly to Canyon Padre, and consists of grading, draining, select material, aggregate base and bituminous surface treatment. Unit bids were as follows:

(1) W. J. Henson.....$438,054
(2) Phoenix-Tempe Stone Co. 443,760
(3) Tiffany Construction Co..... 444,395
(4) Larsen Contracting Co..... 457,112
(5) Bowen & McLaughlin.....$475,316
(6) Wallace & Wallace..... 498,489
(7) Packard Contracting Co..... 521,831

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
49,100	cu. yd. roadway excavation	1.00	.92	.90	.86	.96	1.10	1.14
1,600	cu. yd. overbreakage	.75	.69	.675	.645	.72	.825	.855
650	cu. yd. slides	.50	.46	.45	.43	.48	.55	.57
2,200	cu. yd. drainage excavation	1.08	.60	.75	.80	.30	1.20	1.14
200	lin. ft. grader ditches	.20	.25	.15	.10	.15	.10	.10
1,560	cu. yd. structural excavation	2.00	2.50	2.50	3.00	3.00	3.00	2.50
210	cu. yd. mi. overhaul	.30	.50	.50	.50	.40	.35	.50
231,100	cu. yd. borrow (CIP)	.37	.35	.35	.33	.43	.40	.50
14,000	cu. yd. stripping pits	.25	.25	.25	.20	.18	.20	.20
12,000	M. gal. watering (CIP)	2.00	3.50	2.00	2.50	3.00	4.00	3.00
3,200	hr. rolling	6.50	7.00	6.50	7.00	6.00	6.50	6.00
68,400	ton select material (CIP)	.85	.85	.95	1.00	.90	1.05	.98
32,300	ton aggregate base (CIP)	1.60	1.10	1.50	1.60	1.41	1.35	1.54
500	ton blotter matl. (for B.S.T.) (CIP)	2.50	5.00	3.00	4.00	1.80	3.00	5.00
910	ton liquid asph. (for B.S.T.) (Grade RC-2) (CIP)	36.00	37.00	40.00	40.00	41.40	41.00	40.00
1,309	cu. yd. Cl. "A" conc. (incl. cement) (CIP)	44.00	48.00	50.00	52.00	52.00	50.00	57.50
181	cu. yd. Cl. "D" conc. (incl. cement) (CIP)	45.00	48.00	51.00	53.00	55.00	52.00	60.00
176,360	lb. reinforcing steel (bars) (CIP)	.12	.13	.12	.125	.12	.13	.12
6	lin. ft. 18-in. corru. metal pipe (CIP except excav.)	4.50	4.00	4.00	4.00	5.00	4.00	4.00
194	lin. ft. 24-in. corru. metal pipe (CIP except excav.)	5.50	4.75	5.00	4.50	6.00	4.50	4.20
194	lin. ft. 30-in. corru. metal pipe (CIP except excav.)	7.00	5.50	6.00	5.80	7.00	6.00	5.25
162	lin. ft. 36-in. corru. metal pipe (CIP except excav.)	10.00	8.50	8.50	8.20	10.00	9.00	9.00
262	lin. ft. 42-in. corru. metal pipe (CIP except excav.)	14.00	10.00	10.00	10.00	12.00	11.00	13.00
66	lin. ft. 54-in. corru. metal pipe (CIP except excav.)	16.60	13.00	15.00	16.00	17.00	15.00	17.00
1	ea. cattle guard (2 unit) (std. C-14) (CIP except excav. and concrete)	600.00	600.00	500.00	550.00	$1,000	700.00	600.00
46	ea. right-of-way markers (std. C-1) (Type "B" or "C") (CIP)	7.00	6.00	6.00	6.00	8.00	7.00	9.00
14	ea. reset right-of-way markers (CIP)	3.00	2.50	5.00	4.00	7.00	3.00	3.00
70,400	lin. ft. reconstruct fence	.10	.15	.12	.13	.13	.15	.17
1	lump sum, reset 54-ft. of 18-in. corru. metal pipe and 200 ft. of 1-in.. water pipe (Sta. 1658 plus 15)	450.00	400.00	350.00	300.00	250.00	310.00	204.00

Ten Years Ago in Arizona—

Arizona—Coconino County—BPR—Grade & Bitu. Surf.

Award recommended to Oswald Bros., 366 E. 58th St., Los Angeles, $91,972, by Bureau of Public Roads, Phoenix, for 10.761 mi. grade, drain and place base surface with bitum. treatment on Sec. C and portion of Sec. D, Route 28, Fredonia Houserock Valley National Forest Highway, Kaibab National Forest, COCONINO COUNTY. Bids from:

(1) Oswald Bros., Los Angeles.....$ 91,972
(2) Pearson & Dickerson, Prescott..... 92,427
(3) Lewis Bros., Phoenix..... 111,712
(4) Strong & Grant, Springville.....$112,745
(5) Lee Moor Contr. Co., El Paso..... 116,363
(6) Fisher Contracting Co., Phoenix..... 122,399

Bids received on	(1)	(2)	(3)	(4)	(5)	(6)
24 acres clearing	150.00	185.00	200.00	100.00	150.00	225.00
24 acres grubbing	100.00	125.00	100.00	50.00	150.00	150.00
20,000 cu. yd. strip & store topsoil	.18	.15	.40	.30	.24	.16
36,200 cu. yd. unclass. excavation	.73	.78	.69	.80	1.02	1.00
60 cu. yd. uncl. excav., struc.	1.50	2.00	2.00	3.00	1.50	1.75
49,600 cu. yd. uncl. exc. for borrow	.20	.15	.50	.30	.30	.39
38,000 sq. yd. overhaul	.025	.02	.04	.02	.02	.03
159,000 cu. yd. mi. borrow haul	.15	.15	.10	.20	.18	.16
4,400 lin. ft. furrow ditches	.10	.10	.10	.10	.12	.07

(Continued on next page)

You can get delivery SOONER THAN YOU THINK!

Cast iron pipe is more readily available today than a year ago. You can get it sooner than you think. And here's why.

The cast iron pipe industry, in spite of raw material shortages, achieved in 1946, 1947 and 1948, the greatest three-year production program in its history. Those were the years of urgent demand for cast iron pipe created, to a large extent, by construction to meet a national housing emergency.

For 1949, the increased rate of production is expected to continue and therefore:

You can get cast iron pipe sooner than you think!

Cast Iron Pipe Research Association, Thomas F. Wolfe, Engineer, 122 South Michigan Avenue, Chicago 3, Illinois.

96%

OF ALL 6-INCH AND LARGER CAST IRON WATER MAINS EVER LAID IN 25 REPRESENTATIVE CITIES ARE STILL IN SERVICE.

Based on the findings of a survey conducted by leading water works engineers.

El Paso's "Big Ditch"

. . . Continued from page 79

Orleans, the Southern Pacific, the El Paso and Southwestern and the Texas and Pacific. El Paso's Union Depot Co., jointly owned by the railroads, paid part of the railroads' $2 million.

The engineers spent 1946 preparing preliminary reports and in meetings. The firm arranged with the U. S. Bureau of Community Facilities for a $135,000 interest-free loan to cover the cost of making plans. It has been paid back. The loan allowed the city to hold up the sale of authorized bonds for favorable market conditions.

Cost estimates boosted

Original field surveys were started in January and completed in April of 1947 at a cost of $25,000. Plans, too, were started in January in the Chicago home office of the firm. More than 600 sheets of plans and 1,300 pages of specifications were prepared.

The engineering firm handles all the accounting connected with the job, using railroad accountants and others to break down all costs to railroad accounting numbers and State Highway Department, Public Roads Administration and city methods. A joint audit of all books is made each two months by auditors of the parties concerned.

The engineers estimate each month what they expect to spend. The railroads' share of this is drawn and deposited with the city's funds. All bills then are paid through the city auditor who, at the end of each month, prepares a statement of actual expenditures.

The railroads do their own trackwork, staked out and inspected by the Chicago engineers. The State and Federal agencies involved agreed to allow the engineering firm to prepare their plans and supervise their construction.

The cost of track depression in 1946 was estimated at $5 million. But the cost was boosted a half-million dollars over the first estimate mainly by inflationary pressures. For example, the price of sheet steel went up 30 per cent after it was ordered under an escalator clause in the contract. And railroad labor, a large cost in the project, went up 50 per cent at one jump. The contract for concrete purchases has no escalator clause.

There have been few delays in getting materials because the city, looking ahead on the advice of the engineers, bought critical materials while the plans were being drawn. There has been no shortage of labor.

Since the job began only 15 days have been lost because of weather. An unusually cold winter, however, necessitated use of steam and salamanders to keep fresh concrete pours from freezing.

Right-of-way for the project was mainly railroad-owned. Additional needed right-of-way cost slightly over $200,000. And there was only one condemnation suit. An El Paso firm sought $15,000 damages but after the matter went to condemnation commissioners, was awarded only the $5,946 the city had offered.

Continued on page 148

317 M gal. watering	4.00	4.40	4.00	3.00	4.00	4.5
13,000 tons cr. run top course	.75	.83	1.30	1.30	.82	1.2
500 tons apply Govt. furn. asph. matl.	14.00	12.50	15.00	12.00	16.00	15.0
Force account sanding	300.00	300.00	300.00	300.00	300.00	300.0
5 cu. yd. cement rubble masonry	25.00	20.00	48.00	30.00	30.00	30.0
262 lin. ft. 18" C. G. S. M. pipe	2.50	2.50	4.00	3.00	2.50	3.0
40 lin. ft. rem. clean & relay exist CMP	2.50	2.50	2.00	1.00	1.50	2.0
1 each cattle guards	$1000	$1000	870.00	500.00	$1000	900.0
1,000 lin. ft. barbed wire fence	.15	.20	.20	.15	.12	.1
16 each culvert markers	3.00	3.25	3.00	3.00	3.00	5.0
Force account obliterate old roads	300.00	300.00	300.00	300.00	300.00	300.0

In Oregon, 1949—

Oregon—Jackson County—State—Grade and Surf.

Stevenson Construction Co. of Salem, Ore., with a bid of $250,370, was low bidder before the Oregon State Highway Department for the grading and oil mat surfacing of 6.25 mi. of the Snider Creek-Crater Lake Junction section of Sams Valley Secondary Highway. Unit bids were submitted as follows:

(1) Stevenson Construction Co.	$250,370	(6) M. L. O'Neil & Son	$305,224
(2) T. W. Thomas	258,882	(7) E. C. Hall Co.	313,247
(3) K. F. Jacobsen	262,109	(8) McNutt Bros.	313,423
(4) J. M. Arenz	262,937	(9) Leonard & Slate, Ore. Ltd.	339,184
(5) J. N. & N. J. Conley	285,482	(10) E. L. Gates & Co.	380,022

	(1)	(2)	(3)	(4)	(5)	(6)
Lump sum, clearing and grubbing	$14,971	$4,000	$10,000	$20,000	$25,000	$9,500
1,380 cu. yd. trench excav., unclassified	2.50	2.00	3.00	2.50	3.00	4.00
156,700 cu. yd. general excav., unclassified	.30	.40	.38	.32	.55	.47
349,000 yd. sta. short overhaul	.015	.015	.02	.02	.01	.02
4,000 yd. sta. long overhaul	.50	.50	.50	.50	.40	.70
6.25 mi. finishing roadbed and slopes	400.00	350.00	600.00	600.00	450.00	450.00
9,500 lin. ft. rounding cutbanks	.20	.15	.20	.20	.15	.15
55 lin. ft. 42-in. corrugated metal pipe	12.00	12.00	13.00	13.00	12.00	12.50
160 lin. ft. 6-in. concrete drain pipe	.75	.50	.75	.90	.70	.65
35 lin. ft. 8-in. concrete drain pipe	.80	.75	1.00	1.20	.80	.70
100 lin. ft. 8-in. perf. conc. drain pipe	1.25	1.20	1.10	1.25	1.20	1.20
1,460 lin. ft. 18-in. concrete pipe	3.00	3.00	4.00	4.00	2.70	3.30
390 lin. ft. 24-in. concrete pipe	4.50	4.25	5.50	5.60	4.00	4.50
270 lin. ft. 36-in. concrete pipe	9.00	8.00	12.00	10.20	8.00	8.25
66 lin. ft. 42-in. concrete pipe	11.00	11.00	18.00	12.60	11.00	10.75
300 lin. ft. 18-in. concrete siphon pipe	3.00	3.50	5.25	4.05	3.00	4.00
110 lin. ft. salvaging culvert pipe	2.00	2.00	2.50	2.00	2.00	2.00
50 cu. yd. rock or gravel backfill in drains	4.00	5.00	4.50	3.00	3.70	3.75
288 cu. yd. Class "A" concrete	58.00	62.50	58.00	55.00	55.00	62.00
29,600 lb. metal reinforcement	.135	.13	.135	.13	.14	.135
75,000 cu. yd. selected roadbed topping	.50	.52	.47	.48	.50	.63
226,000 yd. mi. hauling roadbed topping	.14	.14	.13	.14	.10	.20
6,300 cu. yd. ¾-in. - 0-in. gravel in leveling course and shoulders	3.00	2.85	3.00	3.00	2.80	3.05
1,700 M. gal. sprinkling	2.50	2.00	3.00	2.50	2.00	3.50
6.25 mi. preparation of base	250.00	200.00	250.00	250.00	150.00	200.00
4,500 cu. yd. furn. and placing aggregates	4.00	4.50	4.05	4.00	4.20	4.15
350 tons furn. and placing 151-200 asphalt	40.00	43.00	40.00	40.00	40.00	43.00
120 tons furn. and placing RC-3 asph. in binder crse.	42.00	45.50	42.00	42.00	42.50	45.50
2,200 cu. yd. ¾-in. - ½-in. crushed gravel in stkpiles	2.45	2.75	2.45	2.75	2.50	2.55
1,400 cu. yd. ½-in. - ¼-in. crushed gravel in stkpiles	2.45	2.75	2.45	2.75	2.50	2.55
550 cu. yd. ¼-in. - 0-in. crushed gravel in stkpiles	2.45	2.75	2.45	2.75	2.10	2.55

Ten Years Ago in Oregon—

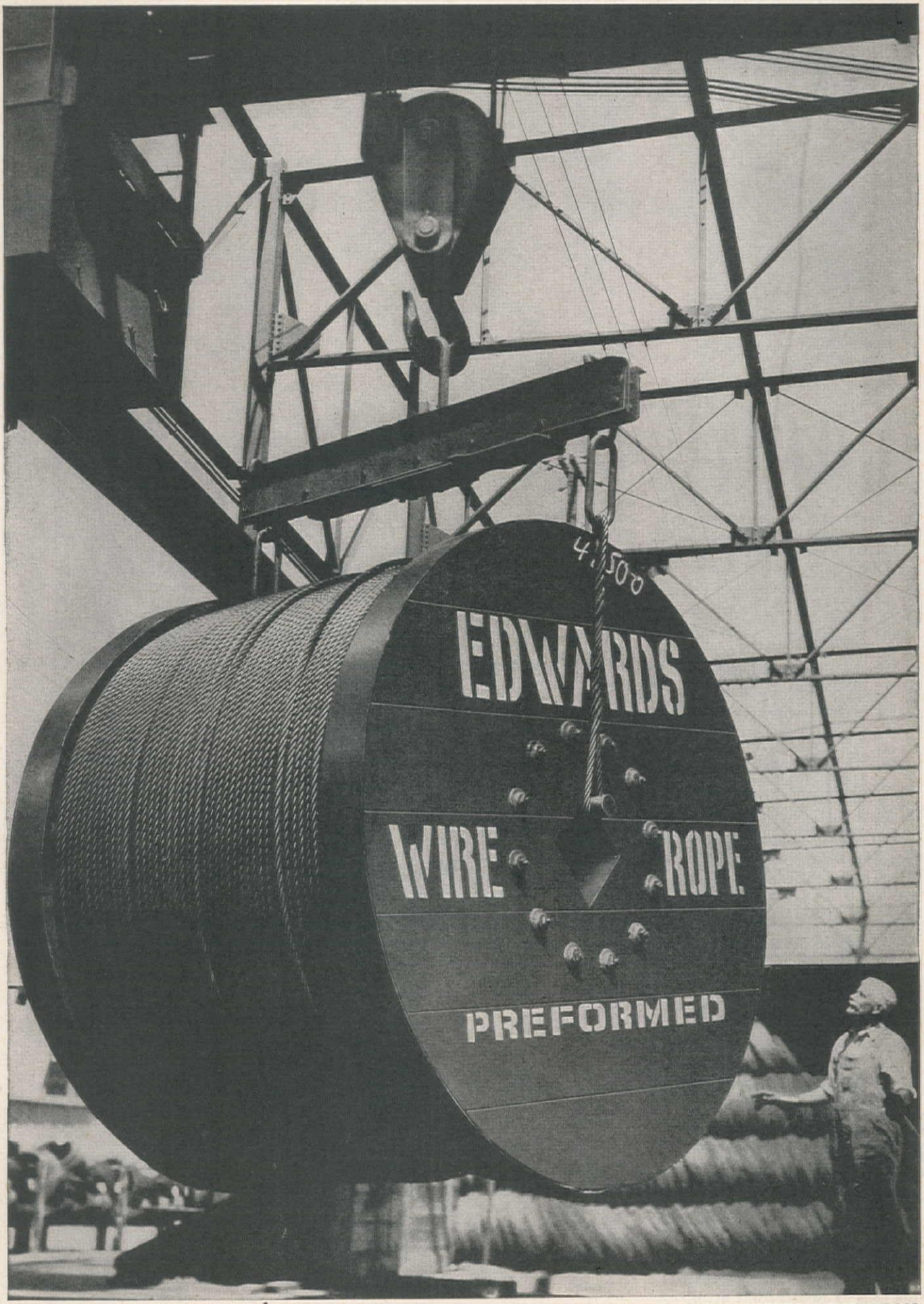
Oregon—Josephine County—State—Grade

Contract awarded to M. L. O'Neil & Son, Eugene, $194,923, by Oregon State Highway Commission, Portland, for 1.9 mi. grade, surface and construction of small drainage structures on Sexton Mountain Section of the Pacific Highway. Bids were received from the following:

(A) M. L. O'Neil & Son	$194,923	(I) Nat McDougal Co.	$334,531
(B) McNutt Bros.	286,844	(J) Berke Bros.	263,573
(C) Leonard & Slate	264,440	(K) Kuckenberg Construction Co.	273,222
(D) Whites Trucking Co.	248,755	(L) J. A. Lyons	290,800
(E) A. C. Greenwood Co., Inc.	318,778	(M) Sam Orino	282,310
(F) Roy L. Houck	246,783	(N) A. Teichert & Son	277,267
(G) K. L. Goulter	255,658	(O) E. L. Gates	296,991
(H) C. J. Eldon	291,361	(P) Frank Penepacker	276,829

		(A)	(B)	(C)	(D)	(E)	(F)
(1)	54 acre clearing and cleaning up	$130	$240	$100	$140	$250	$300
(2)	15 acre grubbing	$130	$195	$100	$100	$250	$250
(3)	4 acre extra clearing	$130	$200	$100	$140	$300	$300
(4)	4 acre extra grubbing	$130	$150	$100	$100	$300	$250
(5)	50 sq. ft. felling danger trees	2.00	1.00	3.00	2.00	2.00	.75
(6)	2,600 cu. yd. trench excav., unclassified	.75	.90	1.50	1.00	1.50	.50
(7)	257,000 cu. yd. gen. excav., stas. 566 to 621, unclass.	.18	.22	.27	.22	.23	.225
(8)	213,000 cu. yd. gen. excav., stas. 621 to 630+40, com.	.18	.22	.27	.16	.23	.225
(9)	135,000 cu. yd. gen. excav., stas. 621 to 630+40, sol. rk.	.18	.40	.27	.52	.56	.225
(10)	27,000 cu. yd. gen. excav., stas. 630+40 to 667, uncl.	.18	.22	.27	.16	.23	.225
(11)	440,000 yd. mi. truck haul	.08	.15	.10	.08	.14	.10
(12)	10,000 lin. ft. rounding cutbanks	.07	.05	.07	.08	.10	.06
(13)	1.85 mi. finishing roadbed and slopes	$300	$400	$300	$300	$400	$300

(Continued on next page)



E. H. EDWARDS COMPANY — SEATTLE • PORTLAND • SAN FRANCISCO • LOS ANGELES • HOUSTON

(14)	750 lin. ft. 9-in. perf. corr. metal pipe	1.20	1.20	1.25	1.10	1.50	1.25
(15)	420 lin. ft. 24-in. extra str. C.M.P., protected inv.	4.00	4.50	4.10	4.00	5.00	4.30
(16)	300 lin. ft. 18-in. concrete pipe	2.20	2.50	2.25	2.50	3.00	2.33
(17)	160 lin. ft. 24-in. concrete pipe	2.85	3.20	3.00	3.10	4.00	3.00
(18)	30 lin. ft. 36-in. concrete pipe	5.80	6.25	6.00	6.00	7.00	5.50
(19)	320 lin. ft. 18-in. extra str. concrete pipe	2.50	2.75	2.50	2.85	3.50	2.65
(20)	1,060 lin. ft. 24-in. extra str. concrete pipe	3.20	3.50	3.25	3.60	4.50	3.45
(21)	850 lin. ft. 36-in. extra str. concrete pipe	7.25	7.50	7.00	7.00	8.00	6.75
(22)	10 lin. ft. metal ditch lining, No. 30	1.05	1.25	4.00	2.00	1.50	1.50
(23)	30 lin. ft. metal ditch lining, No. 42	1.25	1.50	5.00	2.00	2.00	2.00
(24)	160 cu. yd. rock or gravel backfill in drain	.90	2.00	3.00	1.50	3.00	1.00
(25)	600 cu. yd. class "A" concrete	18.00	22.50	23.00	20.00	24.00	22.00
(26)	90,000 lb. metal reinforcement	.0525	.05	.055	.055	.06	.06
(27)	1,100 lin. ft. guard rail	1.10	1.25	1.40	1.00	1.40	1.20
(28)	800 cu. yd. pit-run gravel in surfacing	.85	.90	1.00	.85	1.50	1.00
(29)	250 cu. yd. ¾"-0" material in surfacing	2.75	3.00	3.00	2.25	3.50	2.00
(30)	70 cu. yd. filler	.35	.50	.30	.30	.70	.40
(31)	70 yd. mi. hauling filler	.20	.10	.20	.10	.20	.10
(32)	60 M. gal. sprinkling	1.50	2.00	1.00	1.50	3.00	2.00

	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)
(1)	$150	$250	$165	$200	$150	$200	$150	$250	$175	$100
(2)	$150	$250	$200	$150	$150	$200	$100	$130	$100	75.00
(3)	$150	$250	$200	$200	$175	$200	$150	$300	$200	$100
(4)	$150	$250	$200	$150	$175	$200	$100	$200	$150	75.00
(5)	3.00	2.50	2.00	1.00	2.00	3.00	3.00	2.00	2.00	5.00
(6)	1.00	1.50	2.50	1.00	1.00	1.00	.50	.75	1.00	1.50
(7)	.20	.24	.27	.24	.24	.25	.22	.15	.32	.20
(8)	.20	.18	.27	.18	.16	.22	.22	.27	.22	.26
(9)	.50	.58	.59	.44	.38	.45	.40	.58	.60	.50
(10)	.20	.22	.27	.20	.16	.25	.22	.15	.18	.23
(11)	.08	.10	.125	.10	.14	.12	.15	.10	.07	.10
(12)	.05	.10	.10	.08	.05	.08	.10	.10	.08	.10
(13)	$500	$500	$300	$450	$250	$500	$300	$300	$200	$500
(14)	1.35	1.30	1.30	1.20	2.00	1.30	1.10	1.10	1.25	1.30
(15)	4.25	4.35	4.30	3.95	5.00	3.75	4.10	2.85	4.00	4.10
(16)	2.25	2.60	2.65	2.00	3.50	2.25	2.25	2.10	2.25	2.40
(17)	3.00	3.40	3.40	2.55	5.00	3.00	3.00	3.00	2.88	3.00
(18)	5.50	6.36	7.50	5.25	8.00	6.50	5.50	5.50	5.60	6.50
(19)	2.50	2.85	3.00	2.25	4.00	2.60	2.50	2.40	2.50	2.75
(20)	3.35	3.80	3.85	2.90	5.00	3.50	4.00	3.35	3.25	3.50
(21)	6.75	7.60	8.00	6.50	8.50	8.00	7.50	6.10	7.00	7.50
(22)	1.25	1.20	3.00	2.00	2.00	2.00	1.00	1.20	1.60	2.00
(23)	1.50	1.50	4.00	2.25	3.00	2.00	1.25	1.60	1.80	3.00
(24)	2.00	2.50	3.50	2.00	3.00	2.50	1.00	2.70	2.25	3.00
(25)	25.00	22.00	28.00	23.00	26.00	25.00	25.00	20.00	20.00	25.00
(26)	.06	.05	.06	.055	.06	.05	.07	.06	.0475	.05
(27)	1.25	1.80	1.50	1.35	1.00	1.25	1.10	1.25	1.25	1.50
(28)	1.25	1.50	2.50	2.00	2.00	1.50	1.00	1.00	2.60	1.50
(29)	1.25	2.50	3.50	2.50	3.00	4.00	1.50	3.00	2.60	3.25
(30)	.50	.40	1.00	.50	1.00	1.00	.75	.50	.25	.50
(31)	.10	.20	.50	.20	.20	.25	.25	.20	.10	.20
(32)	2.00	3.00	5.00	1.00	3.50	3.00	2.00	2.25	1.00	3.00

California Bridge, 1949–

California—Los Angeles County—State—Undercrossing

J. E. Haddock, Ltd., of Pasadena, Calif., were low bidders before the California Division of Highways at $469,457 for construction of a reinforced concrete girder bridge as an undercrossing at Glendale Blvd., a reinforced concrete box section for a pedestrian undercrossing at Echo Park, and for about 0.26 mi. of grading and P. C. C. paving. Unit bids were submitted by the following:

(A) J. E. Haddock, Ltd. $469,457
(B) Chas. MacClosky Co. 477,824
(C) Spencer Webb Co. and George W. Peterson 491,481
(D) Charles J. Rounds and Lars Oberg 495,424
(E) C. B. Tuttle Co. 512,736
(F) Winston Bros. Co. and Yount Construction Co., Inc. 513,304
(G) W. J. Disteli and R. J. Daum Construction Co. 521,226
(H) Wonderly Construction Co. 568,257

(1) 825 cu. yd. removing concrete
(2) 14 sta. clearing and grubbing
(3) 75,000 cu. yd. roadway excav.
(4) 2,600 cu. yd. struct. excav. (bridge)
(5) 1,600 cu. yd. struct. backfill (bridge)
(6) 7,000 cu. yd. struct. excav.
(7) 90,000 sta. yd. overhaul
(8) 520 cu. yd. gravel backfill
(9) 1,250 cu. yd. placing top soil
(10) 550 tons imported base material
(11) Dev. water sup. and furn. water equip.
(12) 1,600 M. gal. applying water
(13) 14 sta. finishing roadway
(14) 80 tons plant-mix surf.
(15) 65 cu. yd. Class "B" P.C.C. (pavement and base
(16) 4,450 cu. yd. Class "A" P.C.C. (structs.)
(17) 260 cu. yd. Class "C" P.C.C. (pipe reinf.)
(18) 430 lin. ft. rubber waterstops
(19) 6,220 lb. miscellaneous iron and steel
(20) 8,630 lin. ft. furn. steel piling
(21) 265 ea. driving piles
(22) 26 ea. steel pile splices
(23) 604 sq. yd. membrane waterproofing
(24) 14 cu. yd. rubble masonry
(25) 155 cu. yd. P.C.C. (curbs, gutters and sidewalks)
(26) 90 lin. ft. curb bar
(27) 120 lin. ft. laminated guard railing
(28) 450 lin. ft. steel railing
(29) 2,750 lin. ft. chain link fence
(30) 4 ea. walk gates
(31) 1 ea. drive gate
(32) 200 lin. ft. removing and salv. exist. chain link fence
(33) 400 lin. ft. removing and reconst. exist. chain link fence
(34) 600 lin. ft. 15-in. R.C.P. (std. str.)
(35) 40 lin. ft. 18-in. R.C.P. (std. str.)
(36) 510 lin. ft. 21-in. R.C.P. (std. str.)
(37) 170 lin. ft. 24-in. R.C.P. (1250-D)
(38) 130 lin. ft. 30-in. R.C.P. (1250-D)
(39) 220 lin. ft. 36-in. R.C.P. (1500-D)
(40) 190 lin. ft. 48-in. R.C.P. (1500-D)
(41) 16 lin. ft. 12-in. plain concrete pipe
(42) 50 lin. ft. pipe shaft manholes
(43) 420 lin. ft. 8-in. vitrified clay pipe (ex. str.)
(44) 3 ea. manholes "B" (sewers)
(45) 1 ea. drop manhole "S" (sewers)
(46) 1 ea. adjusting manhole to grade
(47) 26 ea. house connection caps
(48) 1,011,500 lb. bar reinforcing steel
(49) Lump sum, washing equipment
(50) Lump sum, electrical equip. (Glendale Blvd.)
(51) Lump sum, electrical equip. (Echo Park)

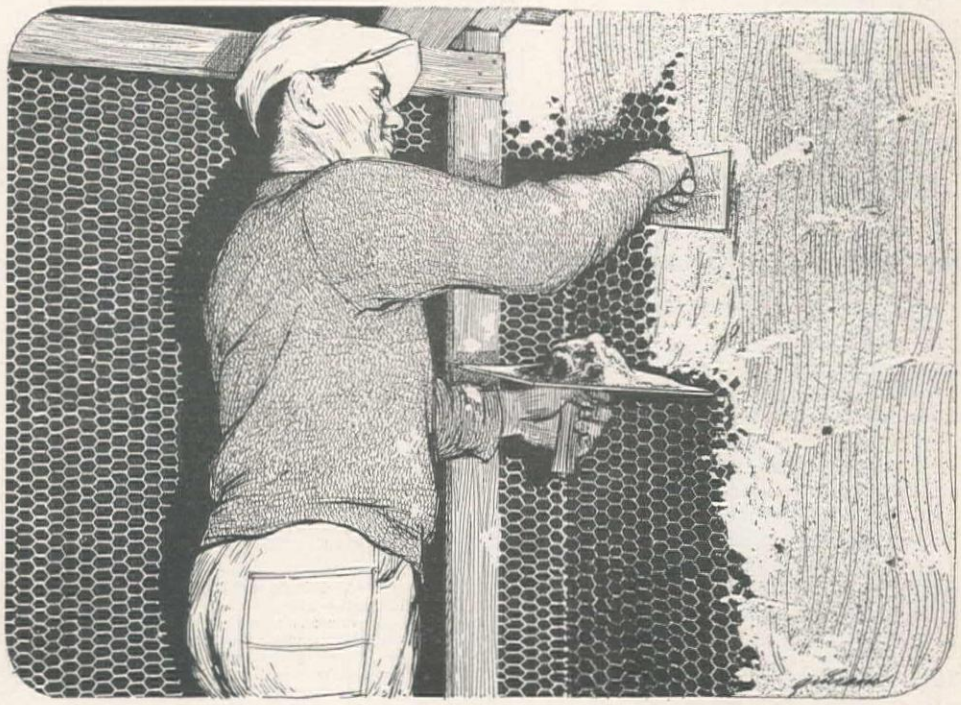
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
(1)	4.20	4.00	5.00	4.00	5.00	6.00	5.00	4.40
(2)	265.00	320.00	200.00	300.00	235.00	60.00	225.00	450.00
(3)	.45	.53	.55	.75	.70	.60	.70	.90
(4)	1.80	2.00	2.00	2.00	2.00	2.50	2.00	1.59
(5)	2.10	2.00	2.00	3.00	2.60	3.00	2.50	2.95
(6)	2.25	2.00	3.50	2.00	3.25	3.50	2.75	3.65
(7)	.0075	.01	.01	.005	.007	.05	.007	.005
(8)	6.00	3.50	3.00	3.00	5.00	2.70	3.50	5.15
(9)	1.80	1.30	1.75	1.50	2.00	1.00	1.75	2.00

(Continued on next page)

SPECIAL PURPOSE CEMENTS

Case No. 142

EXTERIOR STUCCO



STANDARD PORTLAND

MODIFIED PORTLAND

HIGH EARLY

LOW HEAT

SULPHATE RESISTANT

PRONTO

PORTLAND POZZOLAN

BRICK MIX

PLASTIC CEMENT

OIL WELL CEMENT

PERMANENTE PLASTIC CEMENT

Permanente Plastic Cement is produced to provide a cement suitable for making fine exterior stucco, with the proper working qualities, plus the durability of good concrete.

Permanente Plastic Cement is composed of Permanente Portland Cement interground with selected plasticizing agents. These agents actually reduce the quantity of water needed to produce workable mortar. Mortar strength is substantially increased, while shrinkage characteristics are lowered. These properties assure a hard, durable wall.

Mortar made with Permanente Plastic Cement is smooth, workable and highly adhesive. It spreads well, is fireproof, vermin proof, weather resistant and has excellent insulating qualities.

PERMANENTE CEMENT COMPANY

On the job - On time

PERMANENTE CEMENT COMPANY

PERMANENTE, SANTA CLARA, DIAMOND, YOSEMITE AND KAISER BRANDS OF PORTLAND CEMENT AND PERMANENTE LIME PRODUCTS

OAKLAND • SEATTLE • HONOLULU

El Paso's "Big Ditch"

. . . Continued from page 144

The completed job will be the product of 30 contractors and sub-contractors and more than 300 workers. It will accomplish this:

1. Elimination of traffic jams, resulting from railroad operations, that now choke the downtown business district.

2. Opening of eight blocks of a main downtown thoroughfare now out of use because it is covered with main railroad lines and switch tracks.

3. Elimination of the hazard of grade crossings in the city which in recent years alone has taken several lives. Only red signal lights now are used to warn of the apporach of a train.

4. End of difficult operations sometimes experienced by the police and fire departments due to blocked crossings.

5. The possibility of getting acutely-needed parking near the downtown district is presented. After the railroad tracks are put in the cut and the main street is paved and put into use, enough space will remain for use as parking space for some 1,000 cars.

Colorado Road Shakeup

. . . Continued from page 102

House amendments and a joint conference committee was appointed. This first committee was unable to agree and a second conference committee was appointed which also reported it was unable to arrive at an agreeable recommendation. Joint conference committees in the State Legislature must be unanimous in their recommendations or disagreement must be reported. A third conference committee was appointed, and like its two predecessors was unable to agree.

Politics hinder success

By the time all of this legislative maneuvering had been accomplished, the Legislature adjourned without any action being taken on a statutory change of the administrative composition of the Highway Department. There was regret in some quarters that the provision for a Highway Needs Study had been tied into the reorganization bills. It had not been possible to disassociate the two items, and the failure of the Legislature to agree on top level administration resulted in the killing of statutory provision for the making of the Highway Needs Study.

The entire issue has been clouded by political maneuvering and the charges and counter-charges being cast by both major political parties regarding the responsibilities of each for failure to reach agreement. In addition, to a disinterested observer, it is apparent that the local newspapers and the majority of interested citizens have not had a proper understanding of the problem.

The Governor has implied that a special session of the Legislature might be convened to consider this one matter. At the time of the writing of this article, there is no definite information relating thereto.

(10)	2.40	2.50	2.50	3.00	4.00	1.90	2.75	2.85
(11)	$1,800	$1,000	$2,000	500.00	600.00	800.00	$1,000	$2,184
(12)	2.20	1.75	1.00	2.00	2.00	1.75	2.00	1.60
(13)	20.00	110.00	20.00	30.00	70.00	15.00	70.00	48.00
(14)	6.60	12.00	7.00	10.00	15.00	10.00	6.50	7.50
(15)	16.00	24.00	15.00	25.00	25.00	21.00	22.00	22.00
(16)	50.00	50.00	47.00	50.00	50.00	52.50	51.50	60.00
(17)	16.00	15.00	15.00	20.00	30.00	21.00	22.00	17.65
(18)	2.35	3.00	3.00	2.50	3.00	2.50	3.00	2.40
(19)	.33	.30	.25	.40	.45	.30	.35	.36
(20)	3.00	2.65	2.60	2.70	2.30	2.40	4.50	2.73
(21)	32.00	23.00	40.00	30.00	38.00	27.00	25.00	25.50
(22)	24.00	20.00	25.00	20.00	20.00	18.00	18.00	17.35
(23)	2.65	2.00	3.00	3.00	3.00	3.00	3.00	3.00
(24)	48.00	50.00	25.00	50.00	20.00	23.00	25.00	20.00
(25)	38.00	40.00	40.00	35.00	40.00	34.00	37.00	40.00
(26)	.80	1.50	1.00	1.00	1.00	1.00	.90	2.00
(27)	5.00	5.00	3.00	4.00	3.00	3.00	3.50	3.80
(28)	7.75	7.50	8.00	8.00	8.00	8.00	7.00	7.70
(29)	2.00	1.80	2.00	1.80	2.00	2.00	1.90	1.90
(30)	70.00	60.00	60.00	60.00	65.00	65.00	60.00	62.00
(31)	110.00	100.00	100.00	100.00	100.00	100.00	100.00	88.00
(32)	.50	.55	.50	1.00	.50	.60	.50	.56
(33)	1.35	.90	1.20	2.00	1.25	1.00	1.25	.89
(34)	3.40	3.00	3.50	3.00	5.00	4.00	3.25	4.63
(35)	4.20	4.00	4.30	5.00	5.00	5.00	4.00	6.30
(36)	4.75	4.50	4.80	5.00	6.00	5.50	4.75	6.20
(37)	5.40	6.00	5.50	6.00	6.00	6.50	5.50	7.50
(38)	7.15	8.00	7.50	7.00	8.00	8.50	7.00	9.40
(39)	9.25	11.00	10.00	10.00	12.00	12.00	10.00	15.35
(40)	13.70	15.00	16.00	15.00	20.00	17.00	13.50	22.50
(41)	1.75	3.00	3.50	3.00	4.00	2.50	2.50	2.00
(42)	15.00	22.00	13.00	20.00	20.00	12.50	11.50	17.00
(43)	1.80	2.00	6.00	2.50	4.00	1.75	2.75	2.60
(44)	330.00	300.00	350.00	500.00	300.00	370.00	400.00	328.00
(45)	625.00	550.00	$1,000	800.00	500.00	750.00	500.00	662.00
(46)	30.00	50.00	50.00	50.00	100.00	30.00	100.00	54.00
(47)	18.00	30.00	25.00	25.00	25.00	15.00	17.00	26.00
(48)	.085	.095	.105	.09	.095	.10	.096	.08943
(49)	600.00	350.00	$1,000	500.00	300.00	230.00	260.00	202.00
(50)	$3,400	$3,000	$3,500	$4,000	$3,700	$4,000	$3,500	$4,315
(51)	$1,900	$2,000	$2,000	$2,000	$1,800	$1,800	$1,700	$2,065

California Bridge, Ten Years Ago—

California—Los Angeles County—State—Bridge and Surface

Contract awarded to J. E. Haddock, Ltd., Pasadena, $191,601, by the State Division of Highways, Sacramento, for four bridges to be constructed and approaches thereto surfaced with P. C. C., A. C., and P. M. S., and about 0.6 mi. of roadway to be graded and paved with P. C. C. and A. C., on Arroyo Seco Parkway between Ave. 50 and Ave. 58. Bids were received from the following:

(A)	J. E. Haddock, Ltd.	$191,601	
(B)	United Concrete Pipe Corp.	199,342	
(C)	Mittry Bros. Construction Co.	200,328	
(D)	Radich & Brown	204,023	
(E)	Contracting Engineers Co.	205,633	
(F)	Griffith Co.	209,203	
(G)	J. S. Metzger & Sons	$211,543	
(H)	W. E. Hall Co.	213,506	
(I)	Carlo Bongiovanni	214,999	
(J)	Byerts & Dunn	215,846	
(K)	Daley Corporation	223,052	
(L)	C. O. Sparks & Mundo	230,753	

(1)	1,210 cu. yd. remov. concrete
(2)	1,210 cu. yd. clearing and grubbing
(3)	1,300 M. gal. water
(4)	31,000 cu. yd. roadway excav. w/o class
(5)	3,280 cu. yd. structure excavation
(6)	5,150 cu. yd. structure backfill
(7)	96,000 sta. yd. overhaul
(8)	2,900 cu. yd. imported top soil
(9)	31,000 sq. yd. preparing subgrade
(10)	31,000 sq. yd. finishing roadway
(11)	11 tons liq. asph. SC-2 (Pr. Ct.)
(12)	1,900 tons mineral agg. (P.M.S.)
(13)	100 tons liq. asph. 90-95 (P.M.S.)
(14)	5 tons asphaltic emulsion (Sl. Ct.)
(15)	3,800 tons asphalt concrete
(16)	4,010 cu. yd. class "B" P.C.C. (pav't)
(17)	7,200 ea. pavement dowels
(18)	734,000 lb. bar reinforcing steel
(19)	850 sq. yd. mesh reinforcement
(20)	4,342 cu. yd. class "A" P.C.C. (struct.)
(21)	15 ea. adjusting M. H.'s to grade
(22)	1,815 cu. yd. class "A" P.C.C. (crbs., gutters and sidewalks)
(23)	550 lin. ft. curb armor
(24)	3,770 lin. ft. laminated guard railing
(25)	300 lin. ft. pipe handrail
(26)	728 lin. ft. steel railing
(27)	2,700 lbs. copper strips
(28)	1,100 lin. ft. 1½-in. galv. steel pipe (sprinkler system)
(29)	3,100 lin. ft. 2-in. galv. steel pipe (sprinkler system)
(30)	4 ea. reconst'g M. H.'s (type "A")
(31)	1 lot electrical equipment
(32)	1 lot misc. items of work

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
(1)	3.90	4.00	2.50	4.00	4.50	4.40	5.00	3.50	1.50	3.00	2.50	3.50
(2)	$300	$2000	$250	$200	$400	$600	$800	$1000	$700	$1000	$350	$500
(3)	.90	.70	1.00	.75	.80	.61	.80	1.00	1.25	1.00	.75	1.00
(4)	.206	.27	.22	.32	.30	.226	.30	.25	.35	.25	.30	.40
(5)	.65	.60	1.00	.70	.50	1.00	1.00	.75	.75	1.00	1.20	1.25
(6)	.60	.40	.60	.35	.50	.90	.20	.35	.75	.50	1.00	.50
(7)	.01	.005	.01	.005	.01	.003	.01	.003	.002	.003	.005	.01
(8)	.50	.75	.80	.50	1.00	.75	.50	1.00	1.25	1.00	1.25	.70
(9)	.10	.12	.10	.10	.07	.094	.10	.12	.12	.15	.10	.10
(10)	$600	$750	$1000	$150	$300	$280	$1000	$1500	$500	$1500	$500	$500
(11)	10.00	8.00	10.00	10.00	10.00	9.00	9.00	9.80	20.00	9.00	9.00	12.00
(12)	1.70	1.90	2.00	2.00	2.10	2.05	2.00	2.00	2.75	2.50	2.20	2.60
(13)	7.25	7.00	7.00	7.20	7.00	8.00	8.00	8.00	10.00	8.00	8.00	8.00
(14)	20.00	20.00	20.00	26.00	25.00	20.00	25.00	25.00	30.00	20.00	20.00	30.00
(15)	2.00	2.25	2.25	2.23	2.60	2.25	2.50	2.60	3.15	3.00	2.40	2.80
(16)	5.00	5.60	6.50	6.70	6.00	5.70	5.50	6.70	6.00	6.00	5.95	5.65
(17)	.11	.10	.12	.11	.11	.10	.12	.12	.12	.20	.11	.13
(18)	.035	.034	.038	.037	.039	.037	.038	.038	.0375	.035	.04	.04
(19)	.25	.25	.30	.25	.30	.27	.30	.30	.25	.25	.25	.50
(20)	16.50	16.30	14.50	16.10	15.00	17.25	18.00	17.00	15.50	14.00	17.80	20.00
(21)	10.00	10.00	15.00	10.00	20.00	17.50	20.00	5.00	10.00	15.00	40.00	15.00
(22)	9.50	10.00	11.50	9.00	12.00	11.75	11.00	11.50	13.00	12.00	12.50	10.00
(23)	1.00	1.00	1.25	1.25	1.20	1.25	1.00	1.25	1.15	2.00	1.25	1.10
(24)	.90	1.00	1.00	1.25	1.20	1.00	1.00	1.00	1.20	1.50	1.15	1.00
(25)	2.15	1.89	2.00	2.00	2.10	2.15	2.00	2.00	2.15	2.00	2.25	2.50
(26)	6.15	6.40	7.70	6.60	7.00	6.25	6.50	7.10	7.35	8.00	7.50	8.00
(27)	.35	.30	.375	.50	.40	.38	.60	.35	.45	.50	.60	.40
(28)	.33	.30	.25	.50	.45	.39	.60	.36	.40	.45	.40	.40
(29)	.36	.36	.40	.60	.50	.44	.70	.41	.45	.55	.45	.50
(30)	90.00	$100	$100	$125	30.00	60.00	30.00	90.00	50.00	$100	$100	20.00
(31)	$7300	$7400	$7900	$7090	$7000	$7500	$4500	$7000	$8000	$9500	$7500	$8200
(32)	$1000	$2000	$1300	$2000	$2000	$800	$1000	$1000	$974	$9000	$1000	$1500

In Nevada, 1949–

Nevada—Clark County—State—Grade and Surf.

Dodge Construction Co., Inc., Fallon, Nev., with a bid of $450,664, was low before the Nevada Department of Highways for the grading, drainage and plant-mix surfacing of 10.089 mi. of the highway from Henderson to Boulder City. Unit bids were as follows:

(1) Dodge Construction Co. $450,664
(2) Silver State Construction Co. 478,423
(3) Fredericksen & Kasler 511,854
(4) Olof Nelson Construction Co. 521,110
(5) Carl E. Nelson Co. $521,305
(6) Gibbons & Reed Co. 532,610
(7) Isbell Construction Co. 637,822

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lump sum, signs	$1,100	500.00	$1,200	500.00	$1,000	860.00	$5,000
211 lin. ft. remove fence	.10	.10	.30	.50	.10	.085	.50
Lump sum, move service station bldg.	150.00	400.00	800.00	500.00	300.00	27.00	250.00
Lump sum, move lumber shed	300.00	500.00	$1,100	500.00	$1,000	550.00	570.00
Lump sum, move pipe shop bldg.	300.00	500.00	200.00	500.00	300.00	110.00	250.00
Lump sum, move commercial bldg.	$1,000	$1,600	$2,000	250.00	$2,000	550.00	$3,500
Lump sum, move building canopy	150.00	250.00	600.00	250.00	100.00	107.00	$1,000
1,160 lin. ft. remove culvert pipe	1.50	1.00	1.00	1.00	1.00	1.35	2.50
46 ea. remove headwalls	12.50	20.00	20.00	15.00	10.00	40.00	25.00
18 cu. yd. remove concrete	12.50	20.00	10.00	20.00	10.00	7.70	25.00
Lump sum, remove underground tanks	150.00	800.00	$2,400	500.00	100.00	215.00	500.00
310 lin. ft. remove guard rail	.70	1.00	.20	1.00	1.00	1.35	1.00
170,150 cu. yd. roadway excav.	.39	.42	.33	.40	.32	.44	.60
3,680 cu. yd. drainage excav.	.50	.50	.50	.50	.75	.54	1.50
20 sta. V-type ditches	7.50	5.00	5.00	10.00	6.00	2.95	10.00
11,642 cu. yd. borrow	.30	.23	.45	.50	.32	.46	.50
435,425 yd. sta. overhaul	.01	.015	.01	.015	.015	.02	.02
16,700 yd. mi. overhaul	.15	.15	.12	.20	.15	.20	.20
4,250 cu. yd. structure excav.	2.00	1.25	3.40	1.50	2.00	1.30	1.65
4,720 cu. yd. backfill	1.50	1.00	1.70	1.50	1.50	2.45	2.20
11,463 M. gal. water	1.10	1.00	1.10	2.00	1.75	1.68	2.15
Lump sum, furnish water equipment	$2,500	$4,000	$14,500	400.00	$3,000	250.00	$3,500
710 hr. power roller	6.00	6.00	6.00	6.00	6.00	5.30	7.00
10,458 ft. hr. tamping roller	.50	.50	.60	.50	.60	.87	.60
47,590 ton Type 1 gravel base	.40	.39	.51	.56	.55	.43	.75
45,804 ton Type 2 gravel base one inch	.55	.59	.82	.75	.70	.77	.85
535 ton liquid asph., Type MC-1 (prime)	32.50	35.00	34.00	32.00	36.00	31.75	37.50
247 ton emulsified asphalt (seal)	30.50	33.00	34.00	33.00	36.00	34.80	36.50
2,134 ton screenings	3.50	4.00	3.50	3.00	4.00	5.10	5.00
2,497 ton liquid asph., Type SC-6 (plantmix)	28.00	28.00	30.00	28.00	30.00	27.70	30.00
41,614 ton Class F-2 plantmix surface	1.80	1.90	2.25	2.60	2.40	2.38	2.75
1,105 cu. yd. Class A concrete	40.50	56.00	43.00	45.00	55.00	51.00	60.00
125,590 lb. reinforcing steel	.12	.11	.105	.14	.13	.12	.15
780 sq. yd. mesh reinforcement	.50	1.00	.70	.80	.60	.35	.85
550 lin. ft. 18-in. corrugated metal pipe	2.75	3.00	3.00	2.65	2.75	2.80	2.70
2,096 lin. ft. 24-in. corrugated metal pipe	3.75	4.00	4.00	3.75	4.00	4.10	3.90
376 lin. ft. 30-in. corrugated metal pipe	5.00	5.00	5.50	4.80	5.40	5.80	5.00
1,156 lin. ft. 36-in. corrugated metal pipe	7.50	7.00	8.50	7.50	8.50	8.30	7.75
114 lin. ft. 60-in. corrugated metal pipe	20.00	16.00	16.50	16.00	23.00	22.35	17.50
108 lin. ft. 29 x 18-in. corru. metal arch pipe	4.25	4.00	5.00	4.50	4.50	5.55	4.60
168 lin. ft. 36 x 22-in. corru. metal arch pipe	5.50	6.00	6.00	6.00	6.20	7.00	6.10
244 lin. ft. relay culvert pipe	1.00	1.00	1.00	1.00	2.00	1.65	1.50
367 cu. yd. Class A conc. curb and gutter	36.50	40.00	36.00	40.00	35.00	46.20	40.00
6 cu. yd. Class A concrete sidewalk	31.50	40.00	50.00	50.00	40.00	46.20	60.00
3,580 lb. structural steel	.35	.25	.30	.40	.50	.28	.40
230 lin. ft. beam type metal guard rail	3.00	5.00	3.60	3.00	3.00	2.80	4.00
259 ea. culvert markers and guide posts	5.00	5.00	5.00	6.00	5.00	7.50	5.00
163 lin. ft. reconstruct fence	.30	.20	.20	1.00	.20	.55	1.00
69 ea. right-of-way markers	6.00	5.00	6.00	6.00	5.00	7.50	6.00
Lump sum, railroad grade crossing	$1,250	$1,000	$1,000	500.00	$2,000	650.00	$2,500
Lump sum, adjust railroad grade crossing	750.00	500.00	500.00	500.00	$1,000	450.00	$2,500
175 lin. ft. 4-in. cast iron sewer pipe	1.75	1.00	2.00	1.00	1.50	1.65	2.50
176 lin. ft. ½-in. galvanized pipe	.25	.50	1.50	.50	1.00	.55	.50
176 lin. ft. 2-in. galvanized pipe	1.25	.75	1.80	2.00	1.50	1.60	1.00

Ten Years Ago in Nevada–

Nevada—Clark County— BPR—Grade & Surf.

Utah Const. Co., Box 726, Ogden, Utah, $141,709, low to Bureau of Public Roads, Federal Office Bldg., S. F., for 9.366 mi. grading and const. bituminous treated surf. (Class B), on Sec. A of Rt. 1, Overton-Lake Mead, the Boulder Dam Recreational Area, CLARK CO., Nevada.

Bids received from:

(A) Utah Const. Co., Ogden $141,709
(B) Pearson & Dickerson, Prescott 144,489
(C) W. W. Clyde & Co., Springville 157,437
(D) Carl E. Nelson, Logan, Utah, and Morrison-Knudsen Co., Boise 161,145
(E) Olof Nelson, Logan, Utah 164,848
(F) Dodge Const. Inc., Fallon, Nev. 174,400
(G) George K. Thompson, L. A. $195,157
(H) Claude C. Wood, Stockton 195,314
(I) Floyd S. Whiting, Elberta, Utah 201,128
(J) Fredericksen & Westbrook 215,285
(K) Isbell Const. Co., Reno 229,580
(L) A. S. Vinnell Co., L. A. 240,500

Bids received on:

(1) 192,000 cu. yd. unclass. excavation
(2) 2,330 cu. yd. struc. excavation
(3) 13,100 cu. yd. borrow excavation
(4) 219,000 sta. yd. overhaul
(5) 10,000 cu. yd. mi. borrow haul
(6) 6,000 M gal. water
(7) 35,000 T crusher run top course
(8) 190 T slow cur. asph. SC2, pr. ct.
(9) 13,500 T "B" dense plmix. Grade A
(10) 1,100 T "B" cover aggregate
(11) 660 T bit. matl. SC4
(12) 130 T emulsified asphalt
(13) 448 cu. yd. "A" cem. stone masonry
(14) 95 cu. yd. "B" cem. stone masonry
(15) 11,644 ft. 18" corr. metal pipe
(16) 276 ft. 24" corr. metal pipe
(17) 242 ft. 30" corr. metal pipe
(18) 114 ft. 36" corr. metal pipe
(19) 320 ft. 42" corr. metal pipe
(20) 50 ft. 48" corr. metal pipe
(21) 206 ft. 54" CMP 12 ga.
(22) 60 ft. 54" corr. metal pipe, 8 ga.
(23) 70 ft. 60" corr. metal pipe
(24) 170 ft. 8" bit. coated CMP, type 2
(25) 1,488 ft. 18" bit. coated CMP, type 2
(26) 1,358 ft. 24" bit. coated CMP, type 2
(27) 124 ft. 30" bit. coated CMP, type 2
(28) 80 ft. 36" bit. coated CMP, type 2
(29) 174 ft. 42" bit. coated CMP, type 2
(30) 216 ft. 48" bit. coated CMP, type 2
(31) 9 ea. spillway inlets, type A
(32) 326 ft. 18" vitrified pipe
(33) 132 ft. 30" vitrified pipe
(34) 352 cu. yd. hand laid riprap
(35) 6 ea. 18" drop inlets, type 2
(36) 6 ea. reinf. concrete inlet covers
(37) 482 sq. yd. grouted rubble gutter
(38) 14 ea. monuments, type A
(39) 621 ft. remove, clean and relay or stockpile corr. metal pipe
(40) 18 ea. guideposts
(41) Force Acct. obliterate roads
(42) Force Acct. shape terrain, parking area

(Continued on next page)

GRAMM BULK CEMENT
Aerated Carriers and Storage Units

Speed Deliveries... Reduce Handling... Save Man-Hours... Slash Costs...

on Transport of Bulk Cement Direct to Construction Sites!

Gramm aerated bulk cement trailers used for field transport and storage of oil well cement. Ruggedly built for off-highway service.

Direct truck chassis mounted aerated units used by International Cementers, Inc., Long Beach, Calif., as front unit of 4-wheel trailer train.

Amazing Efficiency—Simplicity Now Available to Contractors

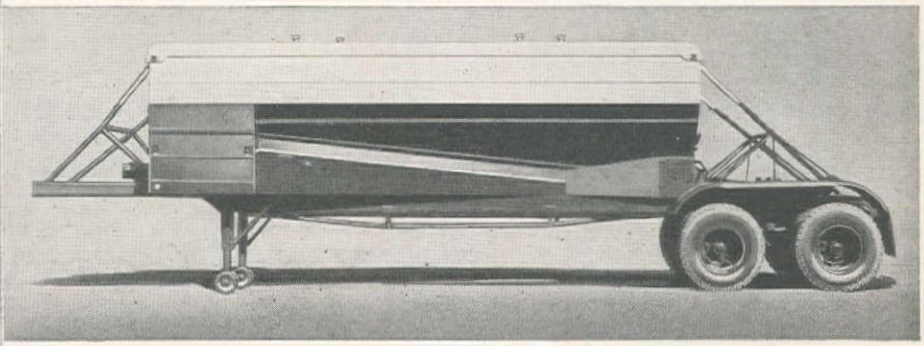
Gramm aerated transport equipment delivers bulk cement to the exact spot desired — with new speed, new efficiency, and with trouble-free certainty — without danger of breakdowns which cause costly delay and work stoppage!

HAUL PEAK CAPACITIES AS FOLLOWS:

Standard Gramm semi-trailer aerated transport units available in 300, 400, 500, and 600 sack capacities. Truck mounted transport units of 150, 250, and 300 sack capacities available. Mobile semi-trailer bulk storage units available in 800, 1000, 1200, 1400, and 1600 sack capacities.

UNLOAD UP TO 25 BARRELS A MINUTE

Positive control of unloading from either side of vehicle permits perfect coordination with allied equipment — conveyors, mixers, scales, etc. One man finger tip discharge control permits unloading at any desired speed—from a mere trickle up to a flood of 25 barrels a minute.



Special Units Designed to Fit Your Exact Needs

As illustrated at left and above, two views of special trailer application designed to conform with state load laws. This special built aerated trailer used by Associated Sand & Gravel Co., Everett, Wash.

WRITE TODAY FOR ILLUSTRATED BROCHURE

DISTRIBUTED BY:

LEROI-RIX MACHINERY COMPANY
6403 E. Slauson Ave.
Los Angeles 22, Calif.

C. H. GRANT COMPANY
435 Bryant Street
San Francisco, Calif.

WESTERN MACHINERY COMPANY
748 West 8th South
Salt Lake City 13, Utah

MANUFACTURED BY

GRAMM TRAILER CORPORATION
DELPHOS, OHIO

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
(1)	.155	.15	.17	.16	.245	.22	.35	.27	.30	.30	.32	.32
(2)	1.00	.85	1.00	1.20	1.50	1.50	1.10	1.00	2.00	2.00	2.00	1.00
(3)	.18	.17	.20	.30	.24	.25	.33	.40	.25	.30	.37	.35
(4)	.01	.01	.01	.01	.01	.01	.005	.005	.02	.01	.01	.005
(5)	.15	.18	.20	.20	.20	.20	.15	.10	.25	.20	.10	.20
(6)	1.25	1.30	1.60	1.60	1.50	2.00	.50	2.50	3.00	2.50	2.75	2.35
(7)	.55	.59	.45	.68	.55	.70	1.00	.85	.50	.88	.90	1.62
(8)	17.00	18.50	17.60	16.60	15.00	16.00	17.00	17.00	30.00	18.50	18.45	20.00
(9)	1.50	1.30	1.75	2.00	1.55	1.75	1.25	2.00	1.90	2.00	2.95	1.70
(10)	2.50	3.30	3.00	2.50	2.00	3.00	3.50	2.00	3.00	3.00	5.00	3.80
(11)	19.00	19.00	18.60	16.60	17.50	18.00	16.00	18.00	18.00	19.30	18.00	21.00
(12)	24.00	30.00	26.00	30.00	25.00	30.00	30.00	25.00	30.00	30.00	32.00	30.00
(13)	11.00	18.50	30.00	16.00	18.00	15.00	20.00	25.00	20.00	30.00	16.00	32.00
(14)	11.00	17.50	19.50	12.00	15.00	10.00	20.00	22.00	20.00	30.00	14.00	26.00
(15)	1.70	2.00	1.85	1.80	1.84	2.25	1.90	1.75	2.00	3.00	2.10	2.10
(16)	2.75	3.00	2.80	2.80	2.80	3.00	2.90	2.80	3.00	3.00	3.25	3.15
(17)	3.25	3.50	3.50	3.40	3.50	3.50	3.60	3.40	4.00	3.50	3.80	4.30
(18)	5.25	5.50	5.30	5.50	5.50	5.00	5.30	5.45	6.00	5.50	5.65	6.00
(19)	6.25	6.50	6.75	7.00	6.50	6.00	6.40	6.45	7.00	6.50	6.75	6.70
(20)	7.30	7.00	8.00	8.00	7.00	7.00	8.00	7.35	8.00	7.00	8.00	7.50
(21)	9.50	8.00	9.00	9.20	8.60	8.25	10.00	8.60	10.00	9.50	9.10	9.00
(22)	13.50	12.00	13.00	13.50	12.30	11.50	15.00	13.00	15.00	14.50	12.75	13.00
(23)	12.60	11.00	13.00	13.00	11.26	11.00	16.00	11.80	15.00	14.00	13.00	14.00
(24)	1.25	1.50	1.20	1.50	1.30	1.75	1.20	1.00	1.00	1.00	1.10	1.15
(25)	1.80	2.00	1.90	1.90	1.90	2.35	2.00	1.80	2.50	2.00	2.25	2.20
(26)	2.80	3.00	2.90	3.00	2.83	3.10	3.00	2.80	3.50	3.00	2.50	3.25
(27)	3.40	3.50	3.70	3.60	3.50	3.75	3.70	3.60	4.50	3.50	4.35	4.35
(28)	5.50	5.50	5.65	6.00	5.42	5.50	5.60	5.80	6.50	6.00	6.10	6.20
(29)	6.50	7.00	7.00	7.50	7.05	6.50	6.80	6.80	7.50	7.00	7.60	7.00
(30)	7.75	7.50	8.50	8.50	8.00	7.50	8.50	7.80	8.50	9.00	8.90	7.80
(31)	13.50	16.00	20.00	15.00	15.00	20.00	20.00	16.00	20.00	20.00	25.00	21.00
(32)	3.50	2.50	2.50	2.50	2.00	4.00	2.50	3.00	3.00	4.50	3.50	3.25
(33)	7.00	7.00	6.00	6.00	6.00	8.00	7.00	8.00	6.00	9.00	7.00	6.50
(34)	3.50	2.50	4.00	4.00	4.00	5.00	8.00	4.00	4.00	5.00	6.00	6.50
(35)	30.00	30.00	35.00	30.00	40.00	40.00	40.00	60.00	20.00	60.00	50.00	50.00
(36)	20.00	13.00	10.00	10.00	5.00	10.00	15.00	5.00	20.00	12.00	25.00	13.00
(37)	4.00	2.00	3.00	4.00	3.00	2.00	2.10	1.50	2.00	.50	5.00	4.25
(38)	3.00	5.00	4.00	5.00	4.00	4.00	3.00	3.00	5.00	3.00	4.00	4.50
(39)	1.00	.60	.75	1.00	1.00	2.00	1.00	1.00	1.00	1.50	1.00	.75
(40)	2.00	3.00	3.00	4.00	4.00	5.00	3.00	3.00	5.00	3.00	3.50	2.50
(41)	$1000	$1000	$1000	$1000	$1000	$1000	$1000	$1000	$1000	$1000	$1000	$1000
(42)	$300	$300	$300	$300	$300	$300	$300	$300	$300	$300	$300	$300

In Utah, 1949—

Utah—Beaver County—State—Grade and Surf.

Whiting & Haymond Contractors of Springville, Utah, with a bid of $119,055, were low before the State Road Commission of Utah for construction of 9.932 mi. of 2-in. road mixed bituminous surfaced road and a reinforced concrete bridge of 20-ft. span on the Milford-Frisco road. Unit bids were submitted as follows:

(1) Whiting & Haymond Contractors.....$119,055
(2) Reynolds Construction Co..... 127,746
(3) L. T. Johnson Construction Co..... 127,904
(4) Parson & Fife Construction Co..... 144,377
(5) Germer, Abbott and Waldron.....$145,794
— W. W. Clyde & Co..... 146,069
— A. O. Thorn & Sons Construction Co. 153,890
(6) Engineer's Estimate 125,543

		(1)	(2)	(3)	(4)	(5)	(6)
154,000	gal. bituminous material, Type SC-3	.125	.14	.13	.15	.1425	.15
32,000	gal. bituminous material, Type RC-4	.18	.20	.175	.185	.1775	.19
1,600	ton cover material	2.50	3.00	3.50	4.00	4.50	3.00
9.925	miles scarifying and mixing (20 ft. wide)	550.00	700.00	700.00	800.00	700.00	650.00
44,000	ton cr. rock or cr. gravel surface crse.	.65	.65	.65	.75	.80	.60
80,000	cu. yd. unclassified excavation	.24	.25	.25	.30	.30	.25
115,000	sta. yd. overhaul, Class "A"	.0125	.01	.015	.02	.02	.015
500	yd. mi. overhaul, Class "B"	.20	.20	.20	.20	.25	.20
1,350	hr. rolling	4.00	5.00	4.00	5.00	5.00	5.00
400	cu. yd. excavation for structures	1.50	3.00	1.50	1.00	2.25	1.50
2.45	miles shaping subgrade and shoulders	500.00	600.00	600.00	600.00	$1,700	300.00
250	cu. yd. channel excavation	.50	1.00	1.50	1.00	.50	.35
492	lin. ft. 18-in. C.G.M. pipe	2.75	3.00	3.50	3.20	3.60	2.95
366	lin. ft. 24-in. C.G.M. pipe	4.50	4.50	5.00	4.40	5.00	4.60
94	lin. ft. 30-in. C.G.M. pipe	5.75	5.65	6.00	5.60	6.20	5.70
48	lin. ft. 36-in. C.G.M. pipe	8.75	8.90	11.00	8.40	9.50	8.75
60	lin. ft. 48-in. C.G.M. pipe	13.20	12.90	14.00	13.30	12.75	11.75
74	lin. ft. 60-in. C.G.M. pipe	20.50	21.00	20.00	20.00	21.00	20.70
62	cu. yd. concrete, Class "A"	60.00	60.00	70.00	75.00	60.00	55.00
11,200	lb. reinforcing steel	.12	.14	.1255	.14	.15	.12
68	each guide posts	4.50	7.00	6.00	5.00	6.00	4.00
90	each right-of-way markers	5.00	6.00	5.00	6.00	5.00	2.50
	CONCRETE BRIDGE						
180	cu. yd. excavation for structures	2.00	3.00	2.00	1.00	4.00	5.00
194	cu. yd. concrete, Class "A"	59.00	55.00	10.00	75.00	60.00	60.00
25,000	lb. reinforcing steel	.12	.14	.1255	.14	.15	.14
68.5	lin. ft. steel handrail	14.65	16.00	12.00	15.00	16.50	16.00

Ten Years Ago in Utah—

Utah—Beaver County—State—Grade and Surface

Dodge Construction Co., Fallon, Nev., at $73,321 (Schedule No. 1) and Floyd S. Whiting, Kaysville, at $129,150 (Schedule No. 2) low to Utah State Road Commission, Salt Lake City, for 6.748 mi. of highway, grading and drainage structures (Schedule No. 2) and gravel base, surface and roadmix (Schedule No. 1) on the Manderfield-Pine Creek Summit road. Contract awarded to Floyd S. Whiting for Schedule No. 2.

Bids for Schedule No. 1 were received from the following:

(1) Dodge Construction Co.....$73,321
(2) W. W. Clyde..... 75,022
(3) McNutt Bros. $76,301
(4) Engineer's Estimate 75,162

Schedule I	(1)	(2)	(3)	(4)
51,700 tons gravel base	.53	.50	.55	.50
39,550 tons gravel surface	.55	.55	.60	.55
4,800 bbl. bituminous material, Type SC-3	3.25	3.50	3.25	3.85
535 bbl. bituminous material, Type RC-4 (seal coat)	4.00	4.00	3.60	4.35
6,748 mi. scarifying and mixing	800.00	600.00	575.00	650.00
910 tons cover material	3.00	3.00	3.00	2.60

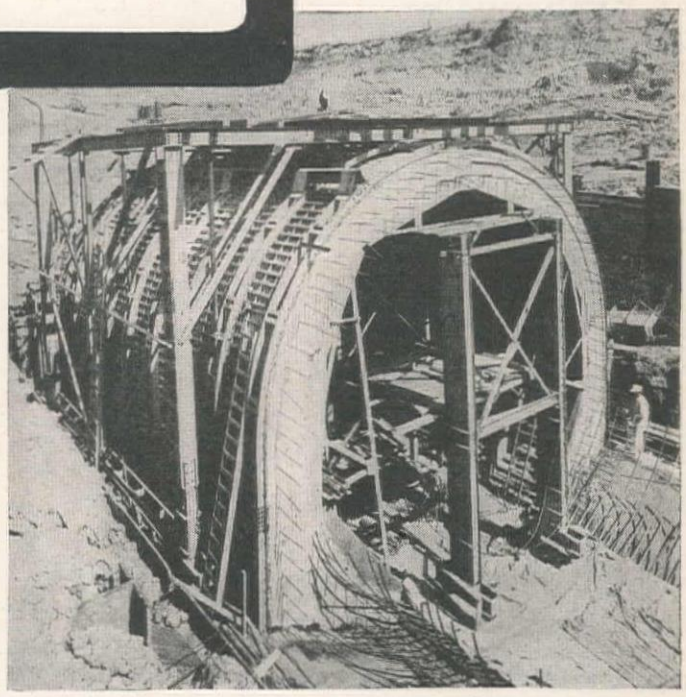
Bids for Schedule No. 2 were received from the following:

(1) Floyd S. Whiting.....$129,150
(2) W. W. Clyde..... 135,181
(3) McNutt Bros.....$138,220
(4) Engineer's Estimate 132,818

(Continued on next page)

Job tough! Problems unusual!

28′ 0 Diameter COLLAPSIBLE TUNNEL FORMS being used on PASADENA TUNNEL.



Forms and form technique by

CONCRETE FORMS CORP.

IN THE CONSTRUCTION of the Pasadena Vehicular Tunnel in Pasadena, Texas, treacherous ground at the bottom of an 110-foot deep excavation caused difficulties solved by pouring the complete shell for the land tunnel in the first pour. Forms and form techniques were supplied by Concrete Forms Corporation.

Steel shells of the underwater tubes and special 40-foot traveler forms were specially designed for the purpose by Concrete Forms Corp.

In the underwater sections provision for quick assembly and knock-down was needed since the parts had to be shifted from one of the 375′ tubes to the next one through a six by four-foot opening. Concrete Forms solved the problem.

To those interested in the details of this tunnel, we will gladly send a reprint of an article on the subject. Just ask for it. Whether you plan to go through mountain, tunnel underwater or just pour a foundation for a small warehouse, if there is any special problem, consult Concrete Forms Corp.

We have solved so many problems for contractors and builders that we can help you use a sharper pencil on your estimates. Please write without hesitation for any advice or information. Today's a good time!

PASADENA VEHICULAR TUNNEL, Pasadena, Texas

For Harris County, Texas

ARCHITECTS & ENGINEERS
Palmer & Baker

GENERAL CONTRACTOR
Merrit, Chapman & Scott

LAND SECTIONS BY
R. P. Farnsworth & Co., Inc.

STEEL FORMS FOR LAND & WATER SECTION
Concrete Forms Corporation
Irvington, New York

STATISTICS OF PASADENA TUNNEL

1500 feet underwater, 2236 feet under land — Excavation 110 feet deep — Inside diameter of tunnel 28′ — Underwater tunnel sections 375′ long — Waterstop shell, 32′ diameter — Shells for underwater section floated 400 miles to site.

CFC
CONCRETE FORMS CORPORATION
IRVINGTON, NEW YORK

Schedule II	(1)	(2)	(3)	(4)
341,500 cu. yd. unclassified excavation	.25	.23	.25	.23
20,000 cu. yd. channel excavation	.25	.30	.25	.30
1,250,000 st. yd. overhaul, Class "A"	.015	.015	.015	.01
10,500 yd. mi. overhaul, Class "B"	.20	.20	.10	.12
4,950 1,000 gal. watering	1.25	1.00	2.00	2.00
3.6 mi. obliteration of old road	100.00	100.00	150.00	150.00
20 acre clearing and grubbing	50.00	50.00	40.00	50.00
152 station rounded cut slopes	8.00	5.00	8.00	10.00
200 cu. yo. riprap	8.00	5.00	8.00	10.00
604 lin. ft. 18-in. C.M. pipe	1.75	2.00	1.85	1.70
1,340 lin. ft. 24-in. C.M. pipe	2.60	3.00	2.75	2.60
294 lin. ft. 30-in C.M. pipe	3.50	4.00	3.50	3.35
340 lin. ft. 36-in. C.M. pipe	5.50	6.00	5.50	5.35
152 lin. ft. 48-in. C.M. pipe	7.50	8.00	7.50	7.60
22 lin. ft. relaying 24-in. C.M. pipe	1.00	1.00	1.00	.50
850 cu. yd. excavation for structure	1.00	1.00	1.00	1.00
55 cu. yd. concrete, Class "A"	25.00	30.00	25.00	30.00
8,500 lb. reinforcing steel	.08	.08	.07	.08
500 lb. structural steel	.20	.10	.15	.15
202 each guide posts	3.50	4.00	3.50	3.50
1,724 lin. ft. guard rail, Type "P"	1.20	1.25	1.40	1.20
76 each right of way markers	2.50	2.50	2.50	2.25
2 each F. A. P. markers	10.00	10.00	10.00	10.00

In California, 1949–

California—San Luis Obispo County—State—Grade and Surf.

Granite Construction Co., Watsonville, Calif., was low bidder before the California Division of Highways, at $434,455, for the grading and surfacing with plant-mixed surfacing on imported base materials of about 2.1 mi. of the roadway between Cuesta Siding and south of Santa Margarita. Unit bids were submitted by the following:

(1) Granite Construction Co. $434,455
(2) Clyde W. Wood, Inc. 471,389
(3) Rand Construction Co., Inc. 478,124
(4) Fredericksen & Kasler 483,801
(5) Cox Bros. Construction Co. and J. E. Haddock, Ltd. $493,240
(6) Madonna Construction Co. 497,928
(7) M. J. B. Construction Co. 509,404

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1,010 cu. yd. removing concrete	3.00	3.00	12.00	3.75	5.30	3.10	5.00
1,010 cu. yd. placing broken concrete	4.00	5.00	8.00	2.00	2.70	4.00	5.00
101 sta. clearing and grubbing	100.00	75.00	175.00	264.00	175.00	177.00	200.00
105,000 cu. yd. roadway excav.	.44	.35	.465	.415	.62	.75	.50
32,000 cu. yd. ditch and channel excav.	.35	.40	.50	.43	.62	1.00	.85
5,850 cu. yd. struct. excav.	2.20	3.00	3.00	4.12	2.30	2.50	4.00
45,000 tons imported subbase material	.85	1.25	.88	1.02	.93	1.00	1.00
26,000 tons imported base material	.90	1.50	1.00	1.16	1.00	1.00	1.00
1,100,000 sta. yd. overhaul	.007	.005	.007	.01	.004	.005	.01
6,500 sq. yd. compacting original ground	.05	.05	.05	.05	.10	.10	.10
Lump sum, dev. wat. sup. and furn. wat. equip.	$8,300	$5,000	$5,000	$16,600	$7,000	$10,000	$5,000
5,500 M. gal. applying water	1.50	1.50	1.50	1.10	1.40	1.25	1.50
110 sta. finishing roadway	25.00	25.00	10.00	14.00	20.00	40.00	20.00
1,400 bbl. Portland cement (cem. stab'n)	4.00	5.00	5.00	5.00	4.50	4.00	5.00
13,000 tons imported base matl. (cem. stab.)	1.50	1.75	1.35	2.00	1.30	1.25	1.78
17,300 tons mineral aggregate (plant-mix. surf.)	4.35	4.00	4.00	4.48	4.00	4.25	4.50
950 tons paving asph. (plant-mix. surf.)	18.00	21.50	22.00	20.00	22.00	22.00	24.00
12 tons liquid asphalt SC-3 (plant-mix surf. stp.)	20.00	25.00	22.00	21.00	22.00	22.00	30.00
67,000 sq. ft. placing plant-mix surf. (gutters, di. and sl. dr.)	.12	.15	.10	.10	.20	.20	.15
2,900 lin. ft. placing plant-mix. surf. dikes	.15	.15	.10	.25	.25	.20	.15
155 tons liquid asph., SC-2 (pr. ct. and penetr. tr.)	25.00	23.00	23.50	24.00	21.50	25.00	28.00
55 tons asph. emuls. (paint bdr. and seal ct.)	26.00	31.00	31.50	42.00	32.00	35.00	40.00
550 tons screenings (seal ct.)	8.00	8.00	7.00	7.00	8.25	6.00	5.50
300 lin. ft. raised bars	1.00	1.50	1.00	1.00	1.20	1.00	1.50
526 cu. yd. Cl. "A" Portland cem. conc. (str.)	60.00	65.00	65.00	60.00	80.00	53.00	65.00
85,400 lb. bar reinforcing steel	.11	.12	.12	.095	.115	.11	.11
520 cu. yd. sacked concrete riprap	30.00	26.00	30.00	20.00	28.50	20.00	28.00
140 cu. yd. Portland cement concrete curbs	34.00	50.00	50.00	42.00	50.00	40.00	42.00
30 lbs. steel angles (curb inlets)	.50	1.00	1.00	.90	.60	1.00	.80
62 ea. monuments	9.00	8.00	6.00	6.50	6.00	6.00	7.00
11 ea. center line monuments	10.00	10.00	6.00	15.00	9.00	6.00	15.00
3,050 lin. ft. metal plate guard railing	2.80	3.75	3.50	2.60	3.00	2.50	3.50
210 ea. install metal guide posts	4.50	3.00	4.00	2.00	2.00	5.00	4.00
75 ea. install metal culv. and monu. mkrs.	3.00	3.00	3.00	2.00	3.00	5.00	4.00
1.9 miles new property fence	$1,000	$1,500	$1,200	$1,200	$1,400	$1,000	$1,400
3 ea. drive gates	40.00	75.00	65.00	60.00	55.00	50.00	60.00
1,100 lin. ft. chain link fence	1.20	2.00	1.35	1.50	2.00	1.50	1.40
950 lin. ft. 24-in. reinforced concrete pipe	6.00	7.00	5.00	6.00	6.50	5.50	5.25
290 lin. ft. 30-in. reinforced concrete pipe	9.00	9.00	7.20	8.00	8.75	7.40	7.40
290 lin. ft. 36-in. reinforced concrete pipe	11.00	11.50	9.70	11.00	11.50	10.00	10.65
100 lin. ft. 18-in. corru. metal pipe (14 ga.)	3.50	4.25	3.00	4.00	4.00	3.00	4.00
230 lin. ft. 36-in. corru. metal pipe (12 ga.)	8.00	8.00	12.00	8.50	9.00	7.00	12.00
8 ea. spillway assemblies	40.00	35.00	25.00	31.00	30.00	25.00	40.00
200 lin. ft. 8-in. corru. metal pipe dn. drains (16 ga.)	2.00	2.00	1.75	1.85	1.60	1.60	2.20
7 ea. pipe anchors	15.00	25.00	10.00	20.00	30.00	25.00	20.00
339 lin. ft. salvaging exist. pipe culv.	1.50	1.50	1.50	1.50	8.50	2.00	6.00
7 ea. horiz. reflector units	12.00	10.00	10.00	6.00	8.50	2.00	6.00
2,200 lin. ft. 24-in. concrete cyl. pipe	14.00	14.00	18.00	11.00	16.00	12.50	13.00

Ten Years Ago in California–

California—San Luis Obispo Co.—State—Grade & Plantmix Surf.

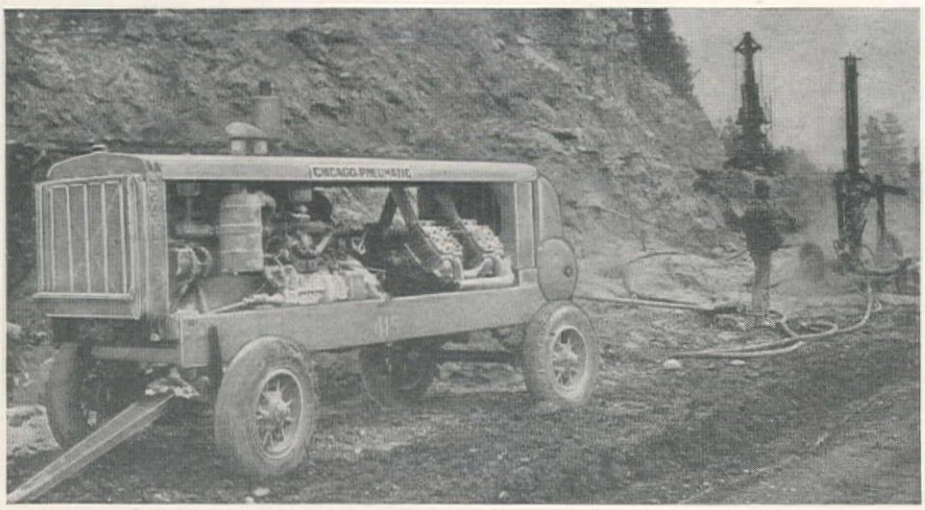
Metropolitan Const. Co., Room 1205, 208 W. 8th St., Los Angeles, $646,027, Alt. A, and $651,255, Alt. B, low to California Div. of Highways, Sacramento, for 3.3 mi. grade and plant mix surface (medium curing type) on crusher run base betw. San Luis Obispo Creek and Cuesta Siding (V SLO 2-D), in SAN LUIS OBISPO CO., Calif. Bids from:

	Alt. A	Alt. B
(A) Metropolitan Const. Co.	$646,027	$651,255
(B) Geo. Pollock, Sacramento	666,633	671,531
(C) Macco Const. Co.	683,137	684,100
(D) Bodenhamer Const. Co. & Lewis Const. Co., Oak.	707,070	.....
(E) A. Teichert & Son, Inc.	$708,235	$710,080
(F) J. E. Haddock, Ltd.	726,764	.....
(G) Basich Bros., L. A.	737,952	.....
(H) Granfield, Farrar & Carlin, San Francisco	741,551	.....

(Continued on next page)

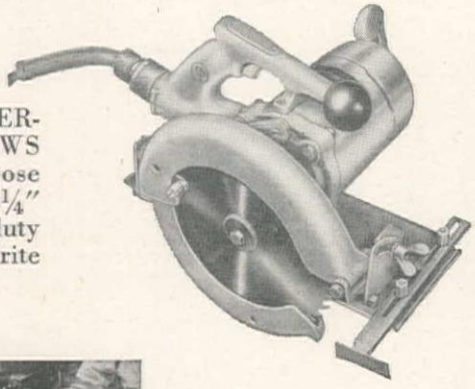
JOBS MOVE ON SCHEDULE

with CP construction equipment



The well-earned reputation for fuel-economy of CP PORTABLE COMPRESSORS owes much to the CP gradual speed regulator, that adjusts engine speed exactly to air demands. This, with other special CP features, effects fuel savings of 15% to 35%.

Gasoline-driven portables range from 60 to 315 c.f.m. actual capacity; Diesel-driven, from 105 to 500 c.f.m., the latter model being shown in action.



New HI-SPEED UNIVERSAL ELECTRIC SAWS are rugged all-purpose power saws; 7½", 8¼" and 9" sizes. Heavy duty motors, helical gears. Write for Bulletin SP-3000.

Providing fast and easy operation of the more powerful CP drifter drills, the lightweight G-200R WAGON DRILL reduces drilling costs, drills holes at any angle, is easily moved over uneven ground. Available with CP-50N (3"), CP-60N (3½"), or CP-70 (4") Drifters.

Seven different models in the complete line of CP Pneumatic and High Frequency Electric VIBRATORS enable the contractor to select just the type and size for a specific job.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

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WESTERN MACHINERY CO., 760 Folsom St., San Francisco Calif., Phone: EXbrook 2-4167; WESTERN MACHINERY CO., 500 North 16th St., Sacramento, Calif., Phone: 2-1211; WESTERN MACHINERY CO., 5722 So. Santa Fe Ave., Los Angeles, Calif., Phone: LOgan 3371; BALZER MACHINERY COMPANY, 2136 S.E. Eighth Ave., Portland, Oregon; WESTERN MACHINERY CO., N. 808 Division St., Spokane, Washington; HALL-PERRY MACHINERY CO., 812 E. Iron St., Butte, Montana; YUKON EQUIPMENT, INC., Seattle-Alaska. HONOLULU IRON WORKS COMPANY, Nuuana and Queen Streets, Honolulu 2, T. H.

Washington Highways

. . . Continued from page 140

cies; and economic saving to traffic by improvement in grades and alignment.

From the programs as submitted by the districts, the biennial construction program is developed and made a part of the Director of Budget's biennial report, which is submitted to the legislature by the governor. After the legislative appropriations have been made, the district highway engineers are requested to establish a list of the projects included in the biennial budget which they desire to carry out on the first year's construction program based on estimated revenue, taking into consideration the status of preparation of plans and acquisition of right of way for carrying out the work as programmed.

Through the highway planning survey program, it is planned to keep the inventory of highway and structure needs current and thereby provide for adjustments in the construction program to meet unforeseen conditions and economic changes.

What Satevepost SAID!!

. . . Continued from page 62

fied by charging of expense against DEFENSE, etc. If the West wants water on lands for irrigation, the productivity of the land thus irrigated plus the sale of the water power at the dam should make up the measuring stick of justification.

Maybe it is time for a serious halt to both Reclamation and Engineer projects, a dissemination of the present engaged talent looking for security, and later a reorganization on projects worth while.

The old fashioned "Pork Barrel" ceased rolling for a time when the appropriations were made by Congress direct to the Army Engineers for expenditure on the most feasible projects in their opinion. This was the honeymoon for the Army Engineer, and I think he would like to return to it if he could shake the forces which urge him to Spend with a capital "S."

The justification, originally, for the River and Harbor work to be done under the Army Engineer was to assure honesty. The fact that such work helped them in their work in wars, line of supply, etc., is secondary. Admire the Engineer for his unwillingness to drop without resistance what he has developed over so long a period. Admire him still more, if he bows to basic engineering sense and is taken over by a Department of Public Works, under which authority all construction activities of the Engineers and of Reclamation could be amalgamated. In the words of Winston Churchill, "I am not looking forward to aid in the dissolution of the Empire," so the Army Engineer would like, if it has to happen, to be eased out of his command in as painless a manner as justice and wisdom can devise.

COL. ——— ——— (Ret.)
U.S.A. Corps of Engineers

		Alt. A	Alt. B
(I)	Utah Const. Co., S. F.	$773,923	$778,980
(J)	C. O. Sparks & Mundo Engineering Corp., L. A.	798,277	.....
(K)	Griffith Co., L. A.	$798,881	.....
(L)	Guy F. Atkinson, S. F.	794,313	.....
(M)	United Conc. Pipe Corp.	846,537	.....

Bids received on:

(1)	170 sta. clearing & grubbing
(2)	8,400 M gal. water
(3)	915,000 cu. yd. roadway excavation
(4)	16,200 cu. yd. struc. excavation
(5)	6,100 cu. yd. ditch & chan. excav.
(6)	3,310,000 sta. yd. overhaul
(7)	44,200 cu. yd. imported borrow
(8)	98,000 cu. yd. trench ex. (filltreat)
(9)	16,000 cu. yd. rk. fill. matl. (fill tr.)
(10)	4,400 cu. yd. remove concrete
(11)	38 sta. scarify & level road
(12)	170 sta. finishing roadway
(13)	22,500 t. crusher run base
(14)	17,500 t. min. aggr. (pl. mix. surf.)
(15)	915 ft. liq. asph. ROMC 4 or 5
(16)	90 t. liq. asph. SC-2, pr. coat
(17)	27 t. liq. asph. SC-4 stockp. surf.
(18)	7 t. liq. asph. SC-1A pen. oil tr.
(19)	455 t. liq. asph. SC-2 rd. mix surf.
(20)	37,500 sq. yd. prep., mix & shape passagew.
(21)	85 t. liq. asph. 90-95 seal coat
(22)	1,050 t. screenings seal coat
(23)	270 cu. yd. "A" conc. structures
(24)	23,000 lb. reinforcing steel
(25)	65 cu. yd. "A" conc. chan. lining
(26)	380 sq. yd. mesh reinforcement
(27)	1,086 lin. ft. 8" corr. metal pipe
(28)	3,146 lin. ft. 18" corr. metal pipe
(29)	1,644 lin. ft. 24" corr. metal pipe
(30)	206 lin. ft. 30" CMP, 14 ga.
(31)	250 lin. ft. 30" CMP, 12 ga.
(32)	530 lin. ft. 36" CMP, 12 ga.
(33)	1,412 lin. ft. 36" CMP, 10 ga.
(34)	92 lin. ft. 42" lin. ft. CMP, 10 ga.
(35)	204 lin. ft. 60" CMP, 8 ga.
(36)	6,754 lin. ft. 8" perf. met. pipe underdr.
(37)	750 cy. rk. filling matl. underdr.
(38)	330 lin. ft. rem., clean & relay CMP
(39)	254 lin. ft. rem., clean & salv. CMP
(40)	390 lin. ft. 75" multiplate CMP 410-18
(41)	300 lin. ft. 75" multiplate CMP 47-15
(42)	170 lin. ft. 105" multiplate CMP 610-18
(43)	300 lin. ft. 120" multiplate CMP 73-11
(44)	39 ea. spillway assemblies
(45)	32 ea. drop inlet frames & covers
(46)	30 ea. redw. timber drop in cov.
(47)	14,535 lin ft. laminated guardrail
(48)	55 ea. culvert markers
(49)	6.8 mi. new fences
(50)	10 ea. drive gates
(51)	33,550 lin. ft. timber curb
(52)	75 ea. monuments
	ALTERNATE "A"
(53)	271 ea. 6"x6"x4' metal headers
(54)	1,467 ea. 6"x6"x6' metal headers
(56)	69 ea. 6"x6"x8' met. step back headers
(57)	4,169 ea. 6"x8"x6' metal stretchers
(58)	1,682 ea. metal header caps
(59)	218 ea. met. header spacers
(60)	287 ea. met. header inserts
(61)	4 ea. gap fillers
(62)	301 ea. stretcher inserts
	ALTERNATE "B"
(63)	544 ea. 5"x6"x6' reinf. conc. headers
(64)	2,357 ea. 5' 10"x6' reinf. conc. headers
(65)	2,204 ea. 6"x6"x6' reinf. conc. stretch.
(66)	2,126 ea. 6"x8"x6' reinf. conc. stretch.
(67)	1,082 ea. 6"x10"x6' reinf. conc. stretch.
(68)	18 ea. 10"x6"x10" conc. filler blks.

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)
(1)	50.00	50.00	25.00	27.00	50.00	50.00	$200	40.00	15.00	70.00	41.00	60.00	$100
(2)	.75	1.00	1.25	1.45	1.20	1.40	1.25	1.25	1.00	.50	1.25	1.50	1.00
(3)	.30	.245	.23	.326	.294	.26	.29	.28	.33	.26	.35	.35	.37
(4)	1.00	1.00	1.25	.60	1.15	1.75	1.00	1.20	.90	1.50	1.30	1.00	.80
(5)	.75	.70	.85	.50	.60	.50	.50	.80	.60	.75	1.30	.60	.50
(6)	.0025	.015	.008	.017	.005	.005	.01	.005	.008	.005	.004	.005	.008
(7)	.50	.60	.60	.48	.60	.75	.80	.90	1.10	1.30	.65	.70	.90
(8)	.30	.30	.36	.31	.36	.33	.30	.45	.25	.80	.55	.40	.39
(9)	2.35	1.50	2.10	.92	1.80	2.50	2.40	2.00	2.75	3.50	3.00	2.50	2.50
(10)	1.00	2.00	2.50	1.25	1.50	1.25	1.15	1.40	2.00	2.00	1.25	2.00	1.50
(11)	15.00	10.00	12.00	20.00	20.00	15.00	3.50	7.00	6.00	5.00	3.50	6.00	30.00
(12)	20.00	10.00	12.00	10.00	10.00	10.00	10.00	7.00	12.00	10.00	6.00	5.00	15.00
(13)	1.65	2.00	2.20	2.00	2.25	2.60	2.00	2.75	2.25	2.40	2.60	2.65	2.60
(14)	1.90	2.60	3.05	2.00	2.50	3.00	2.50	3.05	2.75	2.90	2.70	3.00	3.00
(15)	18.00	16.00	20.50	14.00	20.00	20.00	17.00	18.00	20.00	20.00	17.25	18.00	15.60
(16)	10.00	10.00	13.35	10.00	10.00	10.00	9.00	11.00	14.00	15.00	10.50	10.00	15.00
(17)	13.00	17.00	17.00	12.00	15.00	14.50	14.00	14.00	14.00	25.00	13.50	15.00	20.00
(18)	13.00	14.00	15.00	14.00	20.00	14.40	16.00	15.00	14.00	35.00	13.50	18.00	20.00
(19)	10.00	10.00	13.35	9.65	9.00	9.70	9.00	10.00	17.00	13.00	10.00	10.00	12.00
(20)	.08	.10	.10	.04	.08	.10	.06	.10	.10	.15	.07	.07	.10
(21)	18.00	21.00	20.50	15.00	16.00	24.50	15.00	18.00	20.00	20.00	17.75	16.75	20.00
(22)	3.00	3.50	3.50	3.00	3.30	3.40	2.70	3.50	2.50	2.50	2.80	3.50	3.00
(23)	22.00	30.00	42.50	30.00	24.00	25.00	25.00	26.00	24.00	25.00	30.00	24.00	24.00
(24)	.06	.06	.01	.05	.055	.06	.05	.05	.06	.06	.06	.05	.05
(25)	16.00	20.00	36.00	30.00	15.00	20.00	23.00	20.00	20.00	17.00	20.00	19.00	15.00
(26)	.50	.50	.50	.38	.50	.50	.50	.45	.25	.50	.50	.40	.35
(27)	.80	1.00	1.25	.96	1.00	1.00	1.00	1.00	.90	1.00	1.00	1.10	1.10
(28)	1.00	2.00	2.00	1.86	1.85	1.75	2.00	2.00	1.90	1.70	2.00	2.00	1.90
(29)	2.50	2.75	3.00	2.79	2.95	2.70	3.00	3.00	2.90	2.70	3.00	3.25	2.50
(30)	3.25	3.50	3.80	3.55	3.65	3.35	4.00	3.50	3.60	3.00	3.75	3.75	3.00
(31)	4.00	4.25	4.90	4.42	4.65	4.40	5.00	4.50	4.60	4.00	4.50	4.50	4.00
(32)	5.00	5.00	6.10	5.26	5.45	5.30	5.50	5.50	5.60	5.50	5.50	5.50	6.00
(33)	5.80	6.50	7.30	6.26	6.65	6.40	6.50	7.00	6.90	6.00	6.60	6.50	7.00
(34)	6.75	8.50	9.00	8.40	8.50	7.60	6.60	8.00	8.40	7.00	8.00	8.00	9.00
(35)	13.00	15.00	15.75	13.26	15.25	14.00	15.00	15.00	15.60	13.00	15.00	15.00	18.00
(36)	.80	1.00	1.10	.95	1.00	1.00	1.20	1.00	1.00	.90	1.00	1.10	1.10
(37)	3.00	1.50	3.05	3.60	2.00	3.50	3.50	3.70	2.50	3.00	3.50	4.00	3.00
(38)	1.00	.75	1.25	1.25	.60	1.00	.80	1.00	1.50	1.50	1.00	1.25	2.00
(39)	1.00	.50	.60	.90	.50	.50	.40	.50	1.00	1.00	.60	1.00	2.00
(40)	15.00	15.00	18.05	15.59	17.75	16.50	16.00	18.00	18.00	17.00	16.00	17.00	25.00
(41)	20.00	20.00	24.40	20.97	24.00	22.50	23.00	24.00	24.00	22.00	22.00	22.00	31.00
(42)	20.00	25.00	25.00	21.46	26.00	23.00	23.00	28.00	25.00	25.00	23.00	23.00	30.00
(43)	40.00	45.00	49.00	40.66	47.25	44.00	43.00	48.00	47.00	45.00	43.00	43.00	50.00
(44)	12.00	14.00	17.00	12.25	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
(45)	40.00	50.00	57.00	44.00	50.00	50.00	50.00	45.00	25.00	50.00	50.00	50.00	45.00
(46)	10.00	5.00	12.00	6.48	10.00	10.00	6.00	10.00	10.00	7.00	10.00	10.00	5.00
(47)	.90	.90	1.25	.80	1.25	1.00	1.00	1.00	1.00	1.20	1.00	1.10	1.00
(48)	2.50	4.00	3.00	2.25	2.50	2.50	2.00	2.00	2.50	3.00	2.50	2.00	2.00
(49)	$700	$650	$700	$450	$600	$600	$600	$650	$550	$500	$650	$600	$600
(50)	20.00	20.00	15.00	16.45	20.00	15.00	20.00	20.00	20.00	25.00	25.00	24.00	15.00
(51)	.30	.30	.35	.35	.50	.45	.40	.35	.60	.60	.30	.50	.60
(52)	3.00	4.00	3.00	2.00	3.00	3.00	3.00	3.00	2.50	3.00	3.50	3.00	3.00
					ALTERNATE "A"								
(53)	4.10	5.00	4.70	5.17	5.00	4.60	5.00	6.00	4.40	5.00	4.50	4.50	5.20
(54)	5.10	6.00	5.90	6.49	6.00	5.65	6.00	6.50	5.50	6.00	6.00	5.50	6.30
(55)	6.10	7.25	7.00	7.83	7.50	6.75	6.50	8.00	6.60	7.00	7.00	6.50	7.40
(56)	6.25	7.50	7.20	7.96	7.50	6.90	7.00	8.00	6.70	7.10	7.00	6.60	7.60
(57)	4.35	5.25	4.60	5.56	5.10	4.68	5.00	6.00	4.60	5.10	5.00	4.70	6.00
(58)	.15	.30	.25	.20	.20	.25	.20	.25	.20	.20	.20	.30	.30
(59)	1.00	1.25	1.15	1.21	1.25	1.20	1.00	1.20	1.05	1.20	1.25	.25	2.00
(60)	.60	.90	.65	.72	.75	.60	.50	.60	.60	.70	1.00	.70	2.00
(61)	25.00	30.00	40.00	30.00	25.00	25.00	30.00	30.00	26.00	35.00	35.00	27.00	40.00
(62)	.70	.75	.90	.87	1.00	.85	.70	.75	.80	.70	1.00	.80	1.20
					ALTERNATE "B"								
(63)	3.80	5.00	3.64	.....	4.10	.....	.....	.....	2.90	.....	.....	.....	.....
(64)	5.25	6.00	5.02	.....	5.30	.....	.....	.....	4.80	.....	.....	.....	.....
(65)	3.25	4.00	3.18	.....	3.65	.....	.....	.....	3.45	.....	.....	.....	.....
(66)	3.80	4.25	3.66	.....	4.10	.....	.....	.....	4.60	.....	.....	.....	.....
(67)	4.60	5.25	4.40	.....	4.75	.....	.....	.....	5.70	.....	.....	.....	.....
(68)	.50	1.50	1.00	.....	1.00	.....	.....	.....	2.00	.....	.....	.....	.....

NEW EQUIPMENT

MORE COMPLETE INFORMATION on any of the new products or equipment briefly described on the following pages may be had by sending your request to Equipment Service, Western Construction News, 503 Market Street, San Francisco 5, Calif. For quicker service, please designate the item by number.

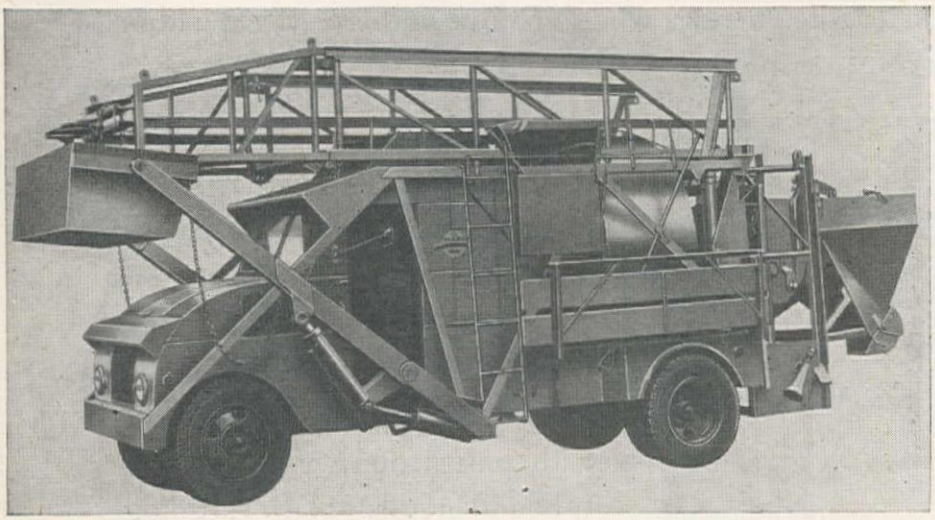
601

One-Yard Mixermobile

Manufacturer: Mixermobile Manufacturers, Portland, Ore.

Equipment: Model M-6 Mixermobile.

Features claimed: The mobile concrete mixing and elevating plant has several new features, including the hydraulic operation of the skip and a single suspension drum mounting. The drum is driven by enclosed gears. When the drum is revolving, the mixture can be visually inspected through either front or rear openings of the drum. The water meter can be checked and locked, so as to prevent any variance in quantity of water. Folded for traveling, the one-yard Mixermobile is 24 ft. long and 12 ft. high. It weighs 20,000 lb., or 6,000 lb. less than the 2-cu. yd. model. It passes within highway limitations anywhere in the United States and complies with the standard truck highway speeds. An experienced operator can set up or take down the one-yard Mixermobile in ten minutes or less.



602

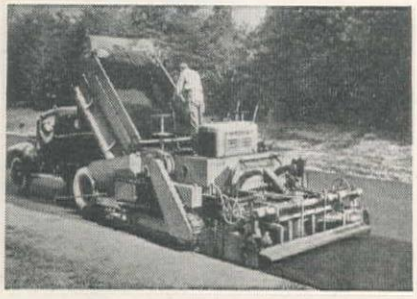
Speedy Paver

Manufacturer: Jaeger Machine Co., Columbus, Ohio.

Equipment: Bituminous Paver Model BP-5.

Features claimed: The new model lays any width of paving between 5 ft., 8 in. and 12 ft., 6 in. without removal or insertion of any parts, and can lay 25-ft. pavement in two lanes without any special attachments. Quickly adjustable for any width between 9 ft. and 12 ft., 6 in. by turning a handwheel, without stopping the machine. Widening for curves and other width changes is accomplished with a great saving of time. Width settings from 5 ft., 8 in. to 9 ft. are made by turning levers that control block-off gates. A hydraulic device automatically and positively matches level of course being laid with adjacent course, curb, gutter or other grade line, maintaining exactly correct thickness for final compaction by roller. The machine is also able to pave flush to curbs and insure perfectly

blended and sealed joints between adjacent lanes. Lays any mat thickness up to 6 in. Center and rear screeds oscillate at 900 strokes per minute, and have beveled front edges that are V-grooved in the direction



of travel. In addition, screeds are tiltable by raising either the leading or trailing edges. Quick crown changes ranging from 2 in. convex to 1 in. concave are easily achieved by cranks located above the screeds. Big tractor crawlers support all weight except that of the screeds and the long equalizing runners that ride on the base course or subgrade. Dual conveyors, independently and closely controlled through hydraulic clutches, carry material from hopper to screeds. An agitator-distributor breaks up, re-fluffs, and spreads the material evenly across the center screed width. Material channels at both sides provide material for the rear screeds. Screeds are heated by hot air, making them burn-proof, and have hydraulic lifting devices. The machine offers eight working speeds, ranging from 5 to 50 ft. per min. Road speeds range from .6 to 2.0 m.p.h.

603

New Design in Motor Trucks

Manufacturer: The White Motor Co., Cleveland, Ohio.

Equipment: White Super Power 3000 series with many dramatic improvements.

Features claimed: Most striking feature of the new line of trucks is a power-lift

cab, which provides complete accessibility to mechanical parts in less than 30 seconds. The turn of a key lifts the cab, under power, through a wide arc, tilting forward. The actuating mechanism is a rugged adaptation of the device used on transport planes to operate the landing gear. With the cab lifted, all the component parts of the chassis are laid bare. The forward position of the cab on the 3000 series permits load distribution with more of the weight carried on the front axle, which is of a heavier capacity and enables a larger payload. Wheelbase, overall length and turning radius have all been reduced.

604

Steel Rule

Manufacturer: Curall Tool Corp., Yonkers, N. Y.

Equipment: Enamelled 6-ft. folding rule.

Features claimed: The new folding rule is made of a special hardened and tempered steel and can be bent and twisted like a pretzel, yet will always spring back to its normal shape. Weight is 3-1/5 oz.

605

Lightweight Paving Breaker

Manufacturer: Gardner-Denver Co., Quincy, Ill.

Equipment: Paving breaker weighing only 38 lb.

Features claimed: Intended for fast demolition work and for use wherever footing is treacherous, the B37 breaker has been added to Gardner-Denver's line as a companion to the heavier B67 and B87 models. The B37 has a removable chuck liner and a hammer of the block-pistol type, reversible for longer life. The use of a tappet minimizes wear on the hammer striking face and the tappet operates in a renewable bushing. Another feature is the throttle valve lock, which works like the "safety" on a gun.

606

Permanent Magnetic Pulley

Manufacturer: Homer Mfg. Co., Inc., Lima, Ohio.

Equipment: Power-Plus non-electric magnetic pulley.

Features claimed: The Power-Plus pulley is crowned to prevent belt weaving and to assist in equalizing the conveyed material as it passes over the pulley. It was designed especially for the separation of tramp metals from products of such industries as coal, quarry, foundries, steel mills,

chemicals, and concentrates. Standard or special length shafts are available to fit new or existing applications without changing bearings or shaft mountings. Head plates are of cast aluminum, which eliminates the piling up of magnetic material on the outer edges of the pulley. The pulleys are designed to be used as either head end pulleys or idler pulleys in belt conveyor systems and are furnished in 57 standard sizes.

607

All-Purpose Hose

Manufacturer: Goodyear Tire & Rubber Co., Akron, Ohio.

Equipment: Hose with oil-resisting synthetic tube.

Features claimed: "Ortac" is a new hose product capable of carrying air-water, oil, gasoline and acids of low concentration and temperature. It is made with vertically braided rayon carcass and oil-resisting synthetic tube, friction and cover. Sizes, 3/16 to 1½ in. inside diameter.

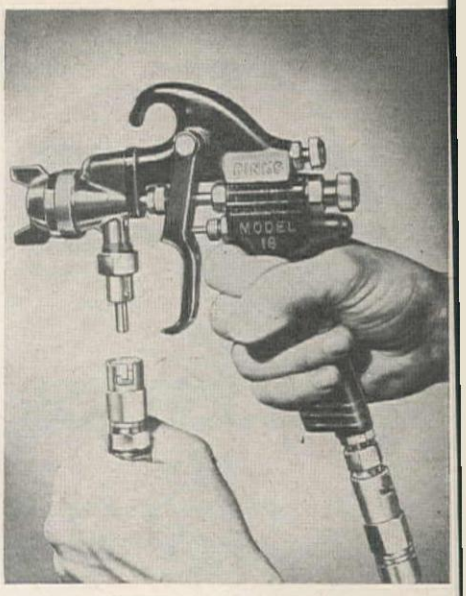
608

Detachable Hose Connection

Manufacturer: Binks Mfg. Co., Chicago, Ill.

Equipment: Quick detachable connections for paint spray material hose.

Features claimed: The connection will shut off fluids under pressure when the hose connection is broken, and instantly restore the flow when the connection is reestablished. Using a bayonet-type joint, the new Binks quick-detachable connection can be made or broken quickly with a slight turn of the wrist. The result is a fluid coupling that will not squirt when the connection is made or broken.



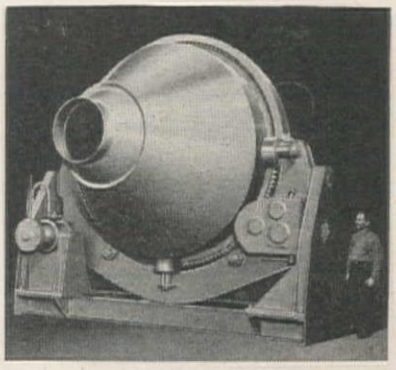
609

Mammoth Concrete Mixer

Manufacturer: T. L. Smith Co., Milwaukee, Wis.

Equipment: Unit to mix 6 cu. yd. per batch, claimed to be the world's largest concrete mixer.

Features claimed: One batch from the new mixer fills a 4½-cu. yd. truck mixer (6⅛-cu. yd. agitator). Greater output is possible with practically the same labor, power and general overhead costs. Features include: Automatic feed chute charging, "Tilt and Pour" discharge without segregation, complete control of discharge, all-welded support pedestals and tilting frame, and push button or manual controls. It was designed to meet the demands of ready-mix plants and big construction projects.



610

Air Entraining Agent Dispenser

Manufacturer: J-W Materials, Inc., Napoleon, Ohio.

Equipment: Refinements to the Darex AEA dispenser.

Features claimed: The dispenser is designed to measure different amounts of air entraining agent in solution into the concrete mix. The dispenser may be installed, ready for operation, in a few minutes and is essentially a container so arranged with a 3-way valve that the air-entraining solution flows from a supply tank mounted above the container to fill a container com-

letely and then the vent line up to the evel of the liquid in the supply tank. The ent line is made of transparent tubing, ermitting visual inspection. The supply ank has a capacity of 5.6 gal., enough to roduce approximately 150 cu. yd. of Darex AEA concrete.

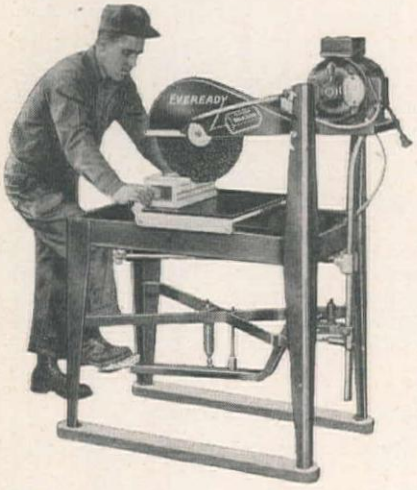
611

Masonry Saw

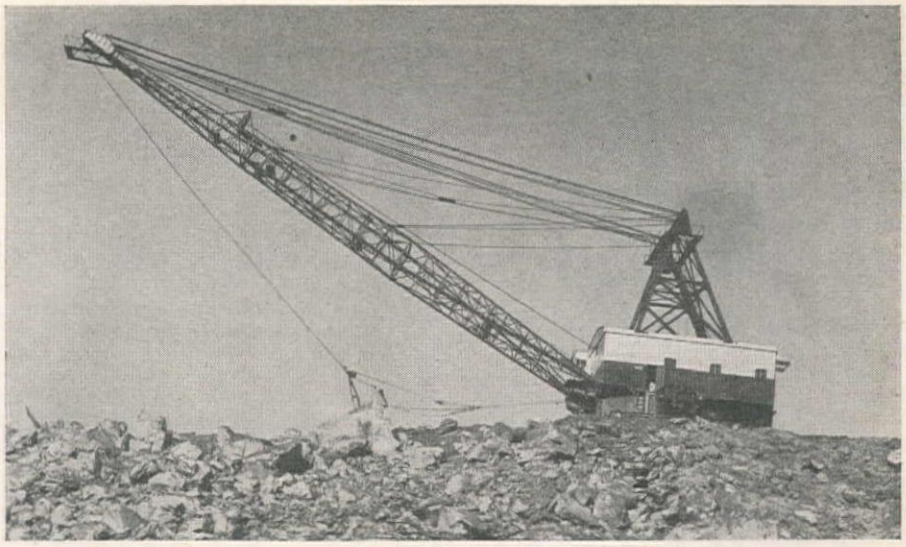
Manufacturer: Eveready Briksaw Co., Chicago, Ill.

Equipment: Saw for both wet and dry cutting.

Features claimed: The saw comes equipped for standard dry cutting, but an inexpensive Wet Cutting Kit can be installed in a few minutes with a screwdriver and pliers for complete dustless operation.



There is no need to unhook the pump when cutting dry. The saw has the patented "Adjusta-Height" feature which quickly adjusts the cutting head height for such widely different size materials as quarry tile, brick, partition tile and concrete block. Another feature is the "Toe-Matic" Control by which the operator, with a light upward tilt of the foot treadle, re-sets the cutting head to any desired angle, then presses down to cut. A patented, automatic blade pressure spring adjusts the blade pressure to the hardness or softness of the material being cut. The one-piece cutting head can be removed in 21 seconds from the saw frame, without tools. Among cutting speeds listed are: Firebrick, 4 seconds; concrete block, 19 seconds; glazed tile, 21 seconds, and vitrified pipe, 18 seconds.



612

Electric Walking Dragline

Manufacturer: Bucyrus-Erie Co., South Milwaukee, Wis.

Equipment: New 500-W dragline with bucket capacities from 8 to 12 cu. yd. and booms from 165 to 205 ft.

Features claimed: The new machine has some of the features of Bucyrus-Erie's 660-B and 1150-B strippers, notably the individual drag and hoist motors and the twin drag lines. Working weight is 1,275,000 lb. Maximum dumping height of the 205-ft. boom is 107 ft. With the same length boom at a standard working angle, it can dig 135 ft. below the surface on which it rests. The dragline walks with 7 ft. 4-in. steps on shoes that are 37 ft. long and 6 ft. wide. Material can be moved 416 ft. without throwing the bucket. Weights and loads are balanced so that the center of gravity shifts within pre-determined safe limits. Generator units are laterally placed in the rear of the house so digging vibrations are normal to the bearings. Swing is accelerated and decelerated under Ward Leonard variable control.

613

Nylon Cord Tires

Manufacturer: B. F. Goodrich Co., Los Angeles, Calif.

Equipment: Tire casings with double strength Nylon cord.

Features claimed: Off-the-road tires made with Nylon cord throughout, and including the Nylon shock shield, are now in use by contractors, mine operators, and loggers. Tire body strength is greatly increased because the same number of plies are being maintained in each tire and the Nylon cord is twice as strong as the rayon previously used. The tire made with Nylon cord will withstand more than double the impact without rupturing than will the tire with rayon cord. Tires are made with weftless construction in which there are no cross threads to increase friction. This construction also reduces growth in service, because tension of the cord is controlled and equalized.

614

Ball Bearing Swivels

Manufacturer: General Machine & Welding Works, Pomona, Calif.

Equipment: Miller angular thrust ball bearing swivels.

Features claimed: Miller Swivels combined with the hook make it possible to turn loads independently of the block. The freely turning, angular thrust swivels are also widely used on the dead end of strung blocks. When used in this manner, they make stringing or restringing much easier by automatically taking all the kick and twist out of the line. Complete assemblies are available combining the Miller Swivel

with various sizes of blocks and hooks, or the swivels can be inserted in blocks now in use. The new swivels can be obtained in a wide range of capacities, handling up to 23-ton working loads with a safety factor of more than 5.

615

Heavy-Duty Motor Grader

Manufacturer: W. A. Riddell Corp., Bucyrus, Ohio.

Equipment: First grader built in the 100-h.p. class by Riddell.

Features claimed: "On the job" advantages claimed for the WARCO 4D-100 include full 360-deg. revolving of the circle without removing the scarifier or teeth; less operator fatigue because of easy hydraulic control; unusual blade reach, and exceptional clearances under the front axle and transmission. The new model is the latest in Riddell's series of hydraulically controlled graders.

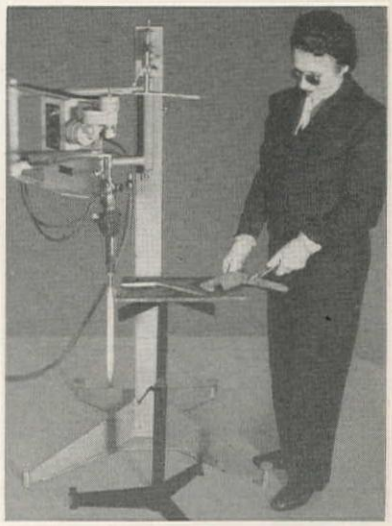
616

Sheet Steel Contour Cutter

Manufacturer: Heath Engineering Co., Fort Collins, Colo.

Equipment: Heath contour cutter.

Features claimed: A standard acetylene machine cutting blowpipe is employed to reproduce automatically a desired pattern in any sheet steel or heavy plate steel quickly and with uniform accuracy. Duplicate flat shape forms, cut to a predetermined pattern, can be produced at low cost for many metal fabricating operations. The "brain," or pattern-tracing finger, incorporates a variable speed, magnetic roto which follows exactly the master pattern in producing flat duplicates in any quantity desired. Optional operating speed permits adjustment to accommodate any gauge steel or production procedure, such as stack cutting. Rotor diameter of ¼ in. insures



accurate pattern tracing of acute and obtuse angles, obverse and reverse curves, slots and projections. Flexible range of practical pattern sizes includes ¾-in. holes to 5-ft. diameter shapes.

617

Electric Soldering Pliers

Manufacturer: Durst Mfg. Co., North Hollywood, Calif.

Equipment: Current-resistance soldering pliers.

Features claimed: The electric soldering pliers employ the current-resistance principle, introducing a faster and more positive method of soldering. The wires or parts to

be soldered are held by the pliers and the foot switch is depressed for an instant, heating the material sufficiently to melt the solder. The Durst pliers do the combined work of pliers and soldering iron and consume but little current for an instant of contact only. Completely eliminates fire hazard and danger of burns to operator. Its effectiveness ranges from 14 to 30 gauge copper wire and can be used to silver braze small metal parts.

618

Steam-Jet Cleaner

Manufacturer: Livingstone Engineering Co., Worcester, Mass.

Equipment: Speedylectric JC-30 automatic cleaner.

Features claimed: Using high pressure steam from its built-in boiler, the JC-30 eliminates the excess water problems common to the conventional type cleaners.

'he high pressure steam is mixed with the roper amount of detergent at the jet. 'here is no excess water to dilute the de-ergent or flood the working area. The new nit features a pressure tank for positive ow of detergent, and cleans high ceilings,

all machines, and large equipment with-ut the ordinary height limitations. The ortable unit is mounted on an all steel olly with ball bearing rubber tired swivel asters, and weighs 500 lb. Floor space equired is 27 by 40 in. Boiler capacity is 0 k.w., and is ASME National Board tamped, with Underwriters' Laboratory sting. Power requirements are 220 volts AC and over, single or polyphase.

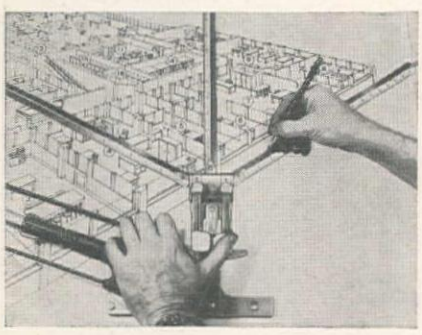
619

nstrument for Perspective Drawings

Manufacturer: Charles Bruning Co., Inc., Chicago, Ill.

Equipment: Instrument to automatically guide the draftsman's pencil toward the established vanishing points from any po-ition upon the drawing board.

Features claimed: The Perspect-O-Metric has three scale arms. The central arm is ixed in a position at right angles to the established base line. The left and right cale arms pivot at one end and swing in



he plane of the drawing board. Once the rms are set, any movement of the unit eeps the scale arms oriented to the chosen anishing points. Other features enable use of the unit for isometric drawings, and an ngenious system of graduation is used on he swinging scales. Attaches to any stand-ard drafting machine.

620

Tractor Loader

Manufacturer: Lull Mfg. Co., Minneap-olis, Minn.

Equipment: Rubber-tired tractor with

attachments, including material buckets, coal and snow buckets, cranes, bulldozers and independently-powered sweepers.

Features claimed: The new Models 4-AT, 4-BT and 4-CT Shoveloaders are equipped with a special fork attachment with a hydraulically controlled "hold-down" finger, lifting for control cylinders, three valve sections, three control levers and rear ballast box. The other standard Shoveloader attachments mentioned above can be used with the new unit by interchanging them with the lifting fork attachment.

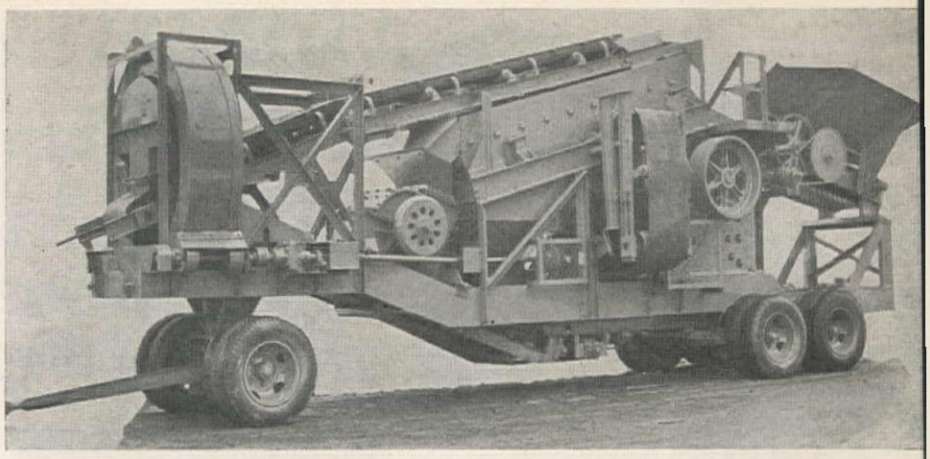
621

Pipe Lagging

Manufacturer: Lexington Supply Co., Cleveland, Ohio.

Equipment: Glasfab glass fiber pipe lagging.

Features claimed: Developed to provide a permanent type reinforcing membrane fabric for water and corrosion proofing treatment, Glasfab is now being successfully used as pipe lagging on interior, exterior, and underground lines. Woven wholly from glass fibers, its inorganic nature offers many advantages over the organic fabrics heretofore used. It does not char under the high temperatures of hot bitumen and has no capillary or "wicking" action, therefore does not carry the volatile oils up out of the mastic and conversely does not conduct moisture into the coating. The applications illustrated show Glasfab used on the refrigeration line of the air conditioning system and on outside steam lines. In the interior view, the pipe insulation has been spirally wrapped and finished with a topcoat of lead and oil. Glasfab is available in widths of from 2 to 36 in.



622

Double Rock Processor

Manufacturer: Universal Engineering Corp., Cedar Rapids, Iowa.

Equipment: Universal one unit "Limerok" portable plant.

Features claimed: Designed to meet the need for a combination plant for road rock, stone chips and agstone, the new high capacity one unit portable outfit does the work of two single crusher units. It is a new arrangement of three primary components: the Universal roller bearing jaw crusher, hammermill, and Simplicity gyrating screen. With these, clutch controlled folding conveyors, rotovator and necessary driving connections are all mounted on a single chassis, making the plant completely mobile. The plant is shovel fed, and when dynamiting, can be moved out of the quarry and back in working position in a matter of minutes, without dismantling. Provision is made to power the hammermill separately, giving variable speed operation to suit the nature of the rock being crushed and the kind of finished product wanted. The rest of the plant is driven from the crusher. The hammermill will receive up to 5-in. stone, and has a high capacity for turning out 1-in. minus road rock. The jaw crusher may be set to whatever size is needed for proper balance with the hammermill. A large, three-deck gyrating screen with gates at the discharge ends grades the crushed stone into one, two, or three sizes. The screen is equipped with a ball tray, which in reality is a fourth deck with coarse mesh wire. This tray is divided into multiple compartments, each carrying several rubber balls. The gyrating motion of the screen causes these balls to beat against the bottom deck, thus keeping the openings clear for top screening efficiency. This maintains maximum capacity even when the moisture content is high.

623

Special Pipe-Stripping Buckets

Manufacturer: Cleveland Trencher Co., Cleveland, Ohio.

Equipment: Buckets designed for installation on the digging wheel of Cleveland's trenching machines.

Features claimed: The buckets are offered in two sizes, 16 and 22 in., for stripping pipe from 4 to 16 in. in diameter. They

permit excavating down to and along both sides of the pipe to at least its horizontal diameter, thus completely freeing the pipe for take-up with no bending damage due to earth bind. The contour of the buckets facilitates their following and staying on line despite sidebends. Because the buckets are practically concentric with the pipe being exposed, all danger of tooth or rooter damage is virtually eliminated.

624

New Chain Saw Blades

Manufacturer: McCulloch Motors Corp., Los Angeles, Calif.

Equipment: New blades for power chain saws.

Features claimed: Blades will now be available in 20, 30, 40, 50 and 60 in. lengths. All sizes of blades, as well as the 20-in. low-saw attachment, are interchangeable on the special 5-h.p. McCulloch power unit. The new blades are manufactured from tool steel, chrome plated to resist rust. The chain track is accurately milled in the blade. To assure extremely accurate placement of the chain track, each blade is surface ground on both sides before the track is machined.

625

Hydraulic Control Valve

Manufacturer: Romec Pump Co. Div., Lear, Inc., Elyria, Ohio.

Equipment: Lear-Romec 4-way manually controlled tractor valve.

Features claimed: As used on the Leader tractor, Model HV-1661-AG valve mounts directly over the hydraulic piston-type cylinder where it controls the linear movement of the piston as to direction and speed. When the hand is removed from the lever, the valve automatically centers. This action locks the piston in any selected position in the cylinder, holds the tool up or down or at some intermediate point as desired, and at the same time relieves pump pressure directly to the supply tank through the "open center" feature of the valve. For over-pressure protection during the operating cycle, an integral relief valve is factory set at 800 p.s.i. Thus no other valve is required. Exemplifying the adaptability of the valve to the Leader tractor, ports are ½-in. for 8 g.p.m. flow. Oversize spool has long spindle sections for full flow with low velocity between ports.

626

Air-Cooled Distribution Transformers

Manufacturer: Marcus Transformer Co., Inc., Hillsdale, N. J.

Equipment: Transformer that can withstand overloads that normally would damage an ordinary class A insulated oil-filled unit.

Features claimed: The air-cooled transformers can be used for practically every application heretofore reserved for liquid filled transformers. Added advantages are that there is no maintenance of oil level, foreign matter, sludge accumulation and subsequent filtering. This versatile transformer can be used outdoors, indoors or wherever convenient with no fireproof vault required. Sizes to 100 KVA; voltages to 5,000 volts.

627

Air-Powered Jacks

Manufacturer: Duff-Norton Mfg. Co., Pittsburgh, Pa.

Equipment: Jacks operated by an integral air motor under normal shop pressure of 80 to 90 lb.

Features claimed: Long popular for lifting and lowering locomotives and freight cars, the Air Motor Power Jacks are now

being introduced into the construction field. Actual raising and lowering is carefully controlled by the air motor, and an automatic shut-off prevents the ram from leaving the housing and spilling the load. The jacks are designed to prevent lowering and creeping in case of air failure due to disconnection or damage to the air hose. A safety keyway in the ram checks the head from turning and shifting under the load. Long trundling handles and collapsible spotting handles make the jacks easy to move and place. The jacks have capacities from 20 to 100 tons.

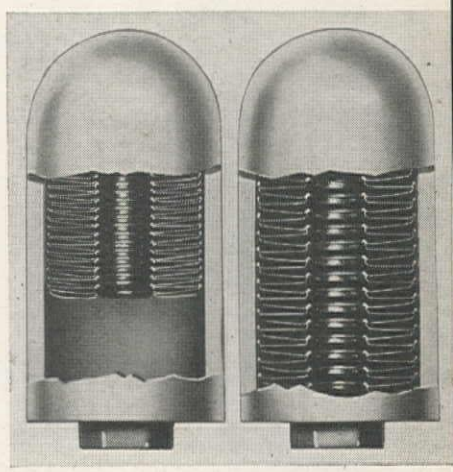
628

Water Hammer Arresting Device

Manufacturer: Wade Mfg. Co., Elgin, Ill.

Equipment: Service-free air chamber to eliminate water hammer damage.

Features claimed: Actual performance tests up to 60 million water hammer cycles rate the ShokStop permanently sealed air



chamber as requiring no servicing or maintenance after installation. The sudden surges of water hammer pressure often exceed 800 p.s.i. and are a major cause of pump damage, equipment failure, and even pipe rupture. Picture at left: air sealed within bellows compresses under impact of water hammer, absorbing shock, and (right) decompresses within bellows as water hammer pressure recedes. The Wade ShokStop provides an air cushion to absorb the water hammer pressure impulse, but prevents waterlogging of the air chamber. A metal bellows allows free contraction and expansion of the air sealed within it but prevents all contact between air and water. Thus, the air chamber is continuously effective and provides constant protection against water hammer.

629

Crane and Shovel on Truck Chassis

Manufacturer: Lima - Hamilton Corp., Lima, Ohio.

Equipment: Three shovel and crane units mounted on rubber-tired machines.

Features claimed: Lima-Hamilton is introducing three new machines: the Types 34-T, 34-M and 604-M. The Type 34-T is mounted on a truck chassis with independent power by two engines, one in the rotating assembly to power all shovel and crane operations and one in the truck used to propel the carrier. The Type 34-M differs from the 34-T inasmuch as it is a self-propelled unit with one engine mounted in the rotating assembly supplying the power for all operations, including propelling in either direction. Power for propelling is transmitted from the standard reversing clutches in

he rotating assembly through a special rain of gears and the vertical shaft to the wheeled mounting. Either type can be quipped for shovel, crane, clamshell, drag-ine or pull-shovel operations, and they hould be ideal units for digging basements, ewer construction, removing road slides, tc. The Type 604-M rotating assembly in-orporates the basic features of the Lima Type 604, but with alterations to facilitate daptation to truck mounting. The carrier s equipped with oscillating tandem type ear axles, which provide extra flexibility when working on uneven terrain.

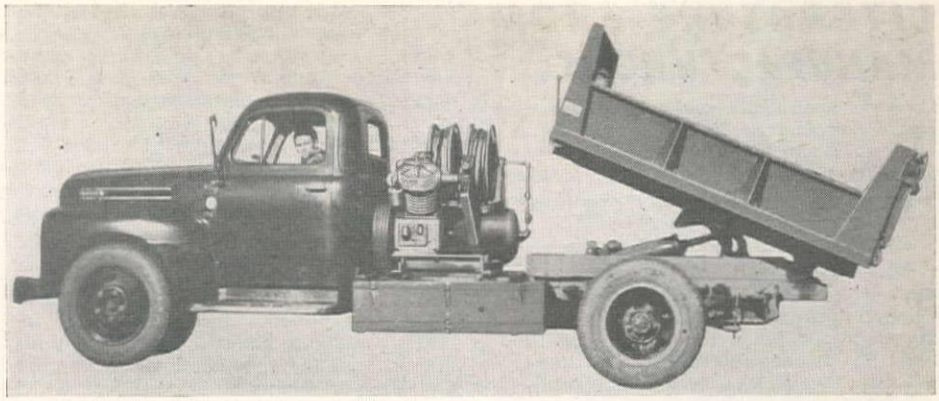
630

Slab System for Roof and Floor

Manufacturer: Basalt Rock Co., Napa, Calif.

Equipment: Machine-made concrete units, the contacting edges of which have been precision ground and the units se-cured together with prestressed steel bars positioned in recesses.

Features claimed: The units, made of either light or heavy concrete, are cured and pre-assembled to length and depth with area of steel to carry required load from support to support without vertical shor-ing. In assembling units into slabs, steel is prestressed to approximately the stress re-quired in the designed loading of the roof or floor section. In this way, slabs at full load will have little deflection. Concrete grout is poured between slabs in the form of a joist for coverage of steel and to key slabs together. Concrete slab may or may not be poured as required for additional strength and wearing surface. Advantages are economy, speed of construction, elim-nation of forms, etc.



631

Accessory Air Compressor

Manufacturer: Davey Compressor Co., Cleveland, Ohio.

Equipment: Auto-Air compressor-dump truck combination unit.

Features claimed: The assembly consists of either a Model 105 or 160 cfm. Auto-Air compressor mounted ahead of a standard dump body on the truck chassis. The compressor is driven direct from the truck engine through the Davey Heavy Duty power take-off. The dump body can be employed to haul rock, broken pavement or other materials dug or dislodged by the compressor. The unit functions as a regular dump truck when the compressor is not in use. The assembly has many applications in utility, highway department and city maintenance fields. It is also ideal for use by general contractors.

632

Hand Pump

Manufacturer: Romec Pump Co., Lear, Inc., Elyria, Ohio.

Equipment: Utility Master hand-operated barrel-type pump.

Features claimed: The Utility Master is a low-cost, portable, compact unit constructed of finely finished zinc die casting. The exterior requires no paint to make it corrosion resistant to the elements. The stainless steel 4-blade rotor shaft is supported on two bearings. The shaft seal is a highly durable disc of a type used in Lear-Romec aviation pumps that is easily replaced from the outside, excluding the usual packing gland and fittings, bolts, or nuts. The new pump may be used with light or heavy liquids such as oil, gasoline, kerosene, and toluene with a capacity of 10 gal. per 120 rev.

LITERATURE FROM MANUFACTURERS...

Copies of the bulletins and catalogs described in this column may be had by addressing a request to the Western Construction News, 503 Market Street, San Francisco 5, California.

633

RUBBER TUBING — A four-page folder describing "Ductube," a newly developed pneumatic rubber tubing for molding ducts or holes in concrete or other mastics, has been released by **Ductube Co.**, Washington, D. C. The use of Ductube is described for molding ducts of uniform diameter (vertical or horizontal, either straight or curved) in concrete floors, wall, columns, or beams. The four simple operations involved in molding smooth-bore ducts are explained and illustrated.

634

TRANSIT MIXERS — A bulletin has been published by the **Willard Concrete Machinery Co., Ltd.**, Lynwood, Calif., describing the complete Willard "mobile system," comprising a 3-cu. yd. transit mixer fitting any light truck, a mobile weigh-batcher, and a mobile conveyor that loads the mixer from the weigh-batcher, eliminating the need for overhead bunkers. Specifications are given and job applications are illustrated.

635

EARTHMOVING—"Profiting Through Earthmoving . . . The Caterpillar Way" is the theme of a 16-page booklet published by **Caterpillar Tractor Co.**, Peoria, Ill. Illustrated with applications and job studies of the "Caterpillar" bulldozers, scrapers, wagons, motor graders and allied equipment, the brochure brings to the reader performance data relative to almost every type of earthmoving job. The various adaptations of the equipment to this field through intensive development of a packaged fleet of earthmoving tools offers readers of this publication an overall view of the company's specialized products.

636

ARC WELDERS — **Hobart Brothers Co.**, Troy, Ohio, has released an 8-page folder containing illustrations, descriptions, dimensions, and specifications on its complete line of Simplified arc welders, which includes electric motor and gasoline motor driven models. Features of each model are individually illustrated and described. Also listed is a High Frequency Stabalizer Attachment for use with any standard AC transformer type welder of 500 amperes or less.

637

SYSTEMATIC FEEDING OF AGGREGATES — "Feeds and Feeding," a new illustrated booklet published by **Pioneer Engineering Works, Inc.**, Minneapolis, Minn., discusses recommended practices for the systematic feeding of aggregates in crushing and screening operations. The text is in three parts: Feeding of Coarse Materials, Feeding of Graded Materials, and Feeding of Mixed Materials.

638

TRACTOR SHOVEL—"Four Wheel Drive is Here" is the title of a new piece of literature featuring the new Hough Model HM Payloader Tractor Shovel, available from the **Frank G. Hough Co.** Libertyville, Ill. The broadside shows numerous action views of some of the Payloader's digging, loading, grading and carrying uses. One-and-half cu. yd. bucket capacity and other specifications are shown as well as many design details that are featured in this big 76-hp. tractor shovel.

639

ELECTRICAL TAPE—A single electrical tape that provides "high dialectric strength," abrasion resistance and protection against oils and acids is described in new brochure available from the **Minnesota Mining and Mfg. Co.**, St Paul, Minn. The tape is 7 mils thick, has a dialectric strength of more than 7,000 volts, adheres readily to plastic wires, is impervious to moisture and affords protection against electrolysis and corrosion. Included in the brochure in addition to tables of chemical and physical properties, are photographs of applications showing the tape being used in junction boxes, motors, outdoor lighting wiring, refrigerator units, underground cable, etc.

640

SHEET GLASS PRODUCTION — The Bureau of Economics & Business Research at the State College of Washington, Pullman, Wash., has published a bulletin entitled "The Economics of Sheet Glass Production in the Pacific Northwest." Individual copies are free of charge.

641

CONCRETE FORMING SYSTEM— **Universal Clamp Form Co.**, Chicago, Ill., has published a 34-page, 3-color booklet describing and showing job applications of the Uni-Forms system of concrete forming which uses pre-assembled forms, ready for

use when they reach the job. The forms are made of rigid steel frames and steel protector strips contain the plywood, insuring maximum re-usage. Photographs show uses of the forms on almost every type of construction, and a listing is given of major companies in every state who are using Uni-Forms.

642

CONCRETE MIXER—A description of the "V"-belt theory as applied to mixing drum location on their 3½-S Non-Tilt Dandie concrete mixer is contained in a bulletin published by the **Kwik-Mix Co.**, Port Washington, Wis. The bulletin explains how the "V"-belt eliminates the customary gears of sprocket and chain, gives silent and smooth machine operation and reduces maintenance costs. Other improvements in the new Dandie mixer are also described.

643

STEEL STREET FORMS — **Blaw-Knox Division of Blaw-Knox Co.**, Blawnox, Pa., has issued a 28-page booklet designed to take the mystery out of the problem of selecting and using the proper paving forms for the construction of any type of concrete curb, curb and gutter, integral curb, special curb or sidewalk. Sixteen types of forms, embodying a completely standardized and inter-related steel form system, are described and illustrated. An illustrated guide also shows how to set and strip the forms in actual use.

644

MILLI-SECOND DELAY BLASTING—**Atlas Powder Co.**, Wilmington, Del., has released a 20-page booklet explaining why milli-second blasting is being widely adapted because of the greater control it gives over fragmentation, noise, vibration, throw and drilling costs. The booklet includes twenty sketches of typical drill-hole and detonator layouts for quarrying, stripping, construction and underground work. An innovation in milli-second delay blasting discussed in the booklet is the Atlas development of a series of 16 Rockmaster electric detonators designed so the entire group fires in 550 one-thousands of a second.

645

DRAGLINE BUCKET—"How To Get the Most Out of a Page Automatic Dragline Bucket" is the title of an 18-page booklet published by the **Page Engineering Co.**, Chicago, Ill. The booklet gives the historical development of the revolutionary bucket, and describes exactly how it works by text and illustrations. Capacities, weights, dimensions and performance records are given.

646

HARDSURFACING GUIDE—**Lincoln Electric Co.**, Cleveland, Ohio, has published a bulletin outlining procedures for Lincoln hardsurfacing electrodes. Properties, methods for use and recommended applications are outlined for ten electrodes in the series. Lincoln also has available a service directory listing all of the firm's authorized field service shops where parts, repairs and service may be obtained conveniently.

OPPORTUNITY SECTION

INDEX TO ADVERTISERS
★ IN THIS ISSUE ★