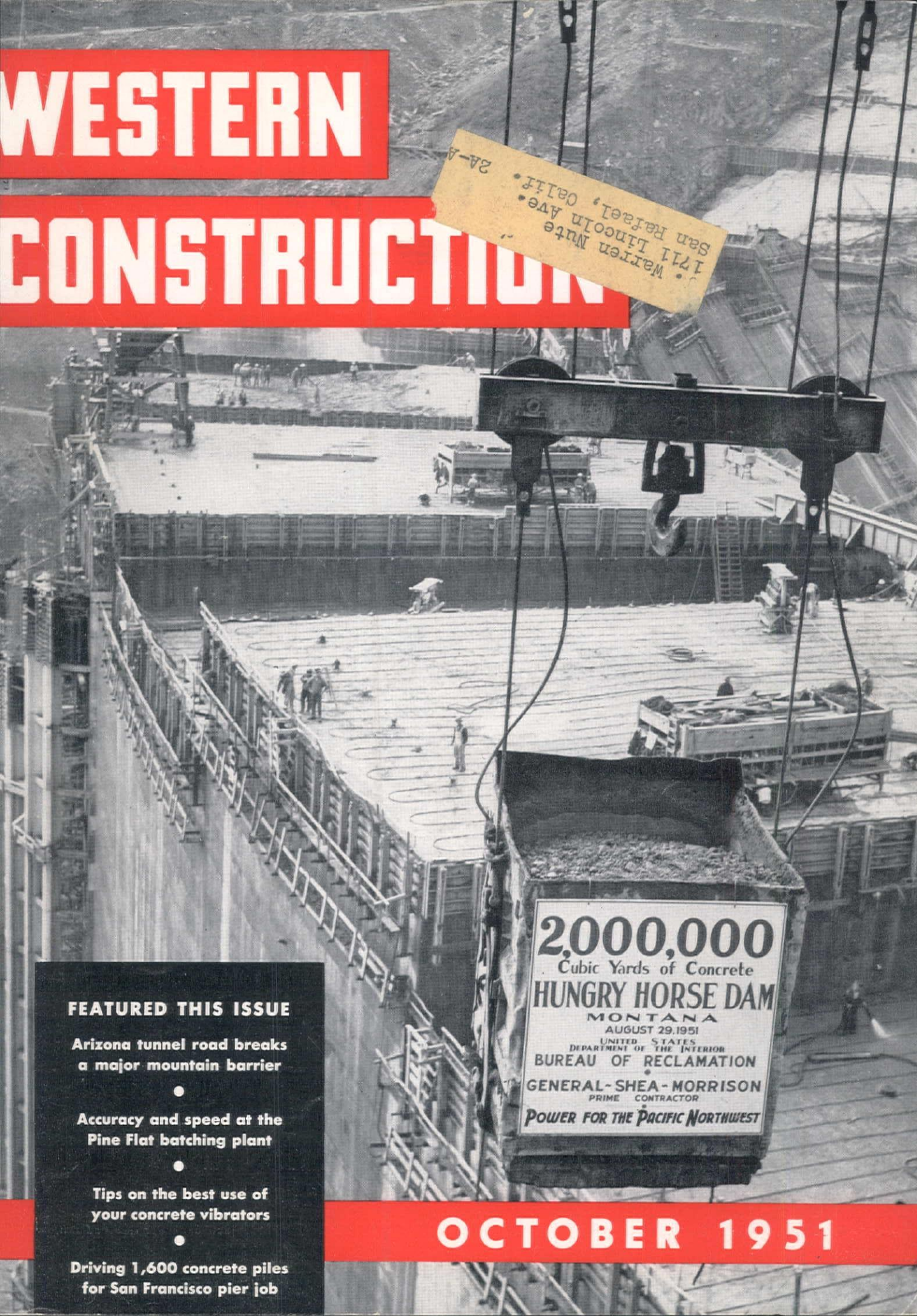
WESTERN CONSTRUCTION



FEATURED THIS ISSUE

Arizona tunnel road breaks a major mountain barrier

•

Accuracy and speed at the Pine Flat batching plant

•

Tips on the best use of your concrete vibrators

•

Driving 1,600 concrete piles for San Francisco pier job

OCTOBER 1951

"...ENGINE STILL IN EXCELLENT CONDITION AFTER 7,000 HOURS' OPERATION

THANKS TO TEXACO URSA OIL X★★"

...reports Ben Malang, General Superintendent, Chandler Materials Company, Tulsa, Okla.

Taken down after 7,000 hours of rugged service in a rock quarry, this Caterpillar Diesel D-7 bulldozer engine was in excellent condition. Piston rings were all free, wear was so negligible that the crankshaft was reinstalled without any work having to be done on it. *Texaco Ursa Oil X★★* was used exclusively in this record achievement.

Texaco Ursa Oil X★★ is detergent and dispersive, it keeps engines clean . . . free from harmful carbon, gum and sludge. This, plus a high resistance to oxidation keeps rings free, ports open, valves functioning properly for better compression and combustion. *Texaco Ursa Oil X★★* assures full protection for bearings . . . less wear . . . reduced maintenance costs and fuel consumption.

Let a Texaco Lubrication Engineer tell you about the Texaco Simplified Lubrication Plan and the economies it can bring you. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd St., New York 17, New York.

Three Other Texaco Cost-savers

1. *Texaco Marfak* — Tough, adhesive and cohesive, assures longer life and lower maintenance costs for chassis parts. *Over 400 million pounds of Marfak have been sold!*
2. *Texaco Marfak Heavy Duty* — Greater protection and longer life for wheel bearings . . . no seasonal change required.
3. *Texaco Track Roll Lubricant* — Reduces wear and lengthens life on crawler track mechanisms.

TEXACO

REG. T.M.

TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.

ou Buy a Pullshovel for One Purpose — TO MAKE MONEY!

WHERE to go to get the true story on equipment? There is only one sure place, the repeat order buyer. Performance in the hands of well-known contractors like J. E. Haddock, Ltd., of Pasadena, Calif., has established Northwest equipment as the standard by which other equipment of equal capacity is measured. General shapes can be copied, but the tested know-how that delivers performance, reduces upkeep and insures output is beyond copying and results from experience only. It is significant that J. E. Haddock has bought his sixteenth Northwest.

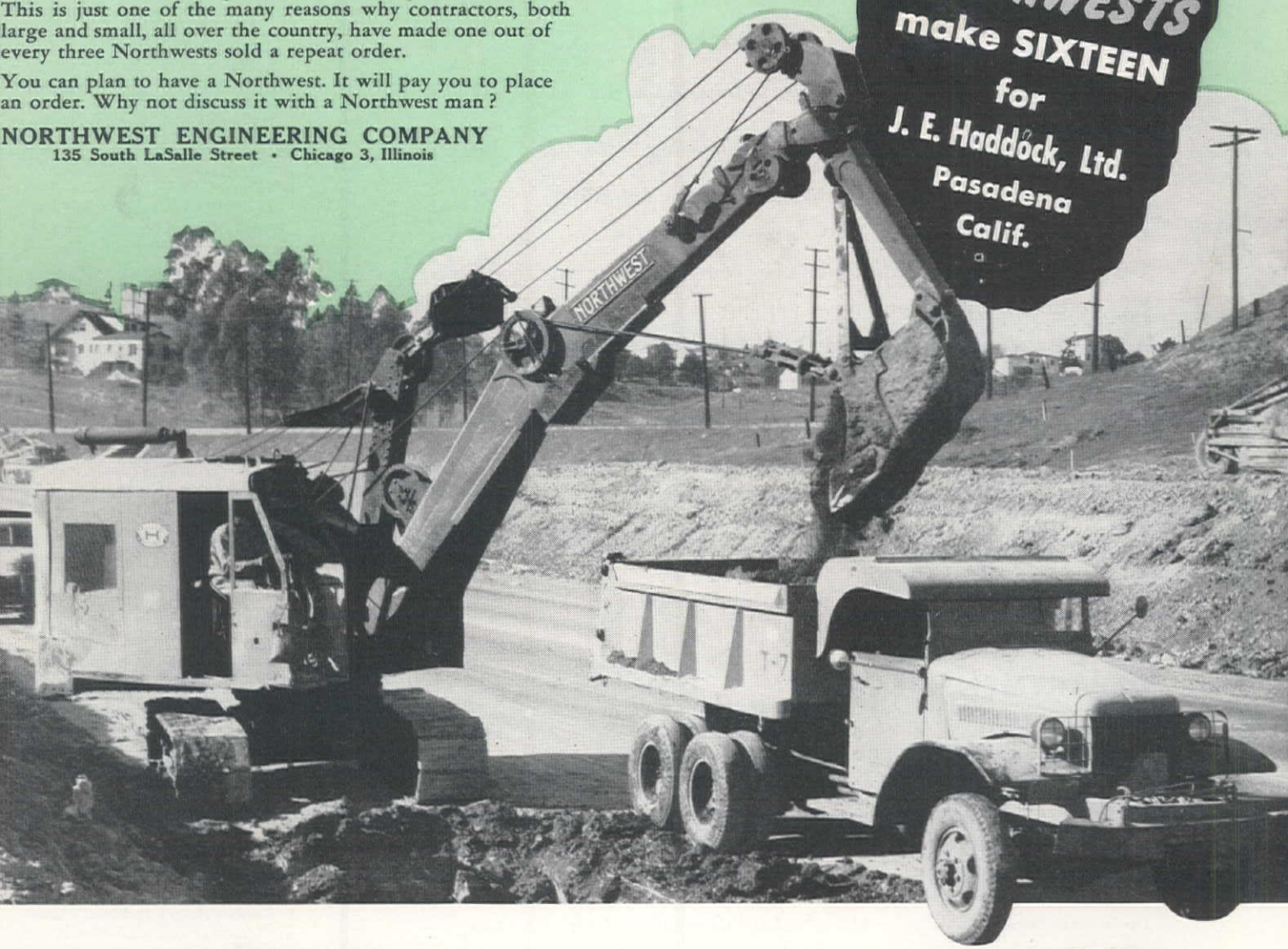
But no Northwest is a one-purpose machine. It is more than a Pullshovel! Your Northwest brings you a group of features so combined, so balanced, that as a unit, Northwest represents an overwhelming advantage whether operating as a Pullshovel, a Shovel, a Crane or a Dragline. Northwests were designed for convertibility when a shovel was *always* a shovel, and a crane *remained* a crane. This is just one of the many reasons why contractors, both large and small, all over the country, have made one out of every three Northwests sold a repeat order.

You can plan to have a Northwest. It will pay you to place an order. Why not discuss it with a Northwest man?

NORTHWEST ENGINEERING COMPANY
135 South LaSalle Street • Chicago 3, Illinois

16

THREE MORE NORTHWESTS make SIXTEEN for J. E. Haddock, Ltd. Pasadena Calif.



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WEIGH ALL THE ADVANTAGES
WHETHER SHOVEL, CRANE, DRAGLINE, PULLSHOVEL or TRUCK CRANE
a star on every job!

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WESTERN CONSTRUCTION

Volume 26 **OCTOBER 1951** Number 10

ARTICLES

DEPARTMENTS

FRONT COVER

IT WAS TWO-THIRDS completion and about 1,000,000 cu. yd. to go at Hungry Horse when crews of General-Shea-Morrison placed the 2,000,000th cubic yard of concrete on August 29. And another 400,000 cu. yd. will be placed by November 1951 for the big multi-purpose dam in Montana. Storage of water in the 34-mi. long reservoir is beginning this month with closure of the 36-ft. diameter diversion tunnel. *Bureau of Reclamation photo*

The Construction and Civil Engineering Publication of the West

★

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Entered as Second Class Matter at the Post Office in San Francisco, California under the Act of March 3, 1879.

B.F.Goodrich

These tires carry 95 tons over crushed limestone—with ease!

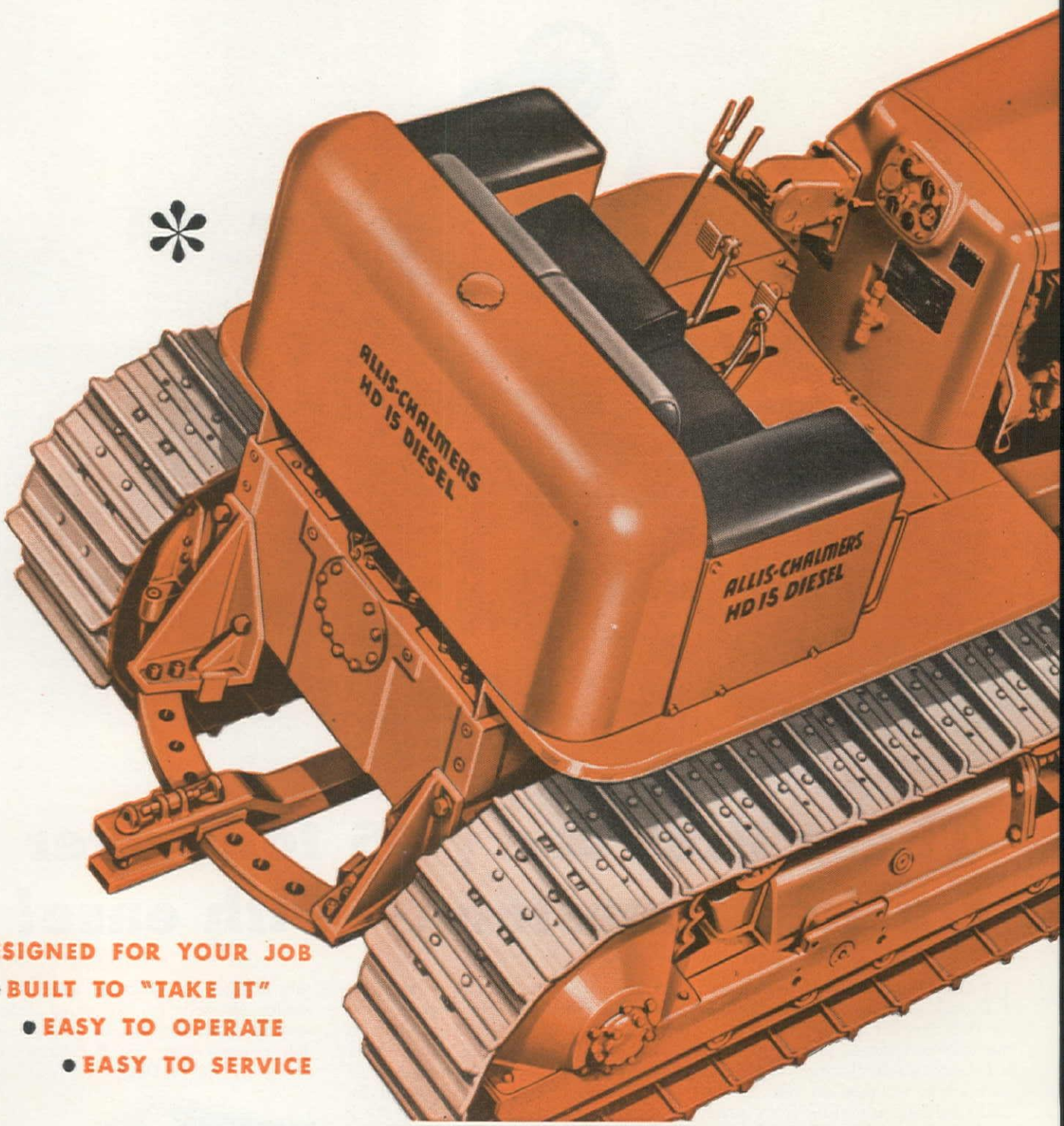
HAULING heavy loads over jagged rock in all kinds of weather calls for tires that can really "take it." Yet this is an everyday occurrence for these B. F. Goodrich Rock tires. The BFG's shown here are used on vehicles that haul limestone and shale from quarry to plant. The total load is 190,000 lbs., of which 88,000 lbs. is pay load.

B. F. Goodrich tires can give this kind of service because they are built to stand up under the most hazardous quarry and construction hauling conditions. For added protection, the patented *nylon shock shield* is built into all B. F. Goodrich tires of 8 or more plies. Extra strong, elastic nylon cords are placed between the tread rubber and the cord body. Under impact, these cords work together, absorbing and distributing the shock evenly. The shock shield protects against bruises and means more recappable tires as well as longer service. Here is a construction advantage which is found only in BFG tires — and at *no additional cost.*

B. F. Goodrich tires are also available in all-nylon construction. For these or any off-the-road tires see your BFG dealer. Or write for additional information on these tires that do a better job at lower cost. *The B. F. Goodrich Company, Akron, Ohio.*

RESEARCH KEEPS
B.F.Goodrich
FIRST IN RUBBER

Here's what WE mean by

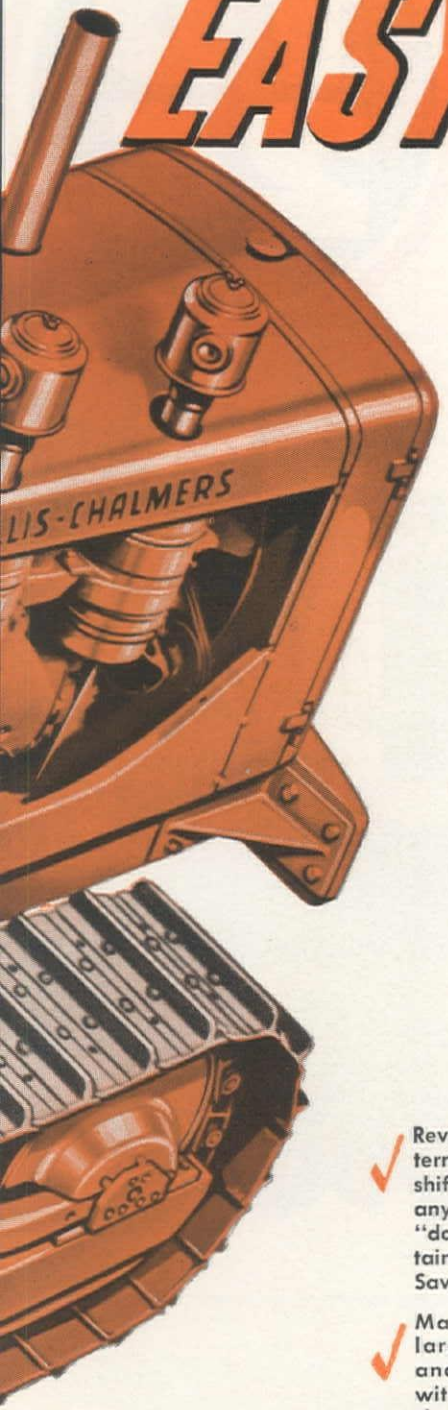


- DESIGNED FOR YOUR JOB
- BUILT TO "TAKE IT"
- EASY TO OPERATE
- EASY TO SERVICE

see your ALLIS-CHALMERS dealer

ARIZONA: **Phoenix** — Neil B. McGinnis Equipment Company. NORTHERN CALIFORNIA: **Oakland**—Buran Equipment Company; **Eureka and Willits**—Aikins and Williams Tractor Co.; **Modesto**—J. M. Equipment Co.; **Fresno**—Food Machinery and Chemical Corp.; **Salinas and King City**—Livingston Bros. Tractor Company; **No. Sacramento, Stockton, Redding**—Moore Equipment Company, Inc.; **Mountain View**—Redwine Tractor Company; **Visalia**—Tulare County Tractor Company. SOUTHERN CALIFORNIA: **Bakersfield**—San Joaquin Tractor Company; **Los Angeles, San Diego and Riverside**—Shaw Sales & Service Company. IDAHO: **Idaho Falls and Boise**—Southern Idaho Equipment Company. MONTANA: **Missoula**—Mountain Tractor Company; **Sidney**—Northland Machinery Company; **Billings** — Seitz Machinery Company, Inc. NEVADA: **Elko**—C. W. Paul Hardware and Machinery; **Reno**—Moore Equipment Company, Inc. OREGON: **Eugene, Roseburg and North Bend**—Farm and Industrial Equipment Co.; **The Dalles**—Dielschneider Equip. Oreg. Ltd.; **Medford** — Tractor Sales and Service, Inc.; **Klamath Falls**—West Hitchcock Corp.; **Portland**—Wood Tractor Company. UTAH: **Salt Lake City**—Cate Equipment Co., Inc. WASHINGTON: **Seattle, Tacoma and Wenatchee**—A. H. Cox Company; **Spokane**—American Machine Company. WYOMING: **Casper**—Studer Tractor & Equipment Co.

EASY TO OPERATE



Operators have long awaited the greater handling ease and comfort now brought to them by this new line of Allis-Chalmers tractors.

Conveniently located controls respond to the slightest effort . . . and are operated in the same familiar way — nothing tricky to "catch on to." There is new shifting ease, new seat and platform comfort, full visibility.

Because the operator's job is easier—takes less effort—he can maintain a steady pace, do a better job throughout his shift . . . day after day.

Look over some of the many reasons why this NEWEST, FINEST TRACTOR LINE ON EARTH is easy to operate . . . as well as being built to "take it," easy to service and entirely new in performance. Then get the full story from your Allis-Chalmers dealer.

- ✓ Revolutionary shift pattern. A quick, one-lever shift from any forward to any reverse speed. No "double" shifting to obtain high reverse speeds. Saves time and effort.
- ✓ Master clutches with large diameter plates, and steering clutches with hydraulic or mechanical boosters, require less effort. All control linkage is equipped with anti-friction needle bearings.
- ✓ Steering brakes are self-energizing for both forward and reverse travel.

Pedals adjustable to operator.

- ✓ Quick electric starting on diesel fuel from operator's seat. Tractors go to work faster. No fuel waste or engine wear by needless idling to avoid restarting.
- ✓ Throttle control, conveniently located, easy and positive (stays put).
- ✓ Roomy, *adjustable*, cushioned seat with wide arm rests. Operator works in real comfort with either front or rear-mounted equipment.

- ✓ Full visibility. Tapered hood, narrow cowl and clean rear-end design provide clear view of front and drawbar work.
- ✓ Ample leg room. Clean platform. Foot rests for added comfort on larger models.
- ✓ Built-in primer system (standard) makes starting quick and easy even in sub-zero weather.

HD-5
40.26 drawbar hp.
11,250 lb.

HD-9
70 drawbar hp.
18,800 lb.

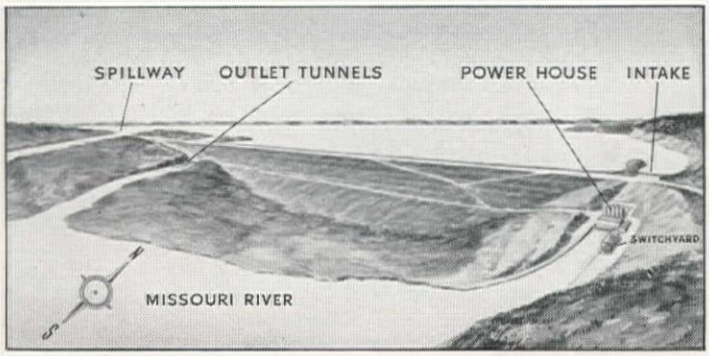
* **HD-15**
102 drawbar hp.
27,850 lb.

HD-20
Hydraulic Torque Converter Drive
175 net engine hp.
41,000 lb.

The Newest, Finest Tractor Line on Earth!

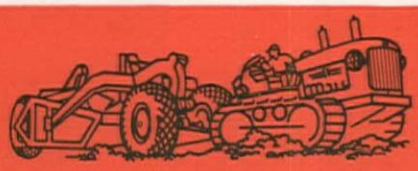
Big Red TD 24

BREAKIN' SHALE ON THE BERM. TD-24 pulls a 60,000-lb. capacity spike-tooth roller, evening surface of uncompacted berms. Five TD-24s are literally "all over the place" on this big project's toughest jobs.

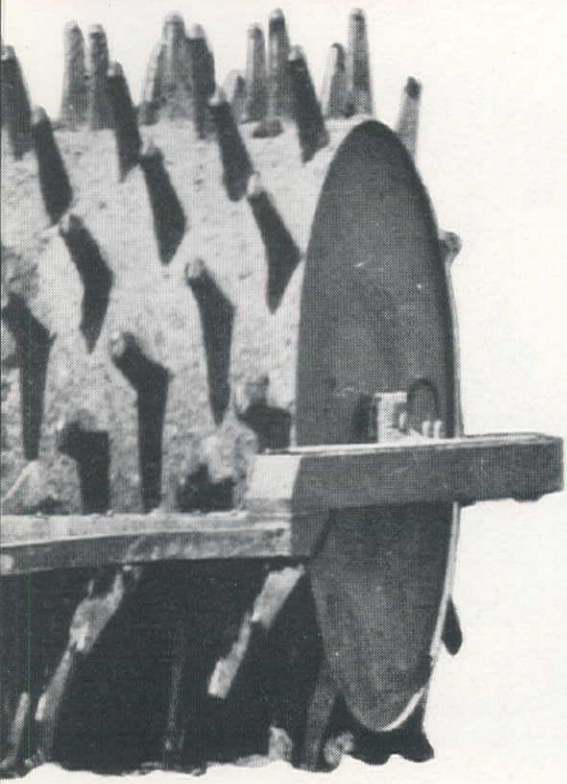


ARTIST'S CONCEPTION OF OAHE DAM at completion in 1959. Power works above will provide 420,000 kw with 6 generators, twice as much power as South Dakota produces at present. 78 million cubic yards of earth are involved.

BIG RED REALLY KEEPS THE LOADS MOVING—Whether it's pushing or pulling, TD-24's great power and speed enable it to move more pay dirt faster.



Rolls Out the Wrinkles on Oahe Dam



Five International TD-24s star on dam project, harnessing the "Big Muddy," creating a 250-mile lake and irrigating two million South Dakota acres.

Contractor's superintendents, dirt boss and skinners at the big Oahe Dam project on the Missouri River near Pierre, South Dakota—all will bend your ear about "Big Red."

Operator Troy Hood goes on record: "Cutting on a curve, TD-24's Planet Power steering keeps both tracks pulling so you keep all power working to do a faster job."

Here's another TD-24 skinner, Jack Rank: "Son-of-a-gun really has got the power. Much easier to handle than other tractors, easier to work, easier on me. I'm on it 10 hours a day, so I know."

Dirt Foreman Sam Crawford backs them up: "TD-24 can't be beat. We haven't found anyplace it won't go."

John P. Beck, general superintendent for subcontractor Campbell-Collins, has high praise for "Big Red": "We're well satisfied with our TD-24s. Their speed in reverse certainly is an advantage as no time is lost between pushing runs behind our ten scrapers."

There they are—solid reasons for TD-24 preference by the men who move the dirt.

Take their word for it. See your nearest International Industrial Distributor for the facts behind enthusiastic TD-24 performance reports making the rounds. Find out how he backs up the power he sells with full stock of parts, factory-trained mechanics, and the latest service equipment, to keep your equipment in the high output bracket.

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS

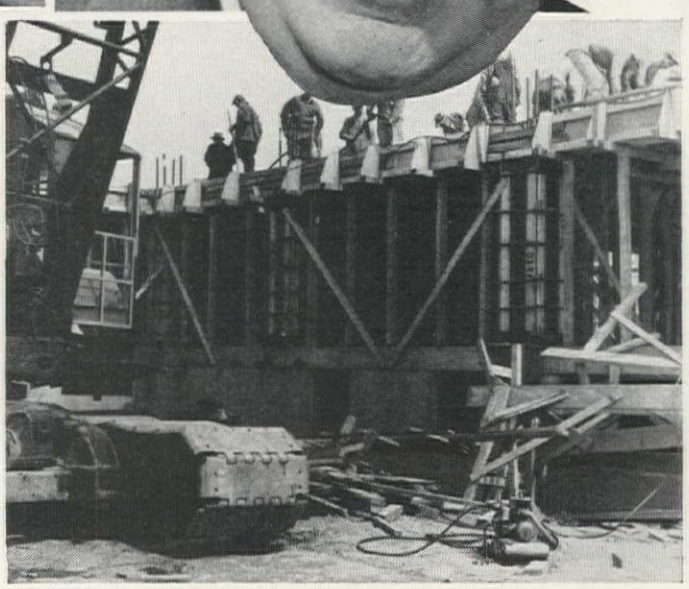
"WE LIKE TD-24 POWER," says John P. Beck of Campbell-Collins (left). Looking on are F. A. Bleecker of Guy H. James Co., prime contractor; L. G. Leavitt, area engineer; and F. P. Evans, office engineer.

INTERNATIONAL HARVESTER

INTERNATIONAL

POWER THAT PAYS

How to Save Wear and Tear on Your Hair



ORDER NOW your HOMELITE PUMPS and GENERATORS

Sure as shooting . . . someday in the not too distant future, water will be slowing up work on the job; or you'll need some instant power to get electric tools into operation or for floodlights on night work. Well, if you haven't got those pumps or generators handy or, if the ones you have are pretty tired, beaten up and just can't come up to the job, that's when you'll feel like pulling your hair out by the roots.

Why not, right now, place your orders for Homelite Carryable Pumps and Generators. Sure deliveries are somewhat delayed . . . as it is with all good *wanted* equipment. But an order today might save the day in the future. You'll have pumps and generators handy . . . and the very best, Homelites.

Manufacturers of Homelite
Carryable Pumps • Generators
Blowers • Chain Saws

PERFORMANCE · DEPENDABILITY · SERVICE

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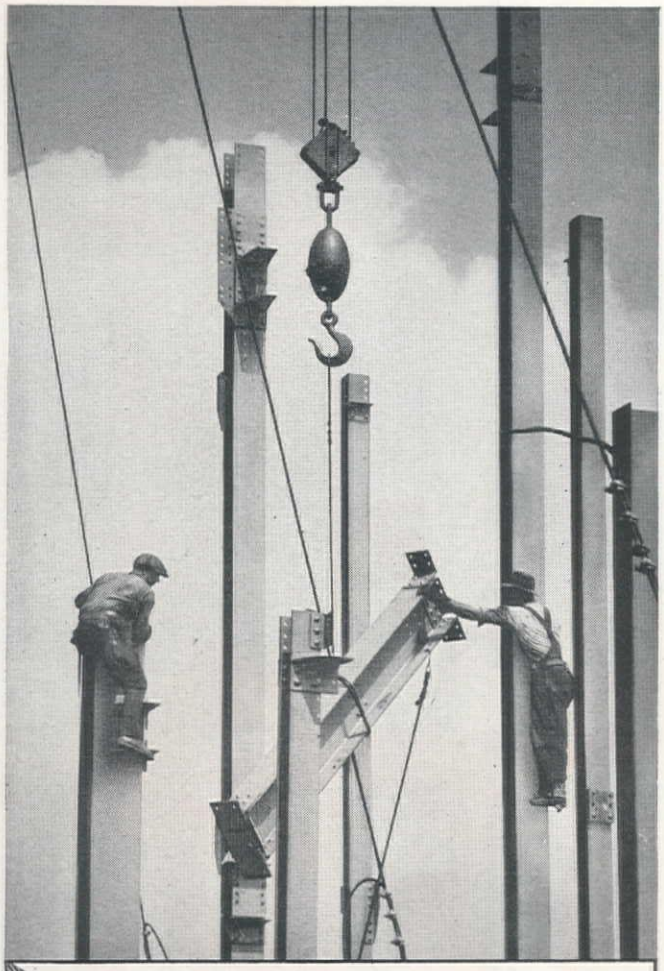
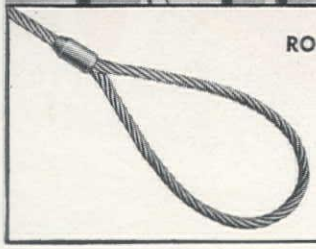
WIRE ROPE





ROEBLING ALL-PURPOSE SLINGS with the Tapered Sleeve Splice come to you ready for the job. They cost less than tucked splices... have the full strength of the rope. Send for the full story.

On every type of equipment you'll do best with Roebling

"BLUE CENTER" STEEL wire rope is an exclusive Roebling development. It has to pass the most stringent tests for strength, fatigue and abrasion resistance . . . gives rope the extra life that spells economies. Besides, Roebling Preforming assures you top performance on the job. "Blue Center" Preformed is easy to handle . . . has better spooling qualities . . . reduces vibration and whipping.

Roebling makes a complete line of wire rope . . . offers the right grade and construction for every installation. Have your Roebling Field Man help choose the *right* rope for your equipment. Get his advice on the correct use and maintenance of wire rope. It is based on performance records on thousands of installations. John A. Roebling's Sons Company—San Francisco—Los Angeles—Seattle.

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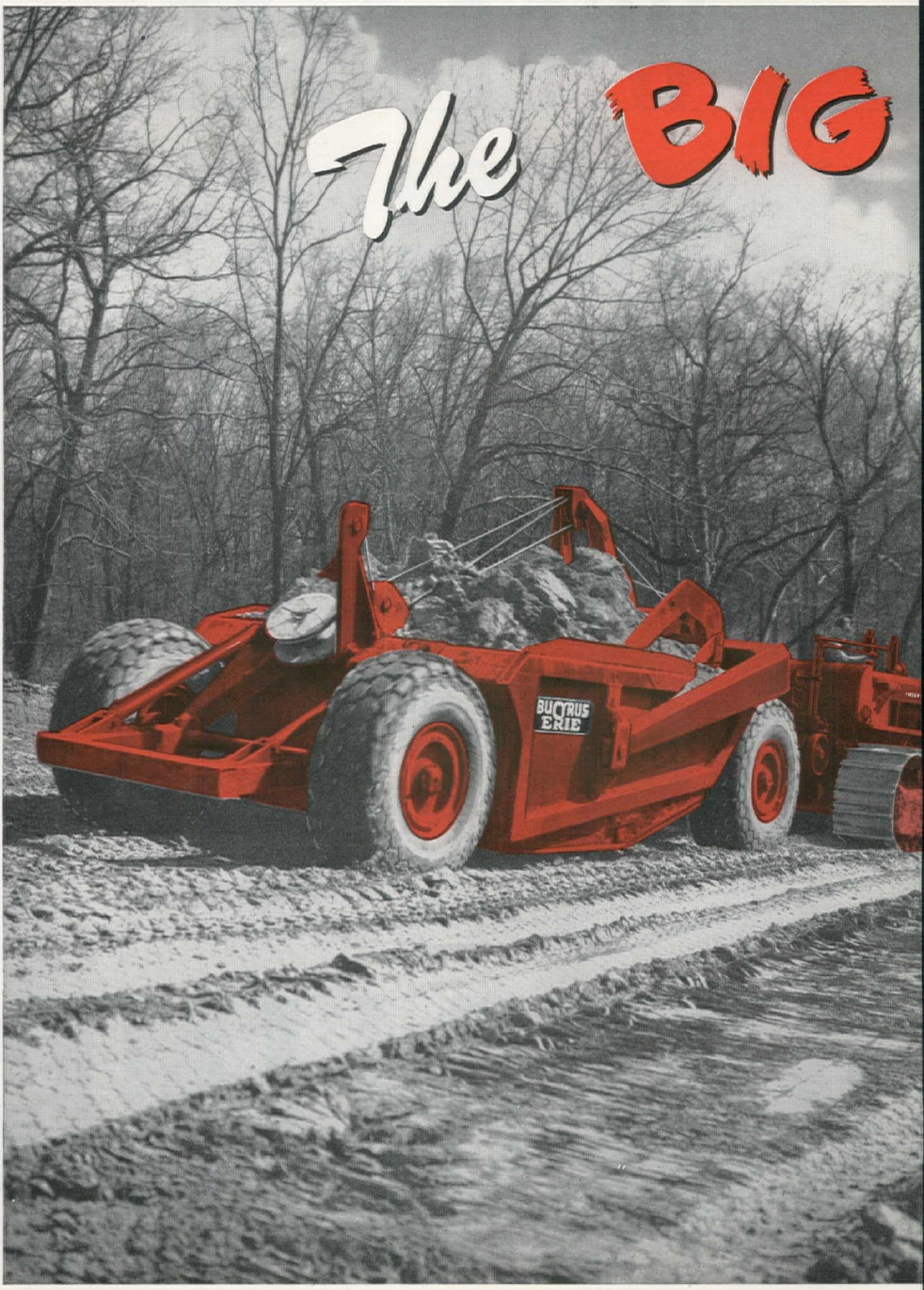

The BIG
BUCYRUS ERIE

RED TEAM

. . . Best at Every Distance on Highway Relocation Job

HANDLING 600,000 yd. of wet sticky clay put every tractor-scraper unit in the contractor's spread to a rugged test on this job. Both loading and unloading were extremely difficult, and hauls ranged from 300 to 2200 feet. Yet the Big Red Team — an International TD-24 and Bucyrus-Erie B-type scraper like the one pictured — outperformed, outproduced every other unit on every count.

Actual on-the-job performance showed that the Big Red Team delivered up to twice as much dirt as any other tractor-scraper combination. Its hourly averages were as high as 173 cu. yd. on the 350-ft. hauls — 118 cu. yd. on the 2000-ft. hauls.

The Bucyrus-Erie scraper is the pay-dirt member of the Big Red Team — perfectly matched to the TD-24 to take full advantage of its great power. Both B-type models, the 15-yd. and the 22-yd. (struck capacities), load quicker, dump faster and cleaner in any kind of material than any other scraper. See for yourself. Ask for a demonstration of the Big Red Team on *your* job as soon as possible.

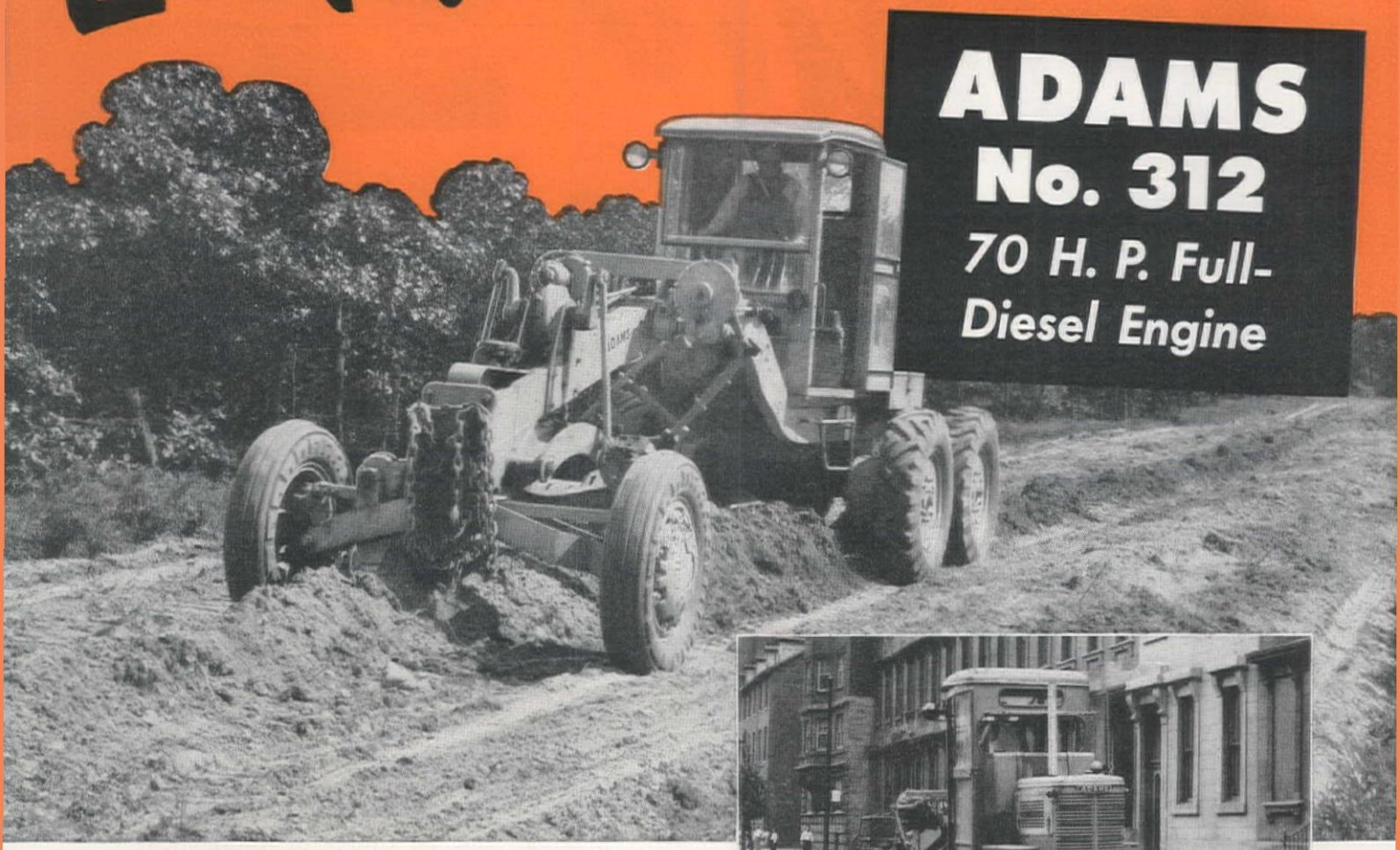
251T51C

SOUTH MILWAUKEE BUCYRUS ERIE WISCONSIN

See

Your International Industrial Tractor Distributor

Look! A Medium-Priced Motor Grader with a lot of Capacity....



• The new Adams Motor Grader No. 312 is made to order for municipalities and contractors who are looking for a good utility machine at a moderate price.

Here is a husky 70 hp. motor grader with all of the weight and performance-ability that you bought in heavy-duty machines several years ago. From deep ditch cutting to high bank sloping—scarifying, sub-grading, fine finishing, mixing, back-filling, snow plowing, etc.—the new Adams No. 312 will do a surprising amount of work with real speed, efficiency and economy.

Before you buy any motor grader in the medium-price class, by all means investigate the great new Adams No. 312. See your local Adams dealer—or write for illustrated literature.

J. D. ADAMS MANUFACTURING CO. • INDIANAPOLIS, IND.

See your local Adams dealer

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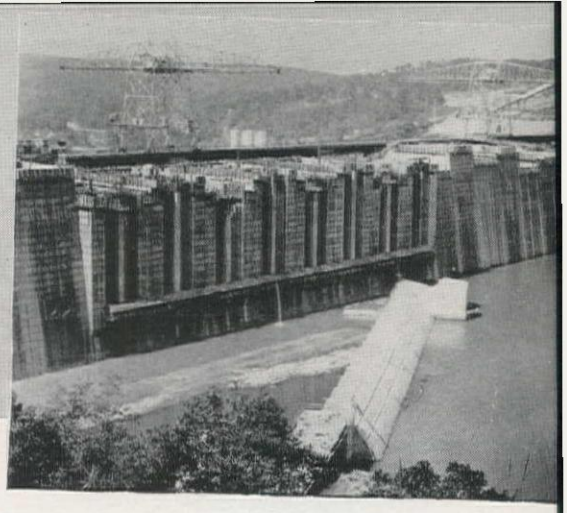
Dam the rivers....



and BLAW-KNOX helped them do it!

WHENEVER there's a river to be dammed, it's a good bet that Blaw-Knox Forms and forming methods will be used. *2 out of every 3 big dams built since 1945 have been constructed with Blaw-Knox Steel Forms!*

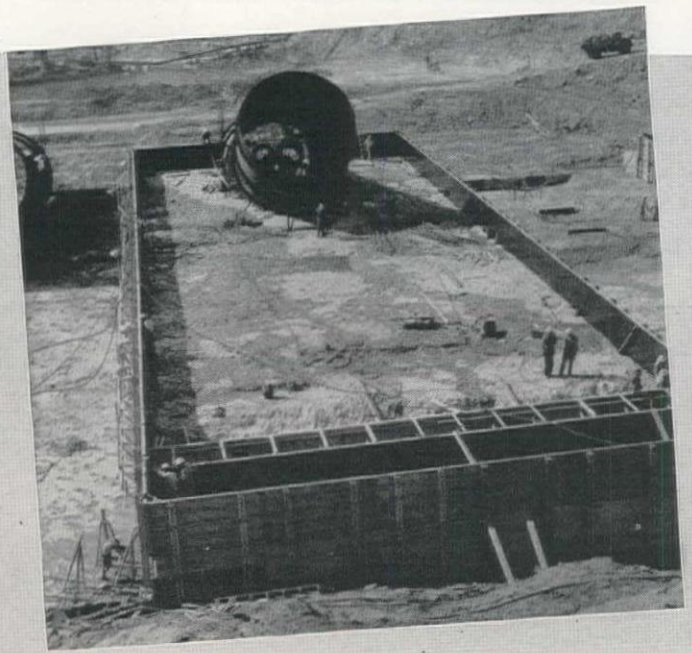
One of the many reasons for this acceptance is the Blaw-Knox engineering know-how which is available, without obligation, from the blueprint stage to the final pour. Blaw-Knox engineers will study your job, recommend the best form design. They will help you simplify your forming methods and can often save money by eliminating unnecessary operations or materials.

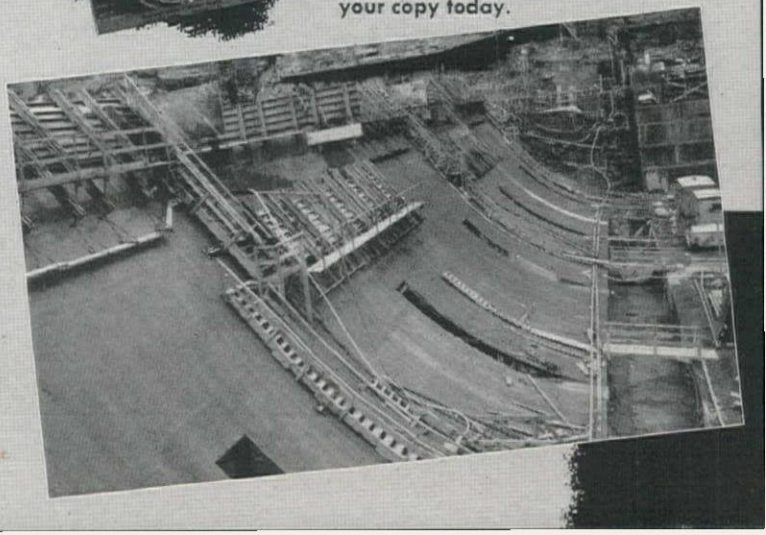
Blaw-Knox engineers are always on hand for consultation to help you solve unusual or costly concreting problems. Their knowledge of practical forming methods is the result of over 40 years Blaw-Knox experience in building steel forms for concrete jobs of all kinds.

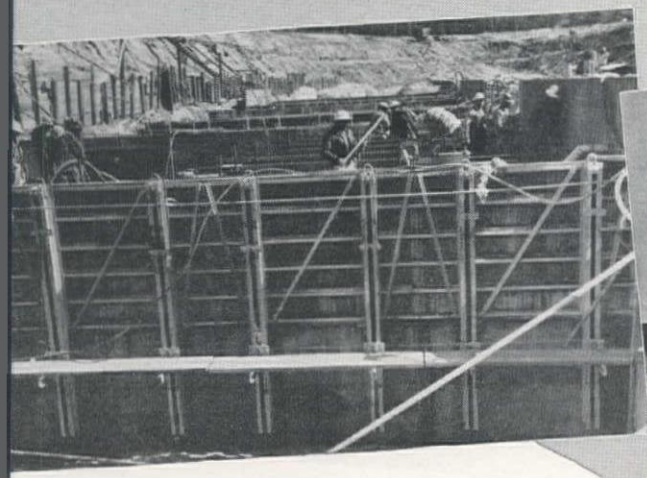
. . . Whether it's placing concrete for big dams or small sewers, simple or tough projects . . . you'll get the job done faster and at lower cost when you use the Blaw-Knox job-proved Steel Form System. Write for details today.

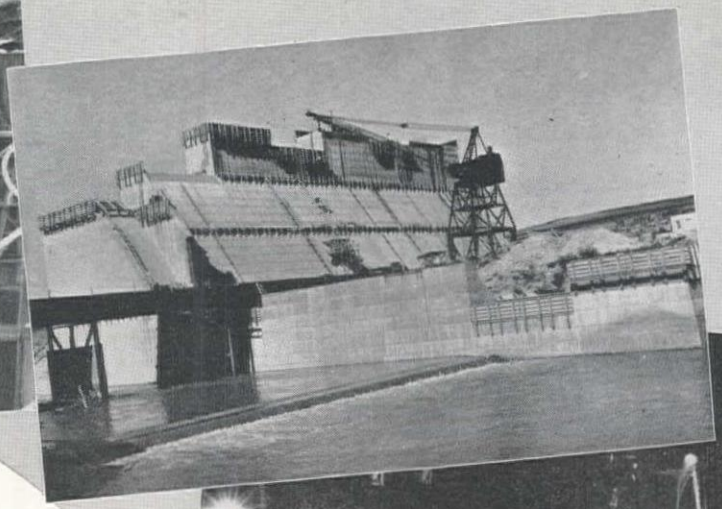
818 Monadnock Bldg., 681 Market St.
San Francisco 5, Calif.

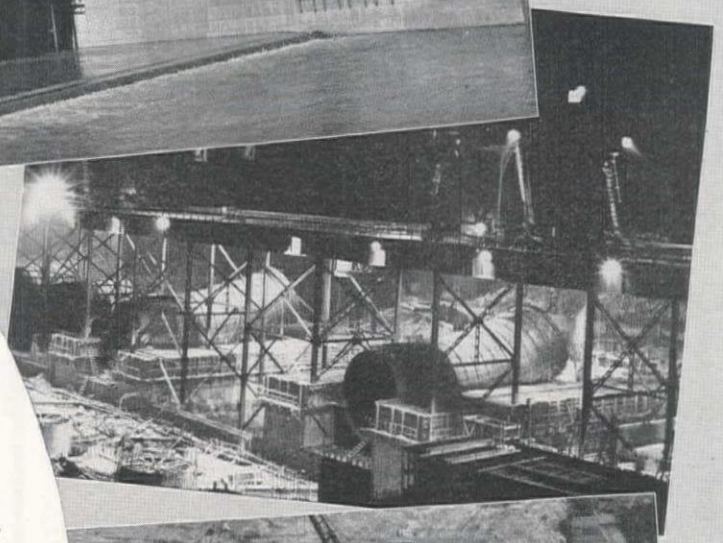
BULLETIN 2035 contains special design suggestions which may save money on your concreting jobs, large or small. Write for your copy today.





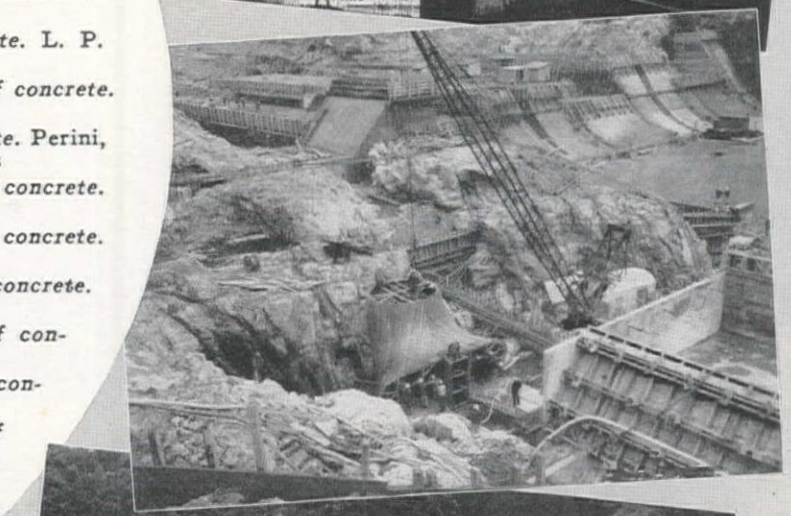


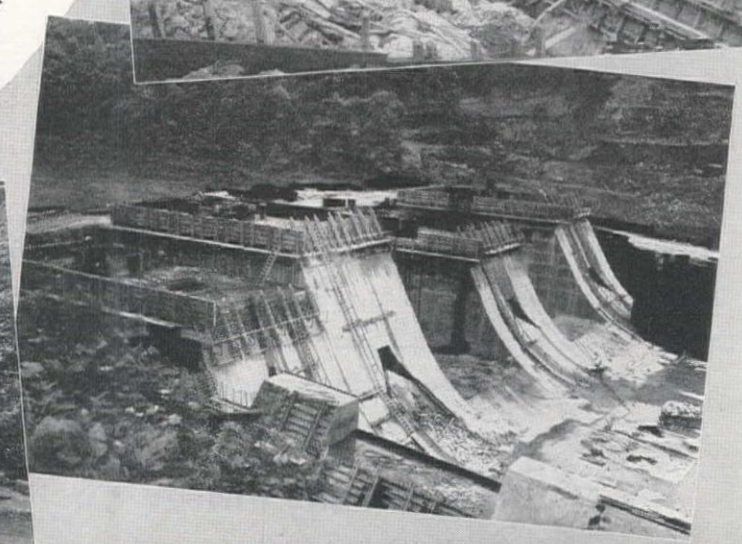


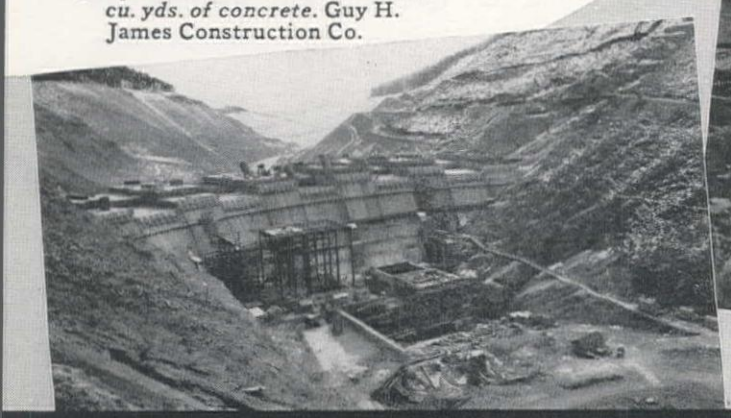


TYPICAL DAMS BUILT with BLAW-KNOX STEEL FORMS

- Chief Joseph Dam—Washington. *820,000 cu. yds. of concrete.* Chief Joseph Builders
- East Sidney Dam—New York. *145,000 cu. yds. of concrete.* The Savin Construction Corporation
- Bull Shoals Dam—Arkansas. *2,100,000 cu. yds. of concrete.* Ozark Dam Constructors
- Auburn Dam—Pennsylvania. *Yardage figures not available.* The Arthur A. Johnson Corporation
- Buggs Island Dam—Virginia. *361,000 cu. yds. of concrete.* Jones-Tompkins-Wright
- Whitney Dam—Texas. *550,000 cu. yds. of concrete.* L. P. Reed, Inc., and Martin & Grace, Inc.
- Mount Morris Dam—New York. *690,000 cu. yds. of concrete.* Mount Morris Dam Builders.
- Woodruff Dam—Florida. *243,840 cu. yds. of concrete.* Perini, Walsh, Mills & Blythe Bros. Construction Companies
- Harlan County Dam—Nebraska. *340,000 cu. yds. of concrete.* Harlan Construction Company
- Canyon Ferry Dam—Montana. *440,000 cu. yds. of concrete.* Canyon Constructors
- Hungry Horse Dam—Montana. *3,000,000 cu. yds. of concrete.* General-Shea-Morrison
- Wolf Creek Dam—Kentucky. *1,250,000 cu. yds. of concrete.* The Jones-Wright Company
- Angostura Dam—South Dakota. *230,000 cu. yds. of concrete.* The Utah Construction Company
- Conemaugh Dam—Pennsylvania. *331,000 cu. yds. of concrete.* The Savin Construction Corporation
- Fall River Dam—Kansas. *130,000 cu. yds. of concrete.* Arcole-Midwest Corporation
- Detroit Dam—Ore. *1,450,000 cu. yds. of concrete.* Consolidated Builders, Inc.
- Spavinaw Dam—Okla. *119,700 cu. yds. of concrete.* Guy H. James Construction Co.







BLAW-KNOX

Division of Blaw-Knox Company • Farmers Bank Bldg., Pittsburgh 22, Pa.

New York • Chicago • Philadelphia • Birmingham • Washington • San Francisco

Carl Myers, Inc., is using thre Euclid Scrapers on a highway re location project near Gallipoli Ohio. Speed of the "Eucs" is im portant on this 400,000 yd. jo where hauls average 4,000 fee

Euclid Scrapers

Make the dirt fly!

Gilbert Engineering Co. used three Euclid Scrapers on a North Carolina airport job. Prior to delivery of a third unit, two "Eucs" moved 152,000 yds. in one month on this 700,000 yd. job—hauls averaged 2500 feet.

Owners in every part of the country report outstanding performance and production with the new Euclid Scraper. It has proved its efficiency and dependability on a wide range of work—construction of roads, airports, levees and in open pit mining.

These features assure top scraper performance ... struck capacity 15.5 cu. yds., 20 cu. yds. heaped ... 10 speed transmission ... 275 h.p. engine ... top speed with full payload 28.2 m.p.h. ... high lift apron and positive roll-out ejector dump loads fast and clean ... four wheel Euclid tractor provides easy, positive steering and has ample power, traction and flotation for fast loading and travel on steep grades and soft fills.

Call your Euclid Distributor or write direct for information on this Euclid Scraper ... the easiest handling and most efficient loading, hauling and spreading scraper for your work.

The EUCLID ROAD MACHINERY Co.

CLEVELAND 17, OHIO

CABLE ADDRESS: YUKLID CODE: BENTLEY

MORE LOADS PER HOUR— MORE PROFIT PER LOAD

EUCLID THE PIONEER

EUCLIDS *Move the Earth*

300,000 YARDS

maintenance still too low to be figured

Two of the eight Worthington Blue Brute Wagon Drills that broke cost records for Rock Construction Corporation. Note the amount of line drilling.

President Walt Dunham and Engineer A. Bruce Lattanzi in the company's Downsville Dam office.

Two 500' Worthington Blue Brute Air Compressors supplying air for drills at the Downsville Dam.

Line drilling in blue stone is child's play to those Worthington Blue Brute Wagon Drills.

Rock Construction Corporation of Kingston, New York, working on the Downsville Dam weir and waste channel, got service out of eight wagon drills that constantly amazed them.

Walt Dunham, president, reported: "We have drilled as much as 700-800 feet per 8-hour day per machine. In 165 working days, the machines put out 300,000 cu yds with so little maintenance it can't be figured in cost per yard."

This job also used a number of Worthington Blue Brute Hand-Held Rock Drills. Says Mr. Dunham: "There has been absolutely no maintenance cost. Our operators like them better than anything they have ever used."

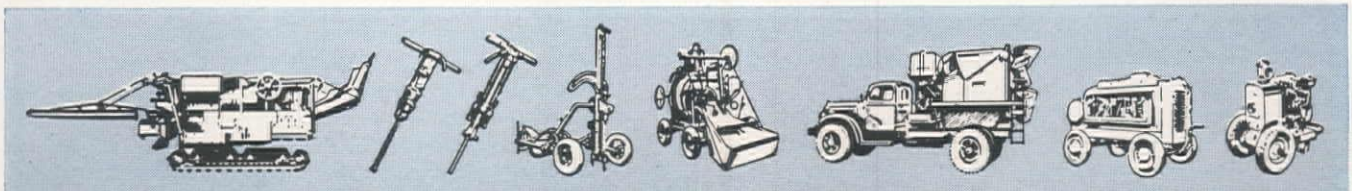
Worthington Blue Brute Rock Drill operating ahead of the wagons collaring hole for laying out line drilling.

Contractors everywhere know that a Worthington Blue Brute team—air compressor and tools—makes mincemeat out of even the toughest jobs. See your nearby Worthington distributor for a demonstration. Worthington Pump and Machinery Corporation, Construction Equipment Division, Dunellen, N. J.

WORTHINGTON

BUY BLUE BRUTES

H.1.5



IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB

JOHNSON Lo-Bin BATCHER

LO-BIN holds 8, 20, or 30 tons... is easily charged by front-end tractor loaders. 8-ton Lo-Bin is only 7½' high; flared extension panels give 20-ton capacity at 8½' height, 30-tons at 9½' height. Furnished with 2, 3 or 4 compartments, up to 4 weigh beams, 22 or 44 cu. ft. weigh hoppers. Hopper rides out beyond end of track, dumps directly into mixer skip. Serves 28-S, 16-S, 11-S, 6-S mixers. Also furnished with bulk cement compartment arranged for 2 or 3 aggregates, 1 cement. Easily dismantled and moved by dump truck. Optional: wheels, pneumatic tires, tow-bar. Ask about Johnson mix plants, buckets, bins, silos.

AMERICAN MACHINE COMPANY ..... Spokane
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CRAMER MACHINERY CO. ..... Portland
WESTERN MACHINERY CO. ..... Salt Lake City
NEIL B. McGINNIS CO. ..... Phoenix
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SHAW SALES & SERVICE CO. ..... Los Angeles
COAST EQUIPMENT COMPANY ..... San Francisco
KING AND KRINGEL MACHINERY CORP. ..... Denver
ENGINEERING SALES SERVICE, INC. ..... Boise

KWIK-MIX TOWER LOADERS

For overhead discharge up to 9'2" . . . this Kwik-Mix Tower Loader fits 11-S and 16-S Dandie® mixers . . . discharges concrete batches into trucks, or direct into hoppers or forms above ground level. Saves time and cost of overhead mixer installations on many jobs. Big capacity bucket holds full mixer batch . . . is raised by power, dumps automatically at top of tower. Control is by single lever from mixer platform. Mixer engine supplies the power. Bucket travels, dumps while next batch mixes. Other Kwik-Mix units: concrete, bituminous, tilt and non-tilt plaster-mortar mixers, 10 cu. ft. power wheelbarrow.

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PARSONS TRENCHLINERS®

221 digs up to 12 ft. per min.... produces clean-cut trenches 16" to 36" wide, 8'-6" deep . . . cuts within 10" of side obstructions. Spoil conveyor shifts by power to either side in less than 1 min., has constant discharge height for loading into trucks. All-welded arch-type main frame is truss-braced, maintains rigid alignment of all major operating assemblies . . . provides low center of gravity for work, low overhead clearance for travel. Engine mounted far forward counterbalances digging boom. Wide crawlers, well ahead of trench, have only 7 lbs. per sq. in. bearing pressure. Check this 221, or 4 other Parsons sizes.

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McKELVY MACHINERY CO. ..... Denver
KIMBALL EQUIPMENT CO. ..... Salt Lake City
NEIL B. McGINNIS CO. ..... Phoenix
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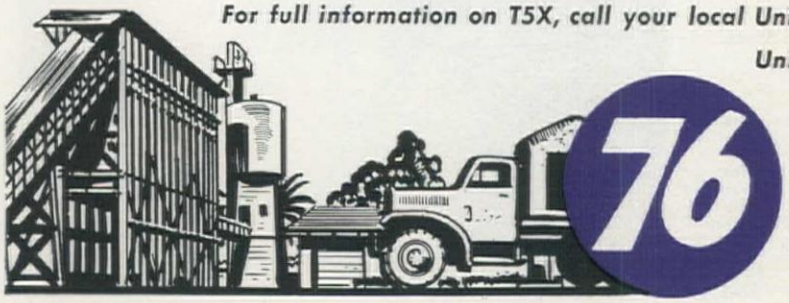
KOEHRING CO., WEST COAST SALES DIVISION ..... Stockton

California fleet owner reports: "A Minimum of Maintenance" with T5X Lubrication!

JOHN BALMINO, co-owner of the Sugar City Drayage and Building Material Company, Crockett, California, writes: "We have been using Union Oil products for 20 years throughout our entire fleet. Our success with T5X motor oil has been outstanding. We have 10 pieces of equipment, both dump and transit mix, and these have been run on T5X . . . with a minimum of maintenance."

Heavy construction work demands that your engines operate at varying speeds under continual heavy loads. These intermittent power-demanding speeds often result in excessive engine wear and high maintenance costs. Construction men such as John Balmino rely on the superior lubricating ability of T5X to protect their engines under *all* operating conditions.

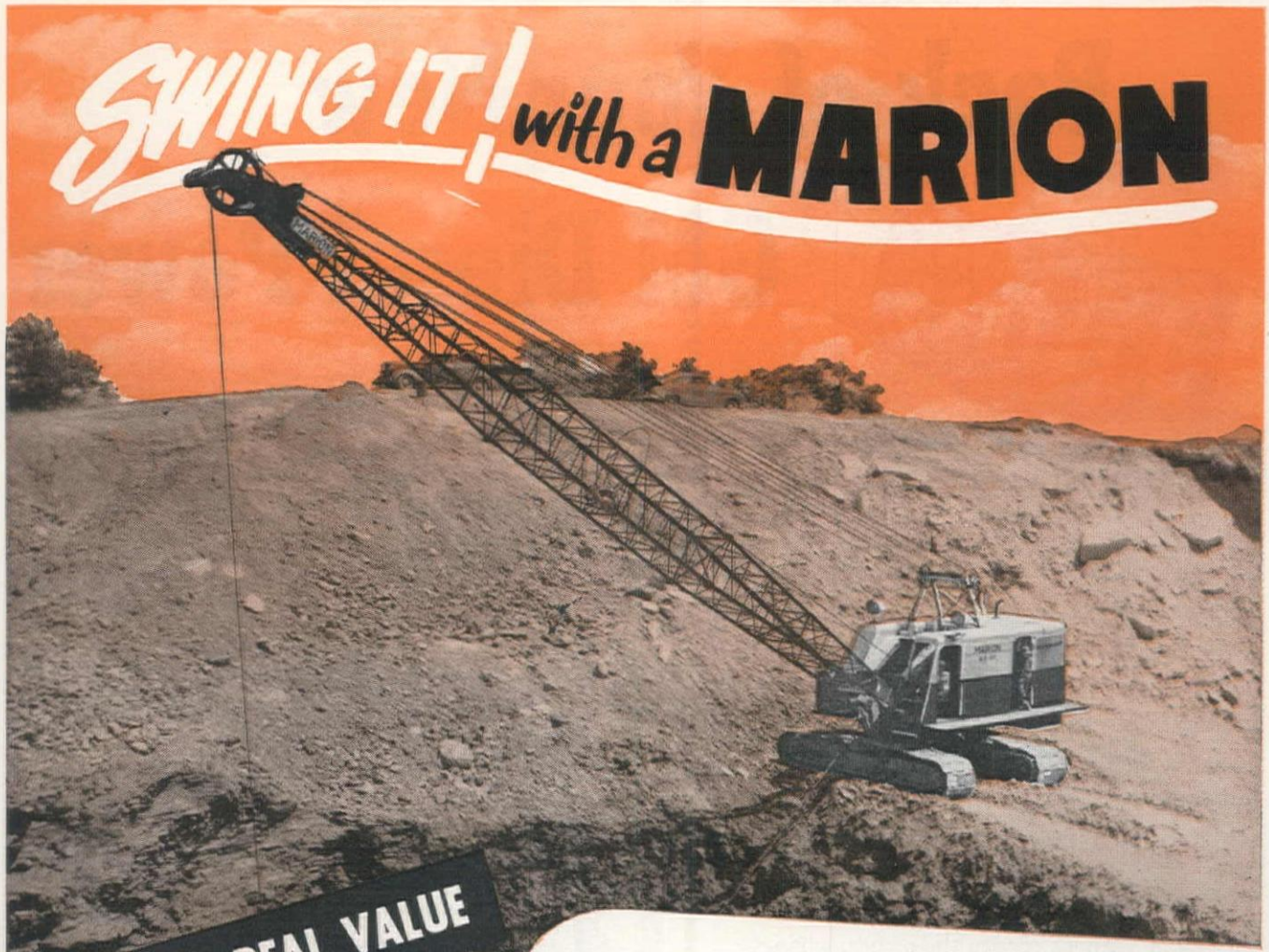
T5X—the famous *purple* motor oil—is made from the finest base stocks that modern chemistry and present-day refinery equipment can produce. Special-purpose compounds have been added to these unexcelled base stocks to give you an oil that is superior in heavy-duty lubricating characteristics.



For full information on T5X, call your local Union Oil Representative or write Sales Dept., Union Oil Company, Los Angeles 17, Calif.

UNION OIL COMPANY
OF CALIFORNIA

SWING IT! with a MARION



And Get REAL VALUE in DRAGLINES

Want to get more for your dragline dollars?

If so, consider what it takes to make a dragline great.

MARION, in more than 65 years of progress, knows there are no substitutes for experienced design, quality materials and careful workmanship if a dragline is to do its job well and faithfully over the years.

MARION builds draglines to **do a job**—not just to "get by" or to "meet a price." MARION builds a size and type to meet every need.

Let your nearest MARION Sales Representative or Distributor show you how easy it is to own today's outstanding Dragline Value.

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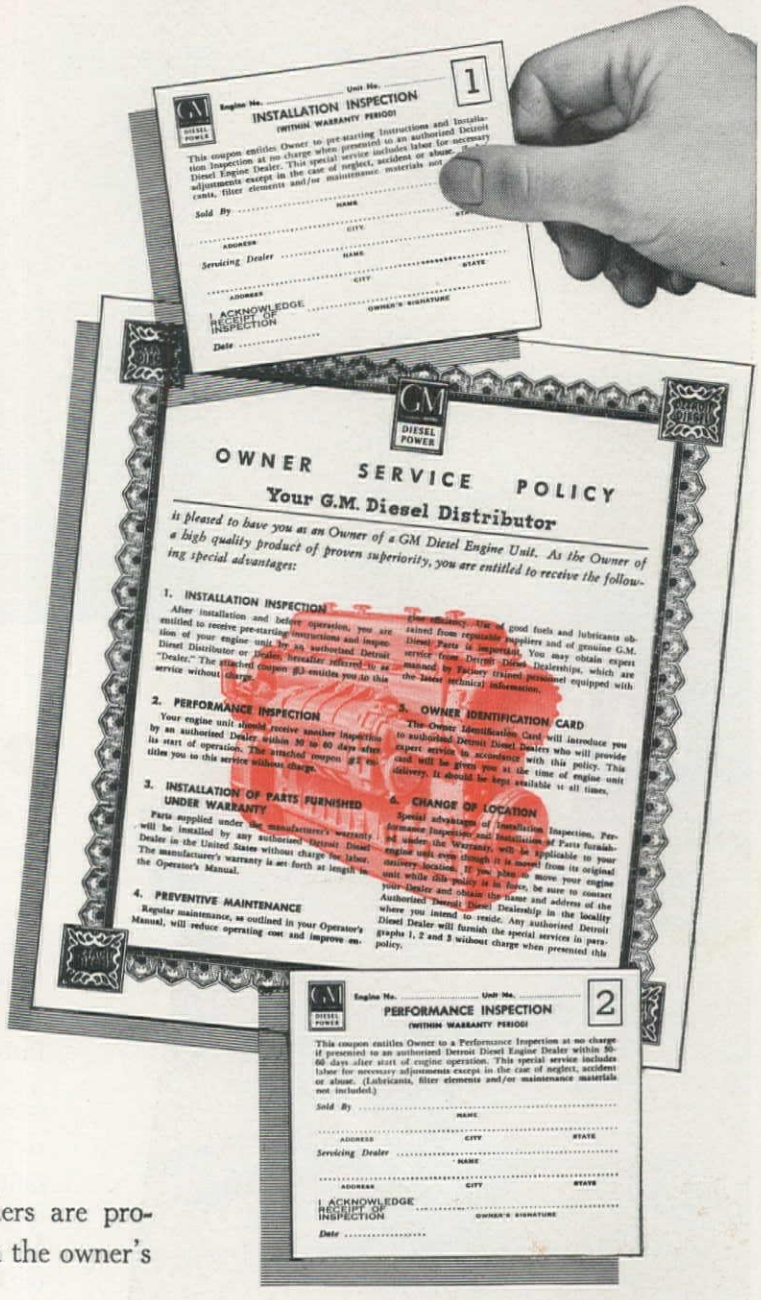
STAR MACHINERY COMPANY.....1741 First Avenue, South, Seattle, Washington
M & F EQUIPMENT COMPANY.....2521 Isleta Highway, Albuquerque, New Mexico
MARION POWER SHOVEL COMPANY.....2505 N. E. 33rd Avenue, Portland, Oregon
C. H. GRANT COMPANY.....1401 Eastshore Highway, Berkeley 10, California
STAR MACHINERY COMPANY.....E. 415 Sprague Avenue, Spokane 8, Washington
MARION POWER SHOVEL COMPANY.....114 W. Adams Street, Phoenix, Arizona
RASMUSSEN EQUIPMENT & SUPPLY COMPANY.....1960 South Second West, Salt Lake City, Utah

Back of Your New GM Diesel Power

3 BIG SERVICE EXTRAS



We want every purchaser or prospective purchaser of one of our engines to know how his local GM Distributor and Dealer, with their factory-trained servicemen, stand back of the product. They in turn are backed by the knowledge that Detroit Diesel supports them strongly in their adherence to this policy.

1. *Installation Inspection:*

The GM Diesel serviceman inspects and checks the engine without cost to the owner; whenever possible this is done before the engine is put to work. He explains how to successfully operate the engine and the "preventive maintenance" necessary for best results in days to come.

2. *Performance Inspection:*

From thirty to sixty days after the engine has begun its job, another inspection is provided without charge. The GM Diesel serviceman makes any adjustments that may be required and tunes up the engine to its best performance.

3. *Owner's Service Policy:*

Besides the above inspections, GM Diesel owners are protected by the exceptional warranty mentioned in the owner's service policy.

ANSWER THE CALL CIVIL DEFENSE

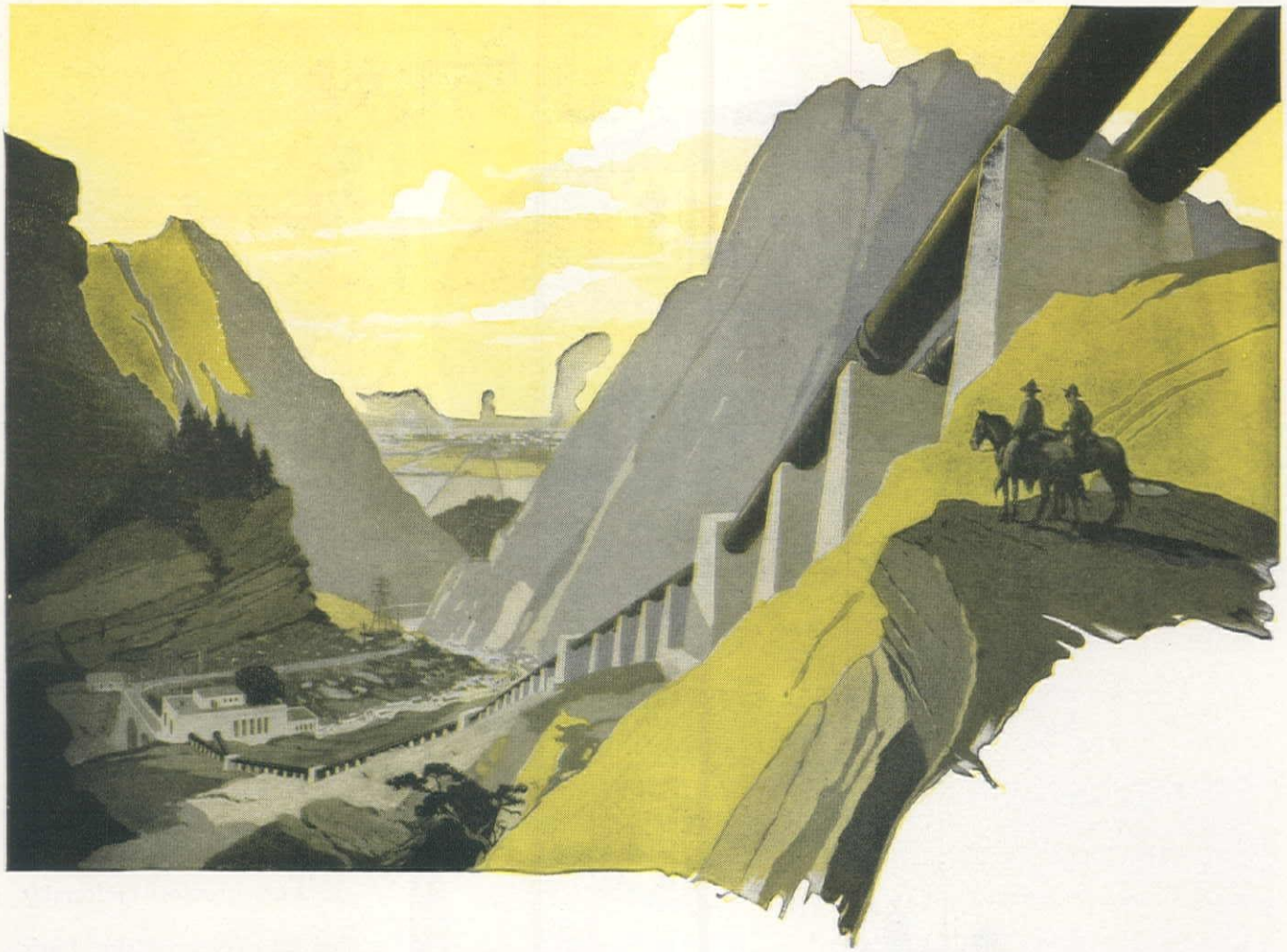
DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES... *Up to 275 H.P.* **DETROIT 28, MICHIGAN** MULTIPLE UNITS... *Up to 800 H.P.*

GENERAL MOTORS

GM GENERAL MOTORS DIESEL POWER

DIESEL BRAWN WITHOUT THE BULK



SMITH Impulse Turbines

FOR HIGH HEADS, and wherever the head and water quantities available prohibit the use of reaction-type machines. Ideal for installations in remote localities because of the ease with which the completed unit may be transported. The simplicity of design, facility of operation and greater dependability remove the necessity of skilled operators and attendants. Smith's solid-cast runner design provides the additional advantages of closer spacing of buckets resulting in increased speed and consequently, a decrease in the size of the turbine unit, as well as the generator. Write for your copy of our Bulletin — "Impulse Turbines by SMITH!"

Impulse runner of *solid-cast* design, an exclusive SMITH advantage.

S. MORGAN SMITH COMPANY

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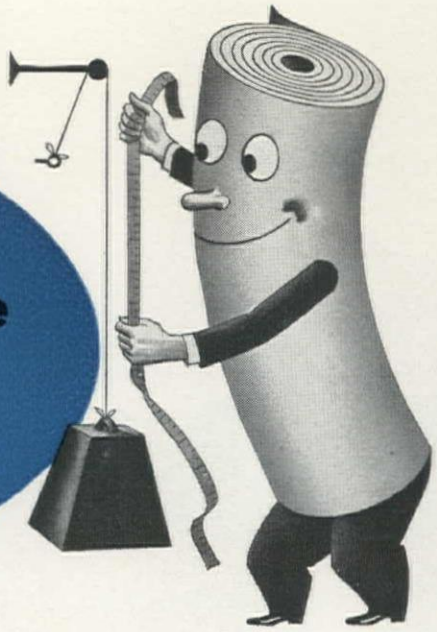
UNIFORMITY
Makes the Big Difference in TARPAULINS



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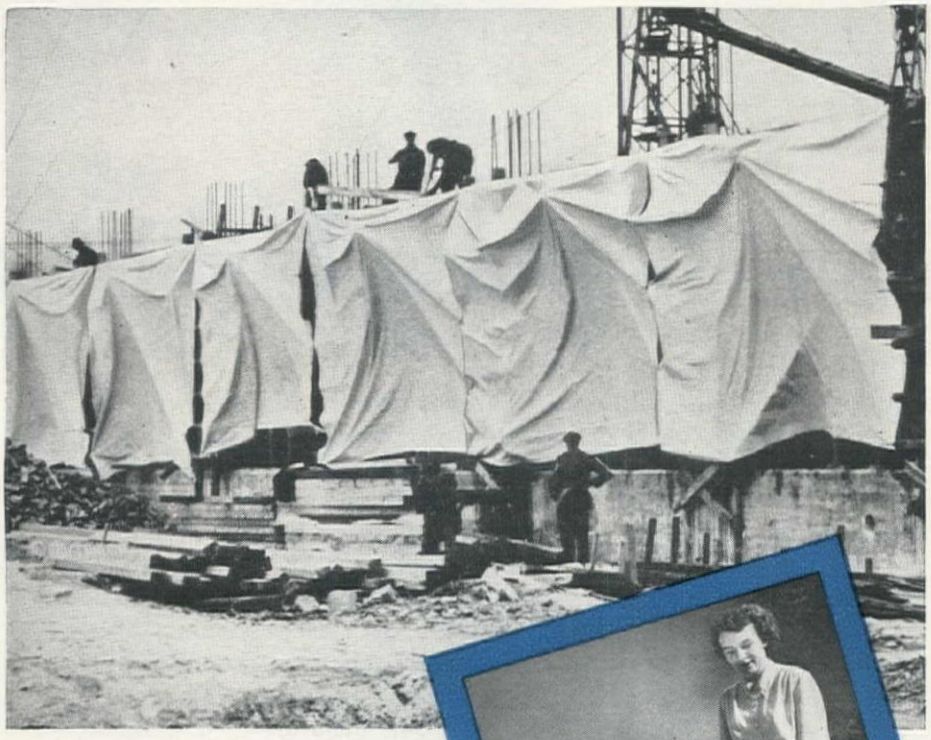
Gives You Greater Fabric Uniformity



TESTING STRENGTH AND ELONGATION OF YARN WITH MOSCROP TESTER. This unit automatically tests 6 strands of yarn at one time. One of a series of comprehensive laboratory controls throughout production to assure fabric uniformity in all Mt. Vernon-Woodberry products.

The greater uniformity of Mt. Vernon Extra Duck assures you the two most important qualities you want in tarps — top protection and top wear. You'll find your repair and replacement costs reduced considerably.

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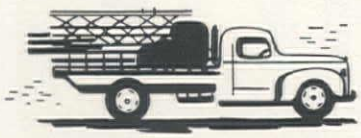

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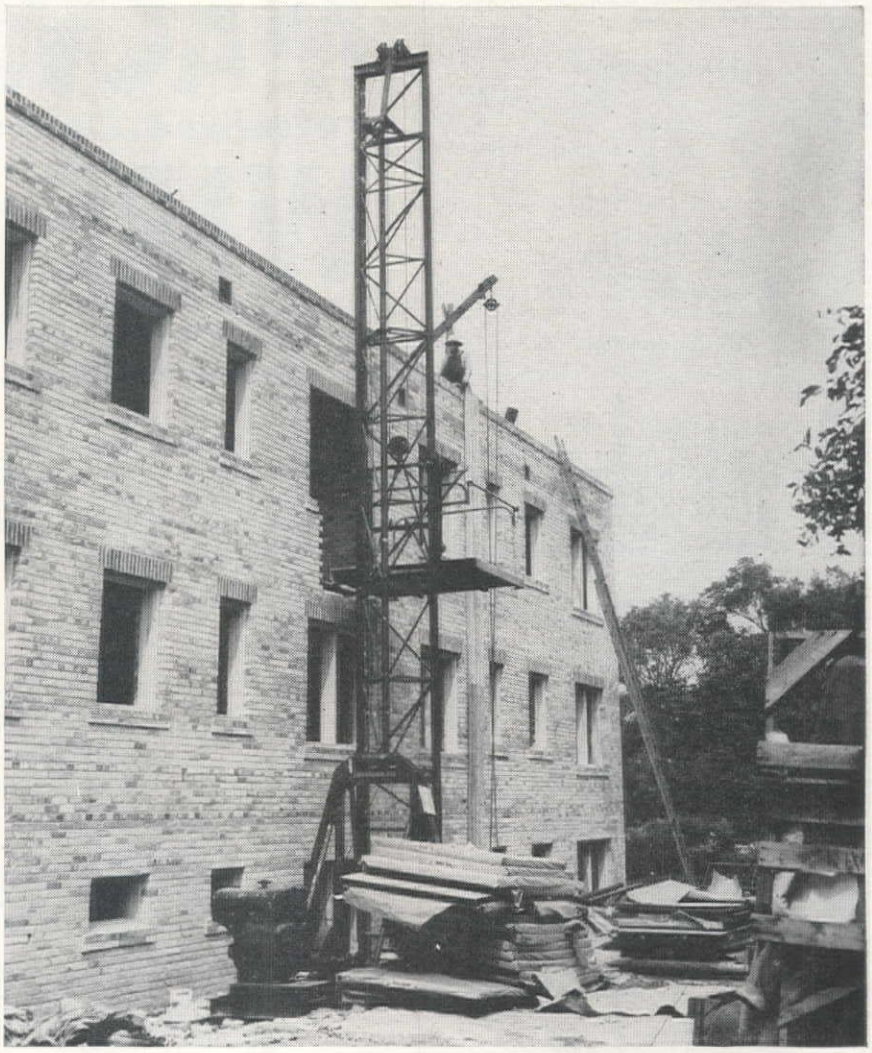
No more cumbersome, expensive wooden scaffolding. Yet the American PME gives you lifting heights from 40′ to 90′ by addition of 10′ tower sections. Capacity 2,500 lbs. Extras include self-dumping concrete bucket, swing boom, automatic safety device and transport wheels.

You can rent or buy this elevator. See your American Hoist distributor today.



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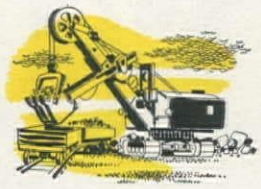

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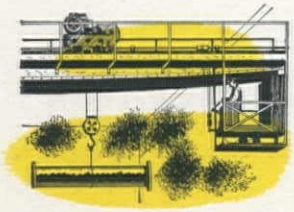

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For better service and more economy

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PREformed...Internally Lubricated

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A thousand and one **to order from assures the right rope for your equipment**

It will pay you to get Macwhyte Wire Rope, engineered and job-proved for your particular equipment. Over the years, ropes for all types of equipment in every field have been developed by Macwhyte. Recommendations are promptly available from Macwhyte distributors or Macwhyte Company. You get the correct wire rope for your equipment when you buy Macwhyte.

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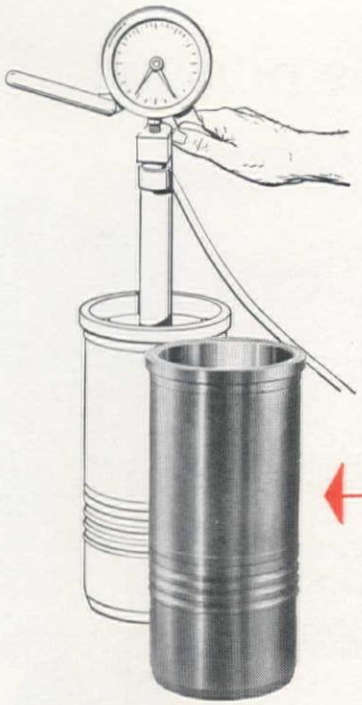
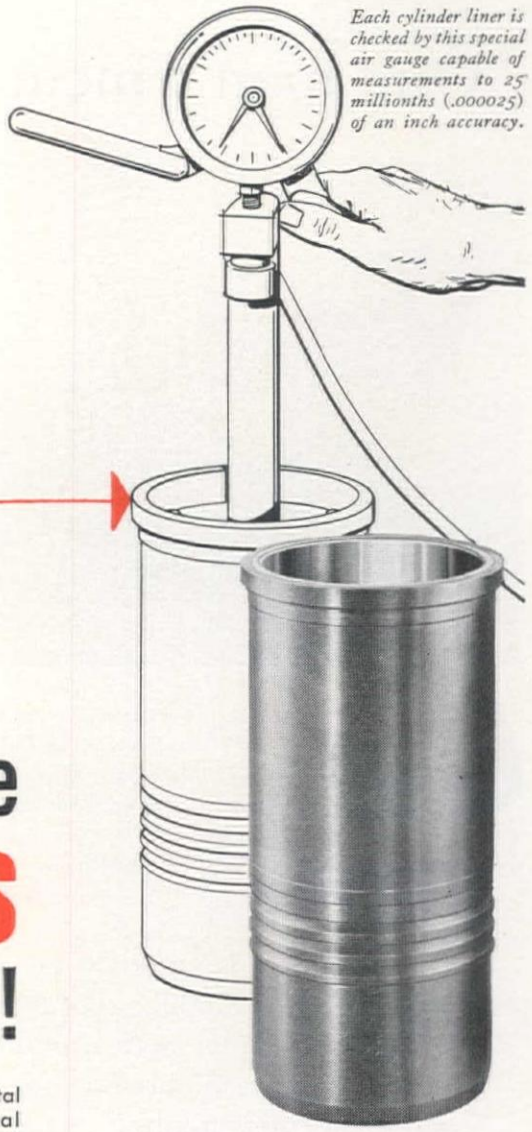
BULLETIN 5025 gives information on "How to order Wire Rope" and lists all sizes and constructions of Improved Plow Steel Monarch Whyte Strand Wire Rope. Copy sent on request.

TD09-4



We take twice the care



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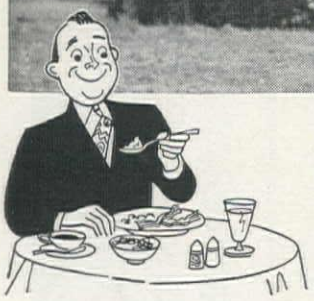
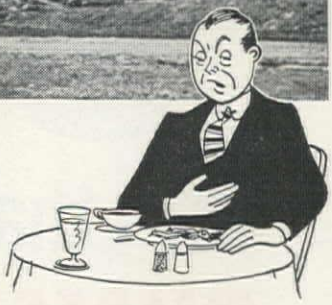
"One man's meat is another man's poison..."



"I'm blasting a ditch. I want to throw that muck UP and OUT. The farther it flies the better. This is a good blast for me, because it's doing what I want—it's making ditch."

"I'm blasting for rock. I don't want to throw it up in the air. I want it broken and dropped for my shovels. Here much of the power of the explosives is going to waste. A mighty poor blast for me!"



The blast that is just right for one operator may be all wrong for another. A ditching shot like the one at left above is meat for the farmer or agricultural engineer. But such throw is strictly poison for blasting work in quarries, strippings and most construction jobs.

The ROCKMASTER Blasting System gives better control over explosives force—enabling you to strike the proper balance between throw and breakage—to suit *your* job.

Your Atlas representative will be glad to help you use the proper combination of the 16 available ROCKMASTER split-second delay detonators, plus explosives and loading methods especially suited to your requirements.

Write today for the ROCKMASTER "16" booklet, showing typical loading diagrams for several types of quarrying, stripping and construction blasting operations. It's yours for the asking.

Less Bark — *More Bite*

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.

New label tells you quick it's TIGER BRAND!

...the rope that spools evenly, resists kinking, handles easily!

This new label tells you quick it's American Tiger Brand wire rope, and it's the right rope for any equipment use—for lumbering, mining, petroleum or construction. Here's why it gives you top service...

It stands up under toughest tests because Tiger Brand is rigidly controlled all the way from raw ore to finished product by United States Steel, of which Columbia Steel Company is the Western producing member.

It spools evenly on drums and gets right on the job with a minimum of break-in time. And those high-tensile steel wires just won't quit! To get all the stamina that's engineered into American Tiger Brand, here's a tip ...

It works hard longer when you take advantage of the services of a Field Specialist. For free consultation, contact your Tiger Brand distributor or write Columbia Steel Company, Room 1422, San Francisco 4.

U·S·S TIGER BRAND Wire Rope

UNITED STATES STEEL

MACK TRUCKS

Get Things Done!

● Extra effort — that's the order of the day as American industry swings into high gear to meet the growing demands of the nation's expanding defense program.

Nowhere is this more important than on vital construction work and on the job of keeping raw materials flowing from the mines, the forests and the oil fields.

Here's work that's cut out for Mack trucks . . . jobs where big Macks show at their best in *extra* strength and stamina, *extra* performance and *extra* dependability.

Your nearest Mack branch or distributor will show you how Mack's exclusive design and construction can boost output on your particular job . . . *get things done* faster and at lower cost. You'll find it's a story well worth hearing.

Mack TRUCKS

. . . outlast them all

Mack Trucks — Los Angeles • Denver • San Francisco Seattle • Portland • Salt Lake City • Factory branches and distributors in all principal cities for service and parts.

Model LRSW six-wheel SUPER MACK truck really "gets things done" in strip mining and excavating work—handles its 30-ton loads with round-the-clock dependability.

BARRETT* COAL-TAR ENAMELS PROTECT AMERICA'S GREATEST PIPELINES

HERE ARE 10 REASONS WHY...

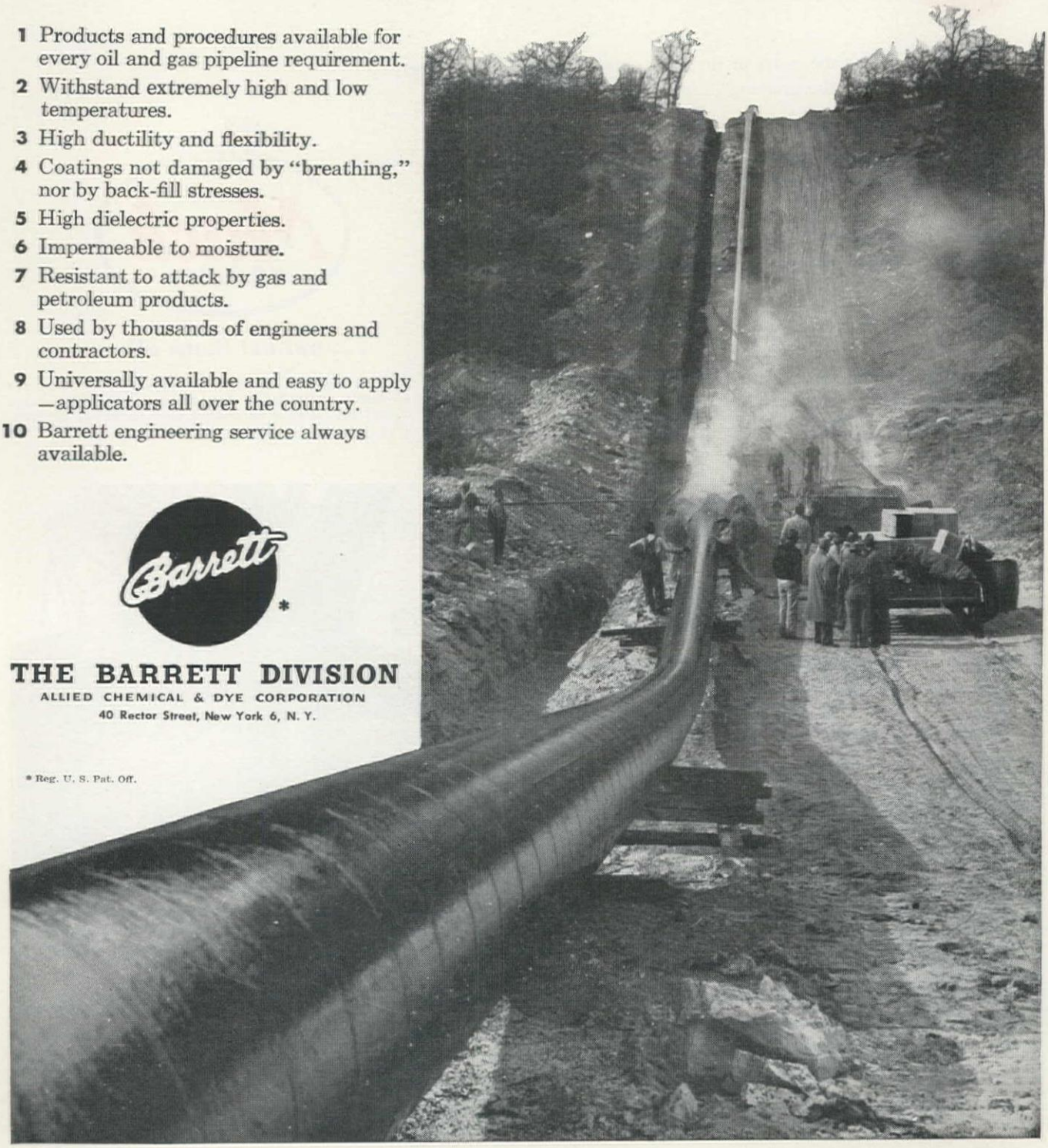
1 Products and procedures available for every oil and gas pipeline requirement.
2 Withstand extremely high and low temperatures.
3 High ductility and flexibility.
4 Coatings not damaged by "breathing," nor by back-fill stresses.
5 High dielectric properties.
6 Impermeable to moisture.
7 Resistant to attack by gas and petroleum products.
8 Used by thousands of engineers and contractors.
9 Universally available and easy to apply —applicators all over the country.
10 Barrett engineering service always available.

Barrett*

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

* Reg. U. S. Pat. Off.

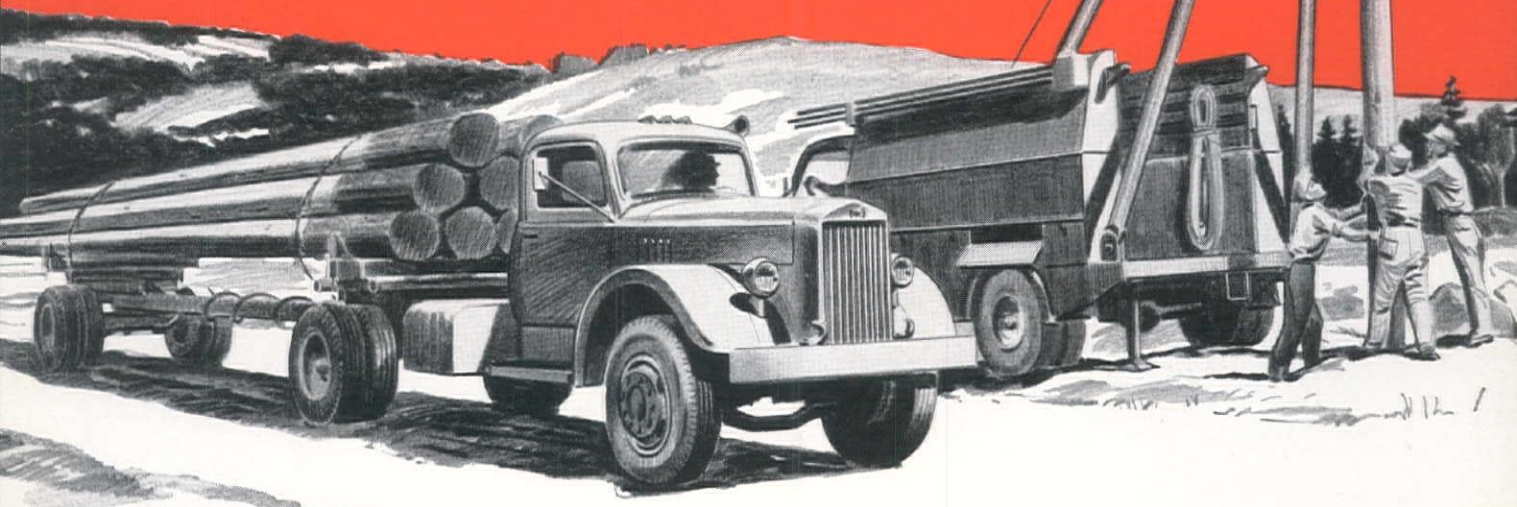
BARRETT Coal-Tar Enamels Protect
The Oklahoma Natural Gas Company Line

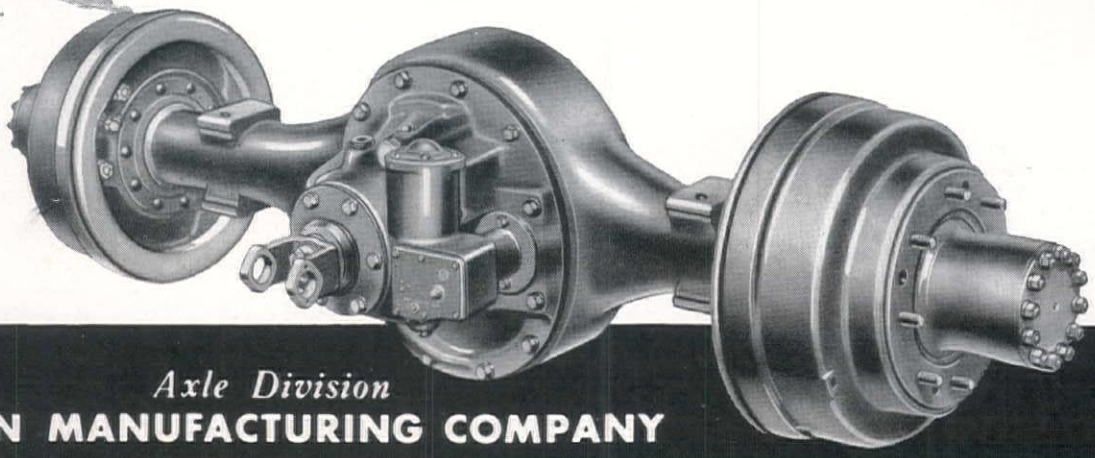


On the Highway or Off—
Trucks Go Faster at Lower Cost

Eaton 2-Speed Axles enable your trucks to go where they have to go to do the job—without damaging strain on engine and power-transmitting parts. They add to the performance of your vehicles, enable them to cover more payload miles in less time, at lower over-all cost. The experience of thousands of users proves that Eaton 2-Speed Axles and Eaton-equipped trucks last longer. Your truck dealer will explain how such outstanding Eaton features as planetary gearing and forced-flow lubrication add thousands of miles to axle life, save maintenance cost, reduce time-in-the-shop.

EATON
2-Speed Truck
AXLES



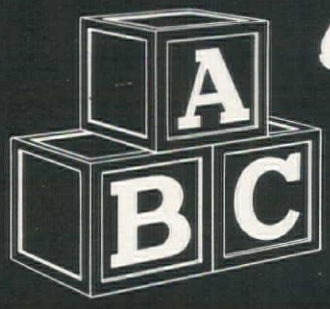


Axle Division

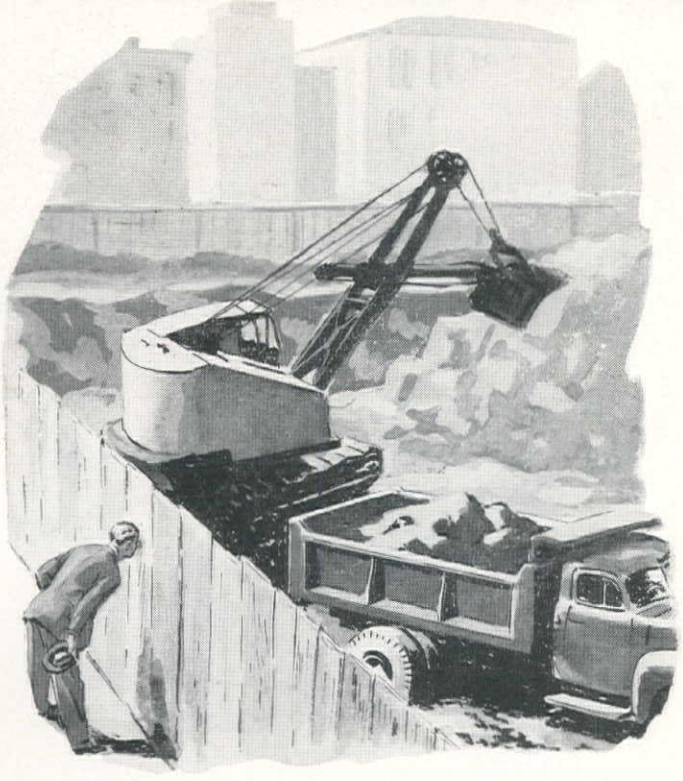
EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • JET ENGINE PARTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS SPRINGTITES • SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS



Only GALION HAS THIS PROVED TIME AND LABOR SAVING A B C COMBINATION



Every month . . . every week . . . in fact every day, dump truck operators who "know the score" are switching to Galion hydraulic hoists and dump bodies. Yes indeed . . . there is a big reason for this trend . . . for Galion engineers have combined the three basic factors of efficient and economical dump truck performance in a great A B C combination. It's the famous Galion combination where the exclusive fulcrumatic hoist ACTION unites with perfect lifting BALANCE and time proved quality CONSTRUCTION to deliver long trouble-free and economical operation and lengthens chassis life as well. Investigate . . . it may save you time, men and money!

MAKES A WHALE OF A DIFFERENCE THE "WEIGH" IT LIFTS

Sales and Service FROM Coast to Coast

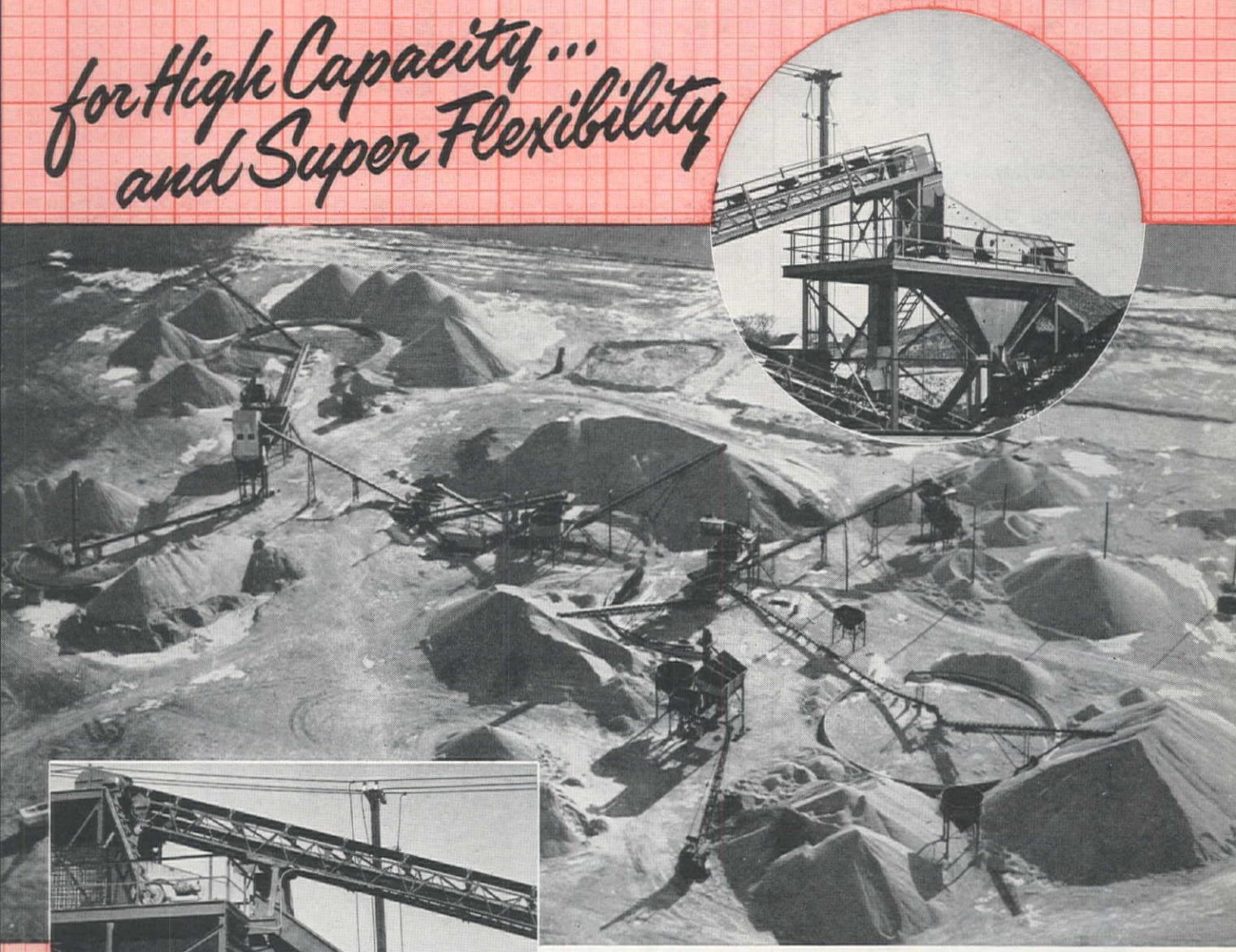
GALION

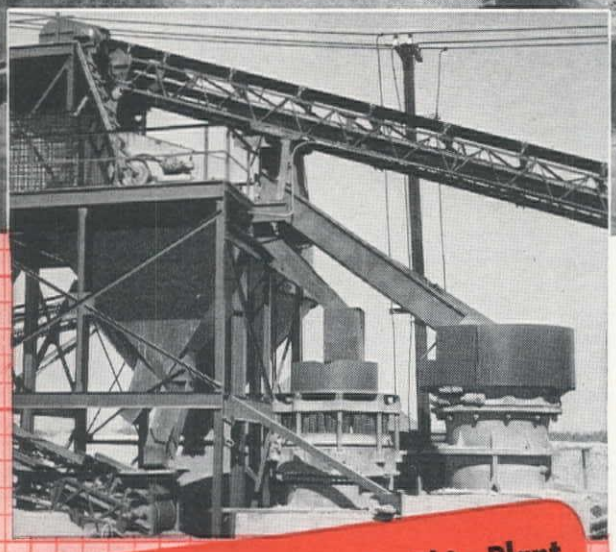
ALLSTEEL BODY COMPANY
GALION, OHIO

A exclusive hoist *Action*
B perfect operating *Balance*
C proved quality *Construction*

TELSMITH® ENGINEERED

for High Capacity... and Super Flexibility





Barbers Corners Crushed Rock, Washed Sand and Gravel Plant of the Elmhurst-Chicago Stone Co., Elmhurst, Illinois. (Top) one of several Telsmith Vibro-King Screens; (left) Telsmith Scalping Screen, Gyratory and Gyrasphere Crushers.

FIVE-WAY EFFICIENCY—(1) High Capacity . . . (2) Super Sizing-Flexibility . . . (3) Simplified, Automatic Controls . . . (4) Large Storage Capacity . . . (5) Fast Truck-Loading . . . makes this plant unique. Because it is not only Telsmith engineered but largely Telsmith equipped.

THREE-SECTION DESIGN—This outstanding sand and gravel plant can produce—In Section One, minus 1″ pit-run road gravel. In Section Two, four sizes of washed gravel, and sand. In Section Three, five sizes of crushed gravel and one of aglime. This three-section plant consistently and economically produces 350 tons per hour.

CONSULT TELSMITH ENGINEERS for newest developments in aggregate production. Send for Bulletin 266.

TELSMITH Equipment in This Plant

One (1) 36″ x 6′ Heavy-Duty Plate Feeder
One (1) 5′ x 12′ Heavy-Duty 2½-Deck Scalping Screen
One (1) 16-B Gyratory Crusher
One (1) 48-S Gyrasphere Crusher
Five (5) Vibro-King Finishing Screens: 5′ x 12′, 4′ x 12′, 4′ x 10′ Triple Decks; 4′ x 12′ Double Deck
Nine (9) Telsmith-BG Conveyors 30″ to 18″ wide and 266′ to 45′ long

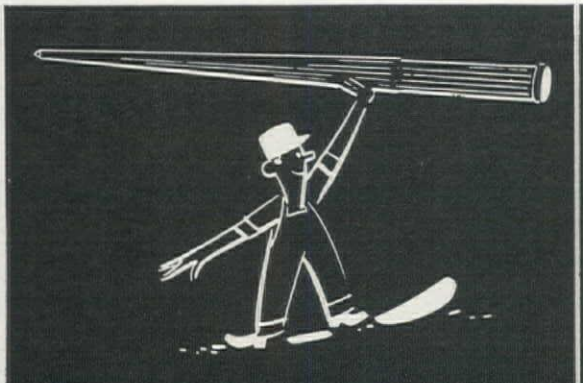
G-20

MINES ENGINEERING & EQUIPMENT CO.
369 Pine Street • SUtter 1-7224
SAN FRANCISCO 4, CALIFORNIA

Manufactured by SMITH ENGINEERING WORKS, MILWAUKEE 12, WISCONSIN

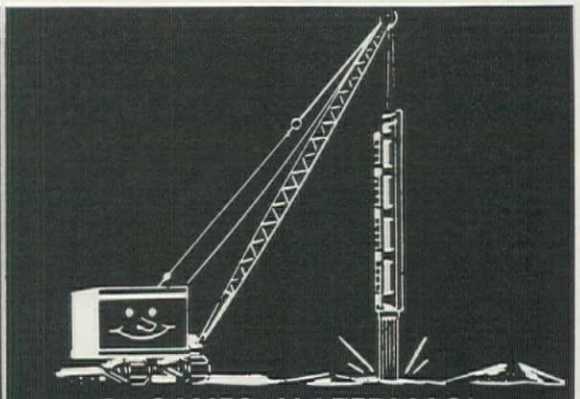
MONOTUBE

Monotube taper-flute steel piles can help you make important savings on all types of foundations. And today, more than ever, savings in materials and time are *doubly* important.



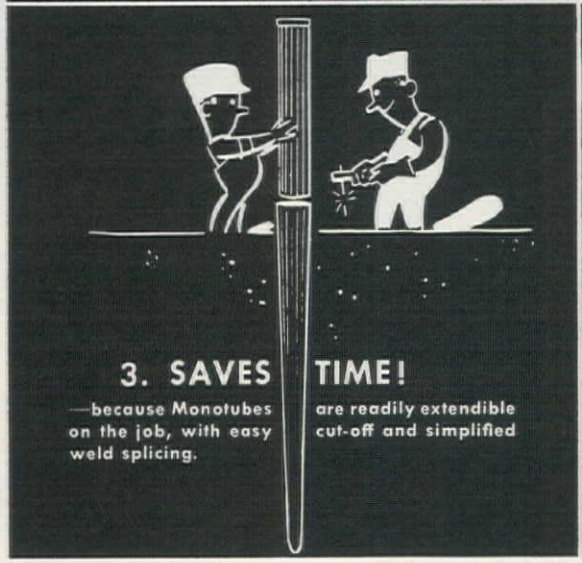
1. SAVES WORK!

—because Monotube's light weight makes handling and locating easier, faster!



2. SAVES MATERIALS!

—because of proven excellence in transmitting loads to the penetrated soil, plus the assurance of their condition after installation, Monotubes can be designed for heavy loads. Result—fewer piles may do your job.

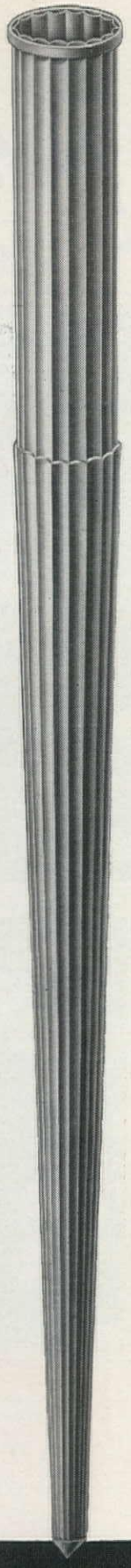


3. SAVES TIME!

—because Monotubes are readily extendible on the job, with easy cut-off and simplified weld splicing.

4. SAVES WORRIES!

—because tubular design permits rapid, sure inspection before concreting.



Get all the facts about Monotubes' advantages. For complete information, write The Union Metal Manufacturing Company, Canton 5, Ohio.

UNION METAL

Monotube Foundation Piles

How to get

MORE WORK

from your "Cat" Motor Grader!

HERE'S the situation in a nutshell. The speed, versatility and big work capacity that have made "Caterpillar" Motor Graders an essential construction tool have also made them necessary to the defense effort. As military orders must be filled first, you may not be able to obtain prompt delivery of new machines. So it will pay you to plan *now* to get greater production and longer wear from your present equipment.

"Cat" Motor Graders are ruggedly built for long life. But good care on your part can lengthen that life span by thousands of extra service hours. Here's how:

1. Follow the recommended *operating* care in your Operator's Instruction Book. Read and reread it.
2. Observe the *maintenance* suggestions in the Operator's Instruction Book. They're down-to-earth — experience has proved them practical and effective.
3. Anticipate your future replacement parts needs by seeing your "Caterpillar" dealer about them *now*. Don't wait until wear gets beyond repair — many a part can be rebuilt *if* serviced in time.

You're in good hands when you work closely with your "Caterpillar" dealer. He is anxious to help you solve your problems. He has the skilled mechanics and service facilities to help you lick them and keep your equipment in shape.

Caterpillar Tractor Co., San Leandro, Calif.; Peoria, Ill.

You're the Doctor Preventive maintenance is good medicine for long life. Your Operator's Instruction Book is invaluable in the fight to conserve machine life. Follow the operation, lubrication and maintenance recommendations. When wear is evidenced in cutting edges, gears, tires or engine, see your "Caterpillar" dealer. He can help you prolong the life of your motor grader. Your motor grader is essential—don't abuse it!

Fast worker—reliable, too! This "Caterpillar" Diesel No. 12 Motor Grader is one of thousands that help construction men meet their contracts on schedule. An essential earthmoving tool, it stands up under tough going — handles easily. As a military tool, it's essential for airport construction and maintenance, road construction, the establishment of bases and scores of other jobs.

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS • MOTOR GRADERS

EARTHMOVING EQUIPMENT

in WIRE ROPE, too the RIGHT KIND of muscle makes the difference

Endowed with highly specialized leg muscles, the kangaroo is able to make tremendous flying leaps—even with Junior perched in the rumble seat.

In wire rope, too, specialized jobs call for specialized muscles. That's why in Wickwire Rope we make sure you always get the proper combination of physical properties to best resist the destructive forces found on your particular job—whether it be abrasion, load strain, shock stress or bending fatigue.

Wickwire Rope gives you the benefit of long experience and specialized know-how which assures you of exactly the right kind of rope your particular job demands.

For additional information write or phone our nearest sales office.

LOOK FOR THE YELLOW TRIANGLE ON THE REEL

THE COLORADO FUEL & IRON CORPORATION—Abilene (Tex.) • Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa

THE CALIFORNIA WIRE CLOTH CORPORATION—Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane

WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga • Chicago • Detroit • Emlenton (Pa.) • New York • Philadelphia

WICKWIRE ROPE

CF&I

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL & IRON CORPORATION

WANTED

More production with limited manpower

IT CAN BE DONE!

. . . with faster drilling CARSET JACKBITS

Because they are tipped with Carboloy inserts—one of the hardest metallic substances known to man—Carset Jackbits drill the hardest rock with a *speed* and *efficiency* which cannot be approached by the finest steel bits.

For instance, Carset Jackbits drill 50% faster—last from 50 to 400 times longer—practically eliminate bit changes and double the life of drill steel. They eliminate tapered holes saving up to 30% on dynamite—permit longer steels and feeds—require much less maintenance—and boost tonnage as much as 50% or more.

These advantages all add up to a tremendous increase in footage per shift—*without increasing your drilling crews*. Remember Ingersoll-Rand offers a complete line of equipment and service for rock drilling. Take advantage of our highly trained and skilled personnel. There is an Ingersoll-Rand branch office and distributor near you. Write or call today.

CARSET JACKBIT

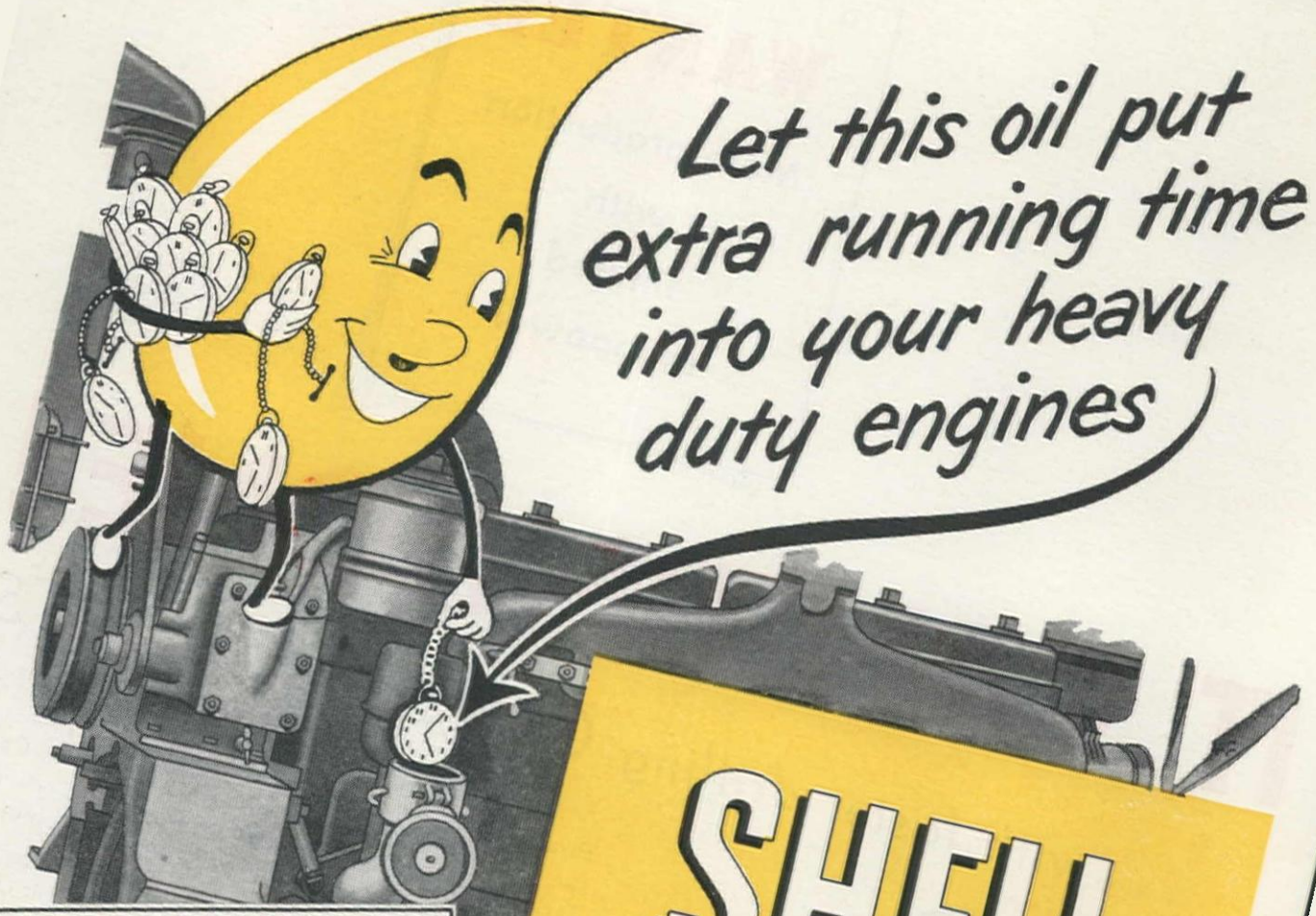
SET WITH CARBOLOY INSERTS

Ingersoll-Rand

11 Broadway, New York 4, New York

632—15

ROCK DRILLS • COMPRESSORS • AIR TOOLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • DIESEL & GAS ENGINES



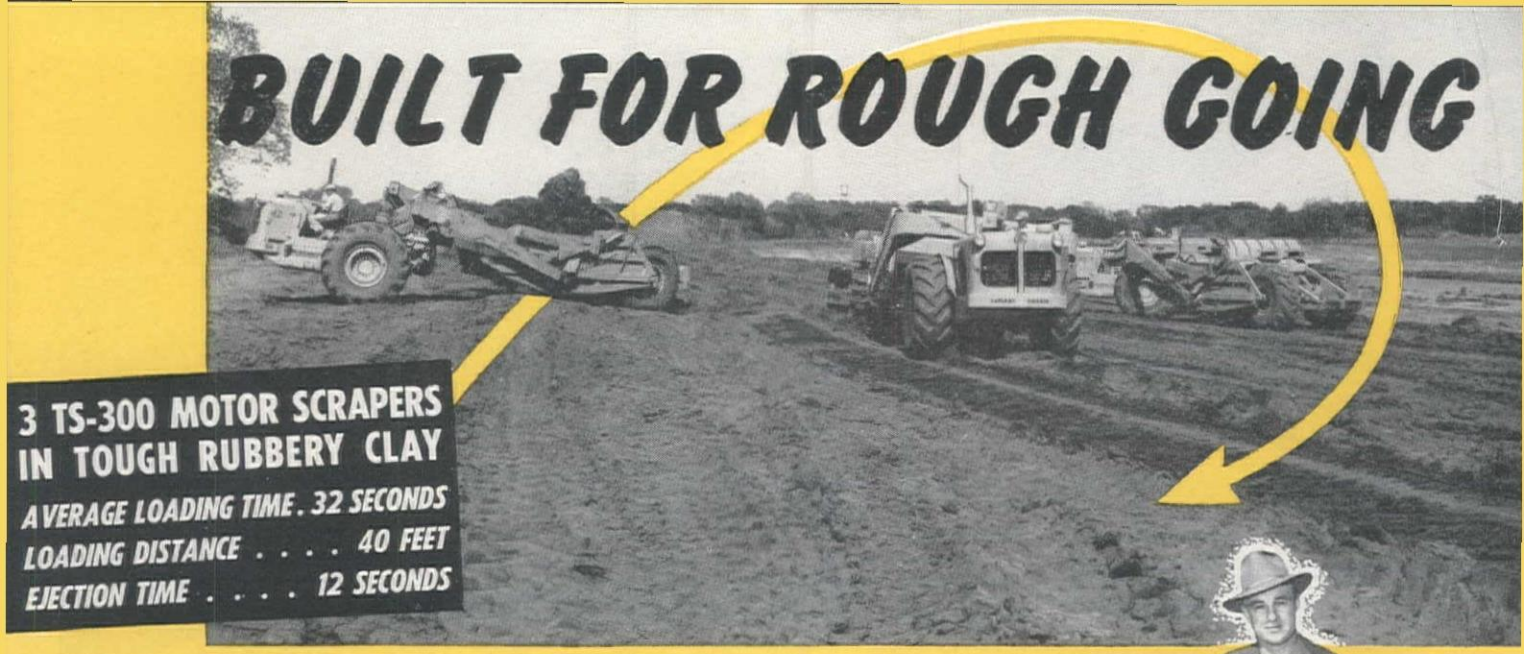
Shell Talona Oil is a specialist in keeping down sludge . . . in keeping carbon and lacquer away from pistons and rings . . . in protecting bearings from corrosion. Those special qualities add up to a general advantage in heavy duty engines: reduced wear rates, and hence longer running time between overhauls. Or, to put it another way, lower maintenance costs.

SHELL

SHELL TALONA OIL

for heavy duty engines GASOLINE or DIESEL

BUILT FOR ROUGH GOING



3 TS-300 MOTOR SCRAPERS IN TOUGH RUBBERY CLAY

AVERAGE LOADING TIME . 32 SECONDS
LOADING DISTANCE . . . . 40 FEET
EJECTION TIME . . . . 12 SECONDS

LOOK at this record . . . exceptional even for LaPlant-Choate Motor Scrapers! Production like this in tough, rubbery clay! It shows what big, powerful TS-300's *can* do in the toughest jobs. It proves that LPC Motor Scrapers have *everything* a real earthmover needs for rough going . . . power, speed, capacity, stamina, many other advantages combined for high production and low earthmoving cost.

When your rig is built for the tough jobs, you can be sure it will deliver on all types of material, under all conditions.

EXTRA LARGE FRONT APRON OPENING

Fast, clean ejection of this tough, rubbery material demands the 8'9" apron opening found only on TS-300 Motor Scrapers.

When you need equipment that's built to beat the roughest conditions, call on your LaPlant-Choate distributor first.

Ask GLENN BUTLER about LaPLANT-CHOATE MOTOR SCRAPER PERFORMANCE

H. L. Butler & Son of Dallas is an outfit that's moved lots of dirt . . . made money on tough ones like this White Rock Sewage Plant job for the City of Dallas. They know what good equipment means . . . that's why they own three LPC TS-300 Motor Scrapers.

LaPLANT CHOATE

MANUFACTURING CO., INC. ® CEDAR RAPIDS, IOWA, U.S.A.

Get the facts from your nearest LPC distributor

INDUSTRIAL EQUIPMENT COMPANY
4441 Santa Fe Avenue LOS ANGELES, CALIFORNIA

WESTERN EQUIPMENT COMPANY
. Box 2196, 3400 E. Olive St. SPOKANE, WASHINGTON

COLUMBIA EQUIPMENT CO.
1240 S. E. 12th Ave. PORTLAND 14, OREGON
5030 1st Ave. South SEATTLE, WASHINGTON

WESTERN CONSTRUCTION EQUIP. CO.
505 N. 24th Street BILLINGS, MONTANA
Stephens & Mount Ave. MISSOULA, MONTANA

ENGINEERING SALES SERVICE, INC.
410 Capitol Boulevard BOISE, IDAHO

STUDER TRACTOR & EQUIP. CO.
East Yellowstone Hwy., P. O. Box 779, CASPER WYOMING

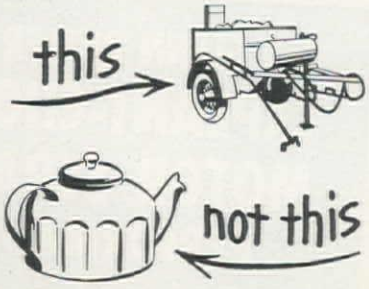
GENERAL EQUIPMENT COMPANY
1201 East 2nd Street RENO, NEVADA

EQUIPMENT SALES CO.
720 So. 19th Avenue PHOENIX, ARIZONA

ARNOLD MACHINERY CO., INC.
433 W. Second South St. SALT LAKE CITY 1, UTAH

N. C. RIBBLE CO.
1304 N. Fourth St. ALBUQUERQUE, NEW MEXICO

For road repairs, you need the right kind of kettle



Same way with trucks. Get one that fits the job!

Thrifty power for rugged jobs... with dependable DODGE "Job-Rated" TRUCKS

Give a Dodge "*Job-Rated*" truck the rough treatment your job demands . . . and watch it perform with *low-cost dependability* year after year!

Plenty of thrifty power! For example, 2½-ton models have a rugged, powerful engine that's rated at 114 h.p. And, to assure even greater power with top economy, high-tonnage models (2¾-ton and up) are offered with twin carburetion and exhaust system.

But that's not all! Back a Dodge into a tight spot—see how easily and sharply it turns, how easily the steering wheel turns! New worm-and-roller steering gears on many models are just one of many reasons why Dodge "*Job-Rated*" trucks are easier to handle.

Then consider advantages like the new moistureproof ignition system and new high-torque capacity starting motor—and you'll know why new Dodge "*Job-Rated*" trucks are more dependable, even in the worst weather.

You'll save in many ways with a truck that fits your construction operation—a Dodge "*Job-Rated*" truck. Talk it over with your friendly Dodge dealer *soon!*

How Dodge trucks are "*Job-Rated*" for the construction business

A Dodge "*Job-Rated*" truck is engineered *at the factory* to fit a specific job . . . save you money . . . last longer.

Every unit from engine to rear axle is "*Job-Rated*"—factory-engineered to haul a specific load over the roads you travel and at the speeds you require.

Every unit that SUPPORTS the load—frame, axles, springs, wheels, tires, and others—is engineered right to provide the strength and capacity needed.

Every unit that MOVES the load—engine, clutch, transmission, propeller shaft, rear axle, and others—is engineered right to meet a particular operating condition.

"Job-Rated" TRUCKS DO THE MOST FOR YOU

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT RPM Tractor Roller Lubricant

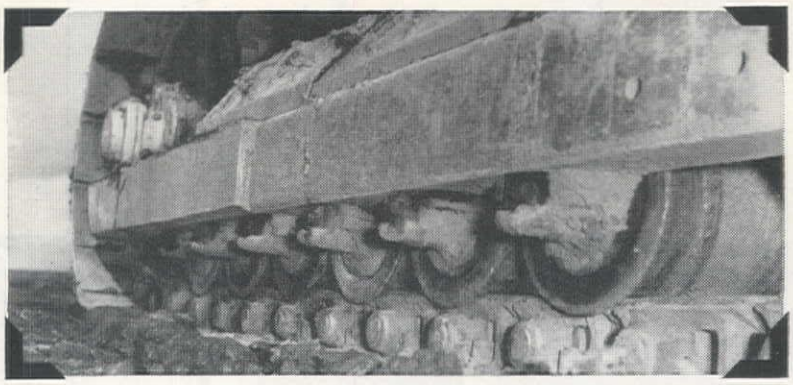
UNIT Track bearings—Caterpillar D-8

CONDITIONS Highway Grade Construction—rock, dust

PERIOD 9500 hours

FIRM M. L. & C. R. O'Neil, Creswell, Oregon

Track-roller bearings still good after 9500 hours work!



ON ROCK- AND DIRT-MOVING JOBS of contractors M. L. & C. R. O'Neil, Creswell, Ore., this D-8 Caterpillar, lubricated with RPM Tractor Roller Lubricant, worked 9500 hours without replacement of a single track bearing. The bearings are still in good condition.

Mr. C. R. O'Neil says, "We've used RPM Tractor Roller Lubricant over 9 years and always get extra long service from track bearings. In 3½ months on our present job, with 5 D-8's working, we've had one roller off, and that was to replace a lock washer."

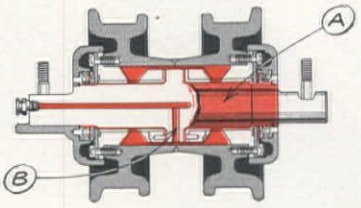
MAKING A CUT THROUGH HEAVY ROCK FORMATION. Building this new section of U. S. Highway 30 in eastern Oregon is typical of the tough work O'Neil equipment does in many parts of the country. On different jobs, it has worked in a variety of climates—summer temperatures over 100° in the shade with heavy winds and dust, to below freezing with snow and mud. Track bearings on all equipment are lubricated with RPM Tractor Roller Lubricant every 8 hours.

REMARKS: There are three grades of RPM Tractor Roller Lubricant—Light, Medium, and Heavy—to meet all climatic and operating conditions in Caterpillar and International track-roller bearings. For Allis-Chalmers, RPM Tractor Roller Lubricant—A. C. Type is recommended.

RPM

TRADEMARK "RPM" REG. U.S. PAT. OFF.

How RPM Tractor Roller Lubricant resists wear in the toughest service



It flows evenly to all bearing surfaces, lubricates and retards rust formation.

A. Contains chemical anti-wear agent—maintains tough lubricating film.

B. Has stringiness compound—improved viscosity, resists leakage, helps keep protective grease seal outside bearings.

STANDARD TECHNICAL SERVICE checked this product performance. For expert help on lubrication or fuel problems, call your Standard Fuel and Lubricant Engineer or Representative; or write Standard Oil Company of California, 225 Bush St., San Francisco.

STANDARD OIL COMPANY OF CALIFORNIA

TOURNAROCKER

design.

Dump is fast and safe. With power on front wheels, Tournarocker backs to edge of spill, sets rear-wheel brakes, dumps big load quickly, and moves off for another load.

Tournarocker—Trademark PQ19

Arizona — Phoenix
ARIZONA EQUIPMENT SALES, INC.

California — Oakland
BAY CITIES EQUIPMENT, INC.

California — Los Angeles, Bakersfield
CROOK COMPANY

Colorado — Denver
COLORADO BUILDERS' SUPPLY CO.

Idaho — Pocatello
J. K. WHEELER MACHINERY C

Montana — Helena, Billings
MONTANA POWDER & EQUIP. C

To reach this job in the Tehachapi Mountains, the 2 rear-dump Tournarockers were driven 125 miles up heavily-traveled U.S. 6 from Los Angeles. Travel speeds reached 35 m.p.h.

Big 8′ x 12½′ top opening, plus low rear entry, speed loading of heavy limestone rock. Reinforced all-steel body eliminates a lot of loading shock damage and maintenance troubles.

. pays off in cramped, mountain-face quarry

Monolith Portland Cement Co. tries one . . . buys two!

For hauling rock in the cramped quarters of their mountain-face limestone quarry at Monolith, Calif., the Monolith Portland Cement Company recently rented a high-speed, 16-ton C Tournarocker. The rubber-tired rig's speed and maneuverability in moving over winding mountain roads, and the ease with which it moved in and out of restricted loading and dumping areas, increased production so much that Monolith bought it. Soon afterward, they purchased a second C Tournarocker . . . with these 2 units and 2 six-ton dump trucks, replaced a fleet of 10-ton trucks.

Both Tournarockers are now working with 2½ yd. rock shovels at an altitude of 3800′. In typical operation, each "C" carries 16 tons per load . . . completes five 400′ cycles every 50 minutes. Hourly output for the 2 rigs averages 160 tons . . . with the assistance of the two 6-ton dump trucks, ample to keep 2 shovels working at full capacity.

Easy to operate . . . easy on operator

There are a lot of reasons why Tournarockers boosted output. With short 90° turns and 13′9″ turn radius, the "C's" spotted quickly at both shovel and spillway! Fingertip electric controls kept operators working at peak efficiency all day . . . big, 4-wheel air brakes — with 940 sq. in. braking surface per wheel — gave them maximum safety and confidence for going downhill at high speeds with a full load. As Operator W. S. Wilkson puts it, "Tournarocker is a good machine . . . fast and sturdy . . . easy to operate."

You can prove this performance on your job and increase your rock hauling profits, too. Ask your LeTourneau Distributor for all the details on 9, 18, 35 or 50-ton electric-control, rear-dump Tournarockers.

LETOURNEAU

Nevada — Reno
SIERRA MACHINERY COMPANY

New Mexico — Albuquerque
CONTRACTORS EQUIP. & SUPPLY CO.

Oregon — Portland, Eugene
LOGGERS & CONTRACTORS MACHY. CO., INC.

Utah — Salt Lake City
J. K. WHEELER MACHINERY CO.

Washington — Spokane, Seattle
MODERN MACHINERY CO., INC.

Wyoming — Casper
COLORADO BUILDERS' SUPPLY CO.

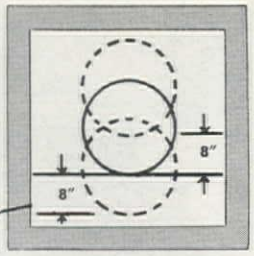
EFFORTLESS POWER SWEEPING

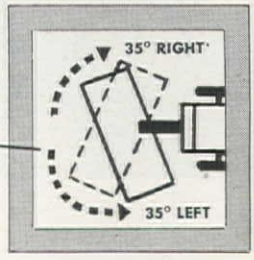
entirely controlled from operator's seat with LULL FINGERTIP HYDRAULIC CONTROL

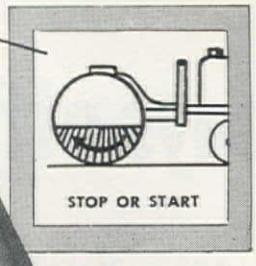
RAISES OR LOWERS BROOM

CHANGES BROOM ANGLE

STOPS OR STARTS BROOM







OPERATOR'S CONTROL ZONE

All Broom and Tractor Controls concentrated in this area . . . readily accessible to the operator at all times.

LULL *Fluid-Driven*

SUPER SWEEPER

From the second the operator climbs into the seat of the Lull Super Sweeper to the second he gets off—he's set for full-time, high-speed sweeping. Lull Fingertip Hydraulic Control eliminates manual adjustments, backing, turning and deadheading. The operator never leaves his seat . . . never stops sweeping!

Lull Fluid Drive swiftly, smoothly transmits power to the broom—without clumsy mechanical linkages. Wear is at a minimum . . . maintenance practically nil!

Ruggedly built, for mounting on industrial tractors, Lull Super Sweepers have proved amazing durability on some of the toughest sweeping jobs in the country.

Available in 5′, 6′ and 7′ models, there's a Lull Super Sweeper priced for *your* budget. On any sweeping job . . . streets, blacktop highways, air ports, parking lots, strip mines . . . you're assured of unbeatable year round performance with a Lull Super Sweeper.

WORK ZONE

Power-controlled by the operator, this Fluid-Driven broom swiftly, efficiently whisks dust, snow, dirt and rubbish from streets, runways and ramps . . . cleans hard-to-get-at gutters . . . maneuvers close to awkward curbs.

WRITE TODAY for Lull Sweeper Bulletin AD-40!

LULL **Manufacturing Company**

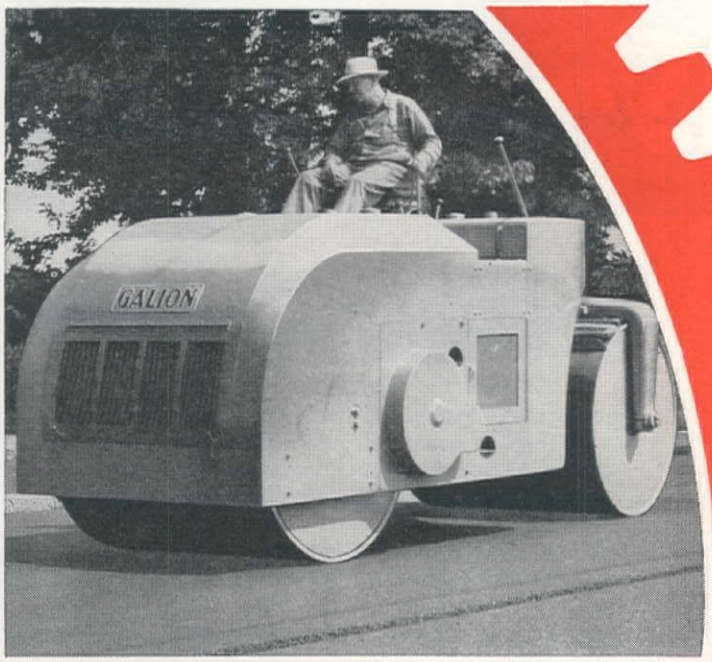
3612 East 44th Street, Minneapolis 6, Minn.

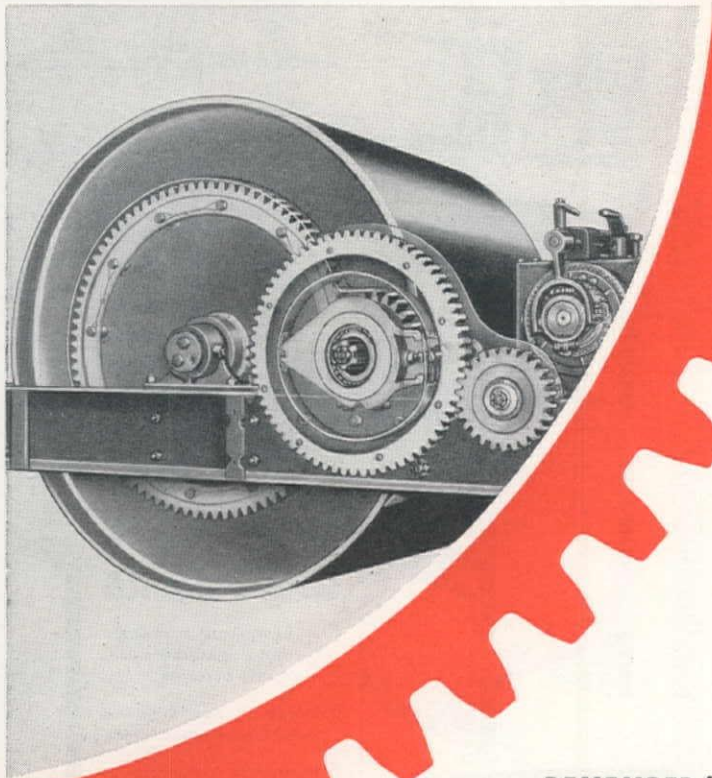
Designers and Builders of
The Largest Line of Allied Equipment
for Industrial Wheel Type Tractors

SHOVELOADER

UNIVERSAL LOADER

SHOVELOADERS • UNIVERSAL LOADERS • FLUID-DRIVEN SWEEPERS • LULLDOZERS • SHOULDER MAINTAINERS





YOUR GOOD MECHANICAL JUDGMENT

will recognize the following features of Galion Tandem Roller Final Drive as sound, performance - proved, time - tested engineering.

- **GALION FINAL DRIVE GEARS are all *Spur Gears.***
- **GALION FINAL DRIVE is a 2 *step* gear reduction thru 4 spur gears—a straight-line drive.**
- **GALION FINAL DRIVE *greatest* gear ratio is only 5 to 1.**
- **GALION FINAL DRIVE spur gears are special alloy steel, accurately machine cut and heat-treated. No ordinary, uncut, cast gears are used.**
- **GALION FINAL DRIVE has *no small beveled pinion gear* driving a *large bevel ring gear* on the roll.**

IF YOU KNOW YOUR GEAR MECHANICS

you know that *gradual reduction* and low speeds (each gear with roller bearings) plus a straight-line spur gear train, give the least friction and consequently have the least gear wear. That is why Galion Final Drive gears *stay in line,* wear the least, and consequently last longest without adjustment or replacement.

REMEMBER!
ROLLER RELIABILITY—
depends largely on its FINAL DRIVE mechanism

SPUR GEAR
GALION
FINAL DRIVE

GALION DISTRIBUTORS

ARIZONA:
Phoenix.....ARIZONA CEDAR RAPIDS CO.
Tuscon.....F. RONSTADT HARDWARE CO.

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Missoula.....HALL-PERRY MACHINERY CO.

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WASHINGTON:
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Portland, Oregon.....NELSON EQUIPMENT COMPANY

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TANDEM ROLLERS

THE GALION IRON WORKS & MFG. CO.

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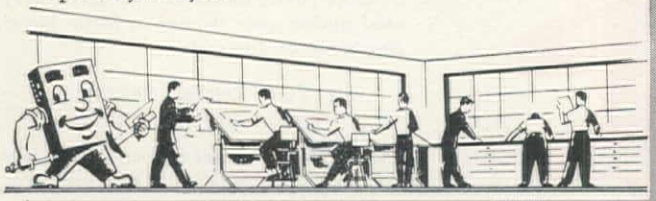
Help you Build Better... Faster...at Lower Cost

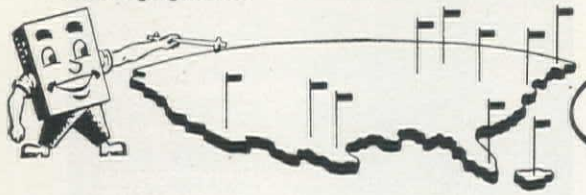
ENGINEERING SERVICE

Whether your job is large or small—you get *complete* engineering service. Universal's concrete form specialists . . . trained to think in terms of faster forming and economy . . . will analyze your job . . . recommend methods, materials and techniques . . . supply form layouts . . . details . . . bills of material—to simplify and speed your job.



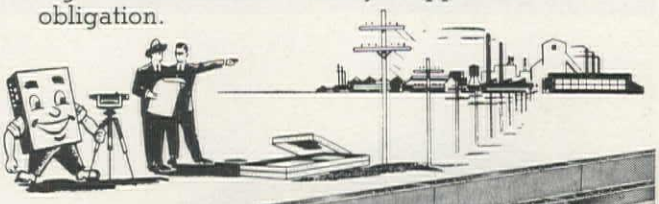
NATION-WIDE SERVICE

Ten strategically located, fully staffed and equipped Branch Offices and Warehouses are ready to supply you with UNI-FORMS and UNI-FORM Accessories, or any of the many Universal Products for concrete construction. Take advantage of Universal's integrated service and supply network to speed and simplify procurement of your concrete forming materials and equipment.



FIELD SERVICE

Universal's Field Service Engineers are always available to give you on-the-job assistance to help you get maximum value and utility from Universal Products. When you encounter a difficult forming problem—a call to the Chicago Office—or any of the 10 Universal Branches—will bring a specialist to your job in a few hours. Builders everywhere have taken advantage of this Service—always supplied without obligation.



Over 10,000,000 Sq. Ft. of UNI-FORMS now in use

UNI-FORMS

- A complete concrete forming system—automatically accurate.
- Ready to use Plywood faced steel-framed forms.
- Guarantee fast starts . . . lowest all around cost.
- Save TIME . . . LABOR . . . MATERIAL.

RENTED . . . SOLD . . .

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Service Wherever You Build . . . Coast-to-Coast

P&H GIVES YOU ALL 3

1. GREATER STABILITY
Lets you put more on the hook — and work faster.

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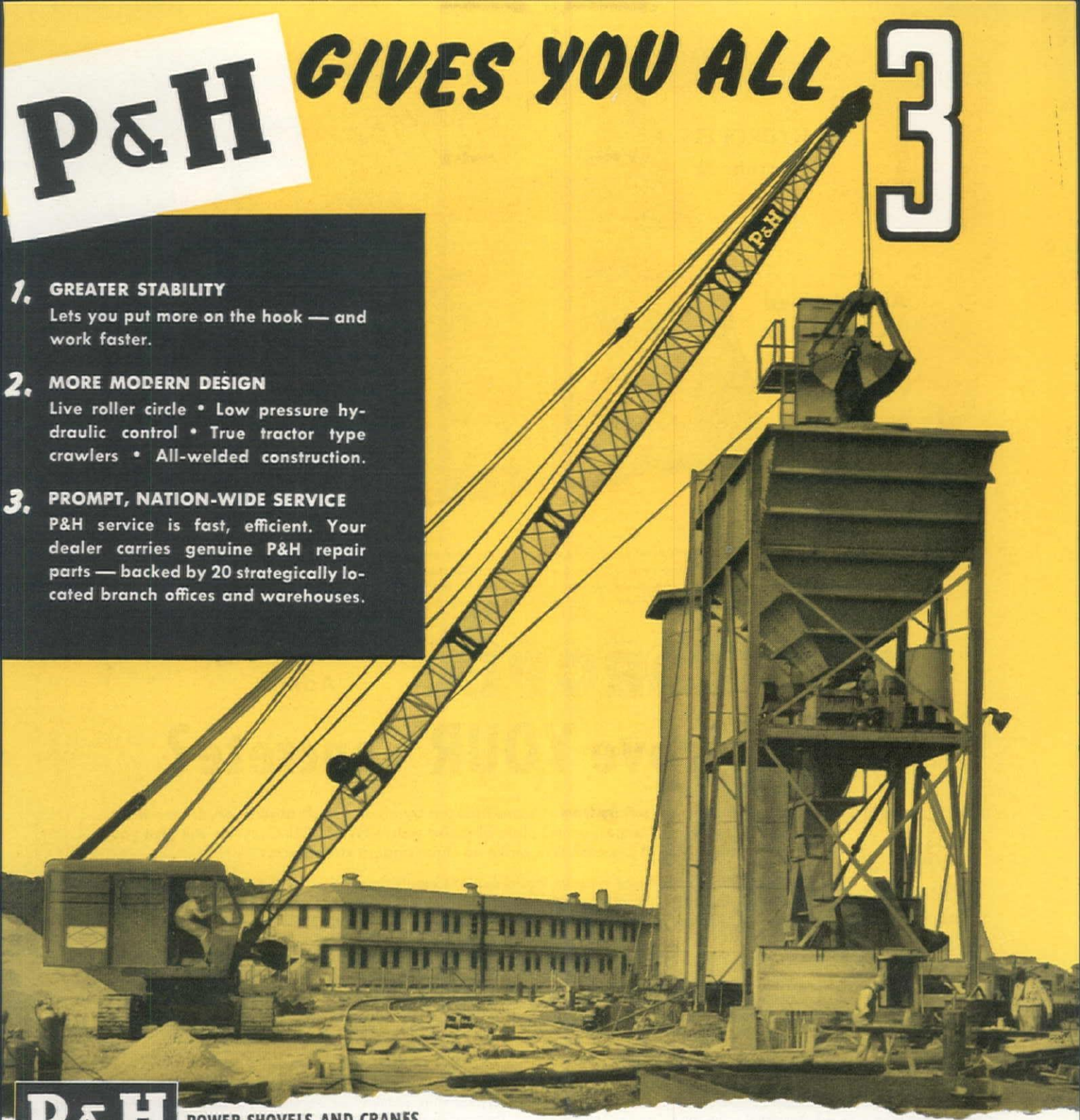
Live roller circle • Low pressure hydraulic control • True tractor type crawlers • All-welded construction.

3. PROMPT, NATION-WIDE SERVICE
P&H service is fast, efficient. Your dealer carries genuine P&H repair parts — backed by 20 strategically located branch offices and warehouses.



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RENO, Nevada	Jenkins & Albright Mack Truck Sales, 1131 W. 4th Street
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SALT LAKE CITY, Utah	Western Machinery Company, 748 West 8th, South
SEATTLE 8, Washington	Bow Lake Equipment Co., Inc., 300 Michigan Street
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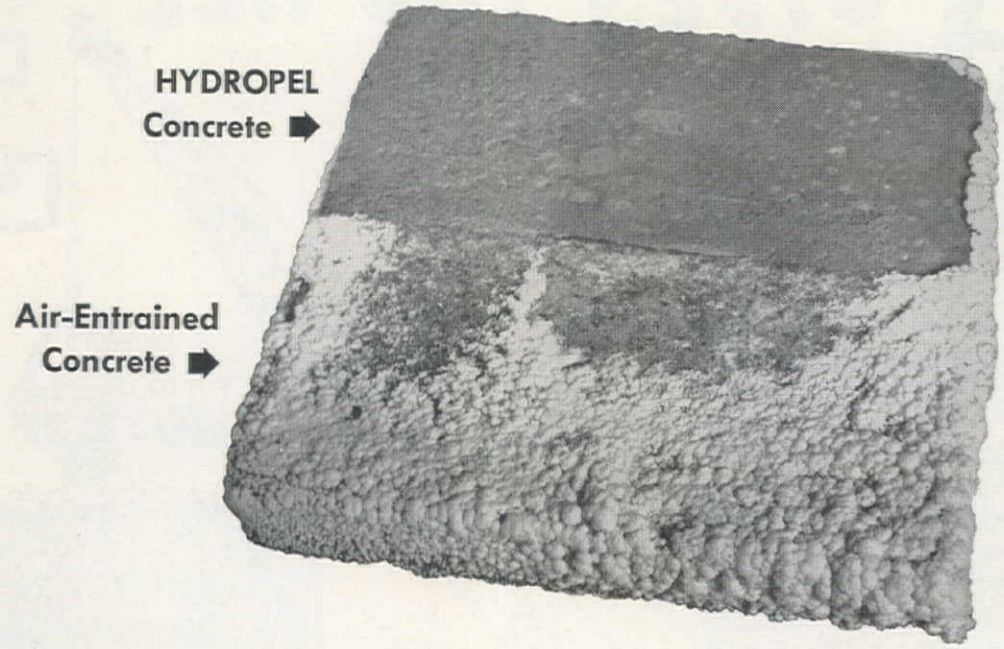
NOW P&H services the West From the West!

The new P&H Pacific Division inaugurates local manufacture and assembly of many famous P&H products — provides bigger parts stocks — better service than ever. Headquarters in Los Angeles.

POWER SHOVELS • CRAWLER AND TRUCK CRANES • OVERHEAD CRANES • HOISTS • ARC WELDERS AND ELECTRODES • SOIL STABILIZERS • DIESEL ENGINES • PRE-FAB. HOMES



This block—one-half HYDROPEL Concrete and the other half air-entrained—sat in a shallow layer of saturated salt solution until all liquid evaporated. The solution was sucked through the air-entrained concrete by capillarity, leaving salt crystals on the surface. Note that the HYDROPEL Concrete absorbed almost none of the salt solution—free from destructive salt crystallization.

Will HYDROPEL® Waterproofing Admix Improve YOUR Concrete?

If YOUR concrete suffers from stresses induced by alkali or salt absorption, freeze-thaw action, moisture changes, or just plain abrasive wear—HYDROPEL Concrete will give you much longer life, at low cost. (We make no claim against strong acids.)

HYDROPEL is a unique type of liquid asphalt emulsion, added as the concrete is mixed. It gives you MANY benefits. Why not try HYDROPEL on one of your TOUGH spots? Here are a few of the many problems in concrete that HYDROPEL has solved.

Case History No. 1

In a Northeastern state with severe climate, a new concrete highway soon scaled badly—and bridge decks showed many cracks. Sections of the same highway, laid with HYDROPEL Concrete, remained perfect—no scaling, no cracking. HYDROPEL repaid its small added cost, many times over.

Case History No. 2

A group of new homes in Lima, Ohio, were built with the first floor well below grade—with walls and floors of concrete. In one house, HYDROPEL Concrete was used as a test. Torrential rains came. Where ordinary concrete was used, the houses had to be pumped out. The "HYDROPEL house" was the only one that stayed dry. Tests of all well-known admixtures proved that HYDROPEL Concrete resists capillary moisture approximately FIVE TIMES better than any other admix.

Case History No. 3

A Connecticut city was plagued with early disintegration of concrete in their curbs, gutters and sidewalks—from freeze-thaw action and de-icing salts. HYDROPEL Concrete was ordered used in all these locations. Inspection, after several years' use, showed the HYDROPEL Concrete to be in perfect condition.

Case History No. 4

A chemical plant, making chlorine and caustic from brine solutions, had very short life of their concrete electrolytic cells. About three years ago, they made new cells of HYDROPEL Concrete. This plant, and others like it, report that HYDROPEL Concrete cells last twice as long with double the amperage formerly used—a gain of 400% in effective cell life. In resisting alkali salts, HYDROPEL Concrete has given large savings, in a variety of applications.

Are YOU troubled with concrete that does not last?
Try HYDROPEL Concrete—it will amaze you.

Ask for our BITUMULS BOOKLETS. They are factual, illustrated, and helpful—a valuable addition to your engineering library.

- **Bitumuls Penetration Macadam** . . ☐
- **Bitumuls for Maintenance** . . . . ☐
- **Bitumuls Sand-Mix** . . . . . ☐
- **Bitumuls Handbook** . . . . . ☐
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200 BUSH STREET · SAN FRANCISCO 4, CALIF.
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E. Providence 14, R. I. · San Juan 23, P. R. · Mobile, Ala.

In the West

STANCAL ASPHALT & BITUMULS COMPANY
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Herman Nelson *Safe* Portable Heaters add weeks of "working weather"!

BAD weather ahead? That's the forecast! But cold, rain or snow won't put your construction schedule in low gear . . . if Herman Nelson heaters are on the job. Engineered for rugged, heavy duty service these Herman Nelson mobile heating units keep jobs moving through winter's coldest months. Quick-Clean-Safe *heat* is delivered where you want it . . . when you need it . . . providing efficient working temperatures for men, materials and machinery.

Experienced construction men know there's a big plus in putting Herman Nelson units on their jobs. Greater heat producing capacity—up to 450,000 BTU—also greater versatility and efficiency saves the original equipment cost again and again. They're safe, too! Exclusive "sealed flame" and forced air ventilation features of Herman Nelson units eliminate carbon monoxide, fumes and fire hazards.

For heat on your job—heat that is quick, clean, *safe* and economical—let us show you why smart construction people are buying Herman Nelson Portable Heaters as a money-making investment. For full information write to Dept. WC-10.

HERMAN NELSON DE LUXE I
Capacity 280,000-450,000 BTU/hr.
Completely automatic, including temperature control.
Fresh air delivery 2,000-2,350 cfm.
Electric motor powered.
Other models available—with gas or electric power—and capacities from 125,000 to 385,000 BTU/hr.

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Division of **AMERICAN AIR FILTER COMPANY, INC.**
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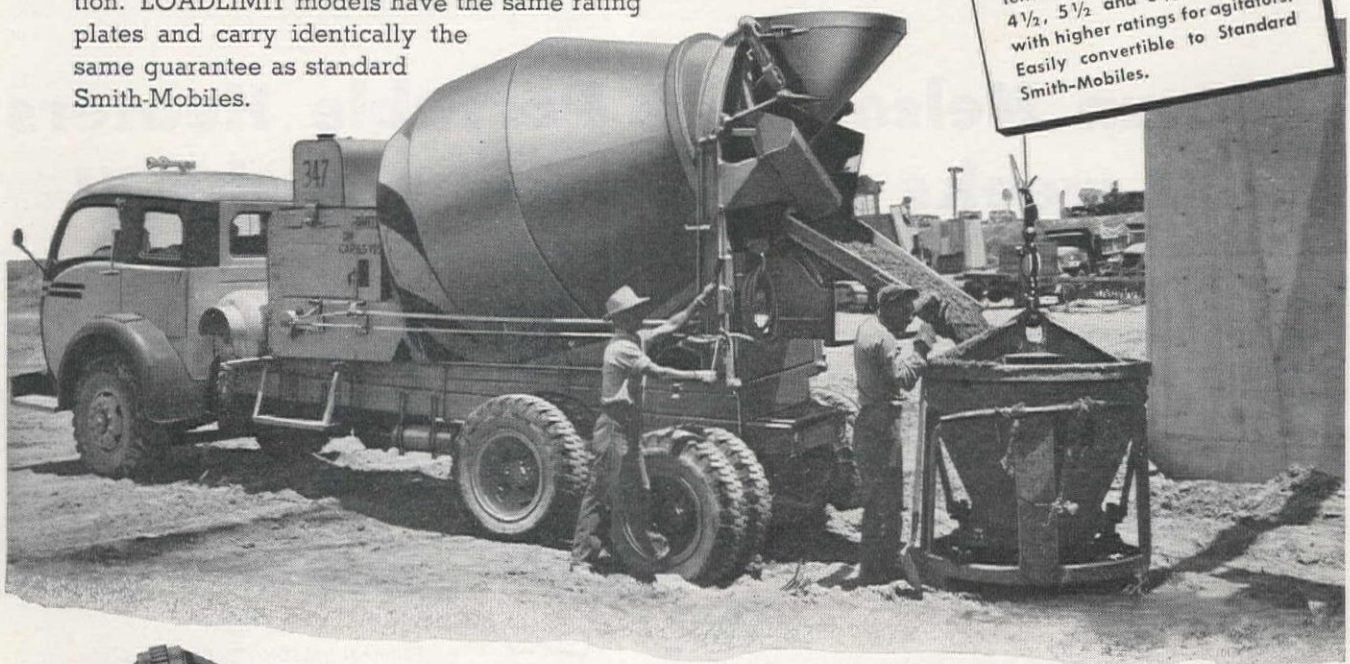
Smile with Smith-Mobile

SAY...THAT'S A SWELL WAY TO DELIVER MY CONCRETE

Your Customers Also Benefit from SMITH LOADLIMIT Models

You can deliver MAXIMUM PAYLOADS and still keep your customers happy. Smith-Mobile LOADLIMIT models have the same efficient drums as standard models. You get the same uniform mix from the first cubic foot of concrete discharged to the last cubic foot . . . whether it's one yard or eight yards. LOADLIMIT machines have the same patented "T" shaped blades made of the same gauge Manten steel as the heavier standard models. In fact, LOADLIMITS and standard Smith-Mobiles are identical, except that LOADLIMITS have no sealing doors to open or close . . . no operator's platform . . . no chute lifters . . . no sign panels, etc. The parts that have been removed are not necessary to smooth and efficient operation. LOADLIMIT models have the same rating plates and carry identically the same guarantee as standard Smith-Mobiles.

You save three ways with Smith LOADLIMIT Truck Mixers — (1) Lower initial cost, (2) Lower operating costs, (3) Lower maintenance costs. Available in 3, 4½, 5½ and 6½ yard sizes, with higher ratings for agitators. Easily convertible to Standard Smith-Mobiles.



LET YOUR NEARBY SMITH DISTRIBUTOR explain to you the PROFIT possibilities of Smith Tilting Mixers and Smith-Mobile Agitators for your Ready-Mix plant. These dependable machines enable you to deliver high-quality concrete with speed and certainty at lowest cost per yard. Ask for literature.

THE T. L. SMITH COMPANY, 2871 N. 32nd St., Milwaukee 45, Wis., U. S. A.

SMITH
THE T. L. SMITH CO. MILWAUKEE, U.S.A.

CONCRETE MIXERS

For BIGGER and BETTER Concrete Mixers and Truck Mixers . . . LOOK TO SMITH

A-5971-1P

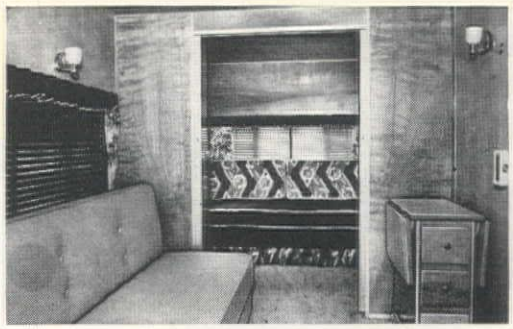
HOW TO KEEP WORKERS HAPPY ON THE JOB... Let them live and enjoy life—

preferably with their families. A marked increase in productivity per man hour has occurred on every construction job... the day that Pan-American Trailer Coaches were provided as workers' living quarters.

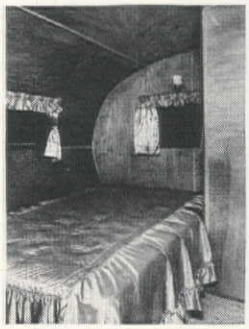
CONTRACTORS—ENGINEERS... Investigate Pan-American's facilities for fast, dependable service! PAN-AMERICAN is the world's largest factory devoted exclusively to mass production of trailer coaches.

Whether it's a single luxury home for your own family or a fleet of mobile homes, Pan-American will mass produce trailer coaches that fit your needs. The 33-foot model pictured above has two bedrooms, a complete bath, kitchen and living room. Pan-American also provides 26½-foot, 30-foot, and 35-foot trailer coaches—sleeping 2, 4, or 6—that you can haul to any job site, no matter how remote. Pan-American also builds barracks type trailer coaches that sleep 6 to 12 men, providing complete bath facilities.

Free consultation on plans, specifications and quick delivery dates. Write, wire or phone the factory for literature and specific information.



Living room



Bedroom

Bath

Built to TCA Trailer Coach Association Certified Construction Standards

PAN-AMERICAN TRAILER COACH COMPANY...1511 So. Shamrock Ave...Monrovia, Calif.

DIVISION OF MID-STATES CORPORATION

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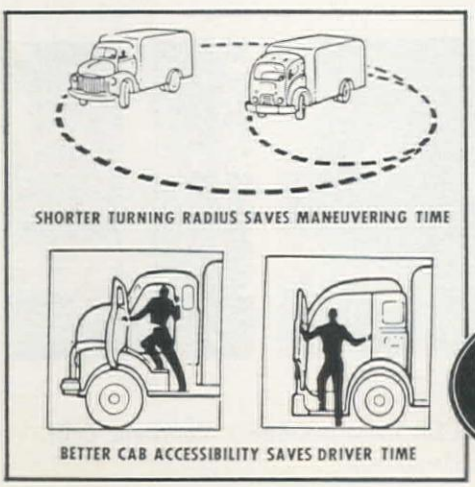
MORE PAYLOAD

on Paving Jobs—

One of a fleet of new White 3022s owned by Southwest Paving Co., operators of some of the world's largest asphalt plants. In business for thirty-five years, Southwest has completed such tremendous paving projects as the North Island Naval Base, Metropolitan Airport, Lockheed Air Terminal.

THE NEW WHITE 3000



More payload—legally, because 3000 design permits much greater weight on the front axle. *More payload*—with less overall length; the compact 3000 saves space—on the job, in the streets, in the garage. *More payload*—with shorter wheelbase, smaller turning-radius. Amazing maneuverability makes the 3000 tops in traffic—and the *handiest* truck on highway construction.

The White 3000 brings new profit-earning efficiency to the job—and also cuts maintenance costs; let your local White Representative show you how this *new* truck "tips its cab to service"—providing complete front-end accessibility at the turn of a key. Let him show you *why* this revolutionary new White 3000 *earns more, costs less*—in terms of *your* business.

White SUPER POWER 3000

THE WHITE MOTOR COMPANY
CLEVELAND 1, OHIO, U. S. A.
Pacific Coast Branches and Dealers in all important cities

FOR 50 YEARS THE GREATEST NAME IN TRUCKS

Meet that deadline every time — insist on THERMOID belting.

Conveyor Belts must not fail where meeting construction deadlines can make the difference between profit and loss. Time-out for repairs disrupts schedules — causes manpower tie-ups — means sizeable losses to YOU.

Thermoid Belts are precision manufactured—built to stand-up under the load, in all kinds of weather. Where rugged performance counts MOST, ***Thermoid*** Conveyor Belting does the job BEST.

Seventy years of engineering stand behind ***Thermoid*** Belting. Production know-how makes ***Thermoid*** Belts, designed for the construction industry, unbeatable for toughness and long wear.

Your nearest ***Thermoid*** Distributor has a complete range of ***Thermoid*** Belting to meet your requirements.

For your special belting problems, ***Thermoid*** Field Representatives are always available to help YOU.

Thermoid Western Co.

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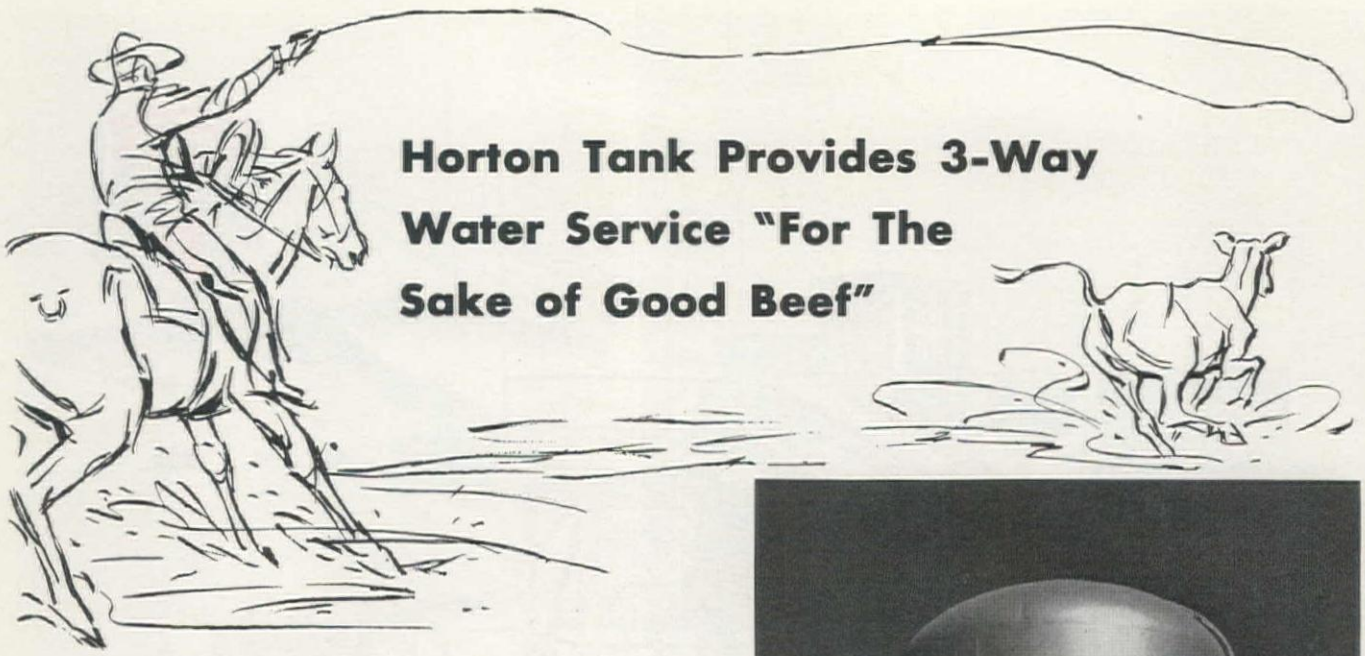
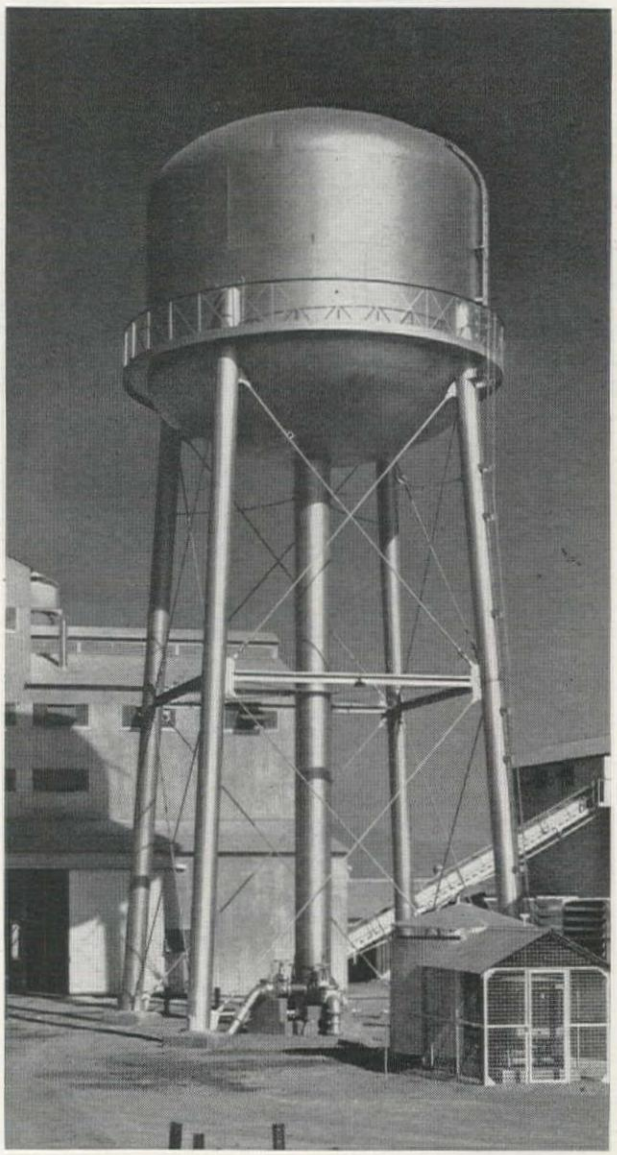
Wrapped & Molded Hose • Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Offices and Factories: Trenton, N. J. Nephi, Utah;



Horton Tank Provides 3-Way Water Service "For The Sake of Good Beef"



This 100,000-gal. Horton ellipsoidal-bottom elevated tank guards against fire, supplies ample water for thirsty cattle and provides gravity water pressure for feed processing . . . all "for the sake of good beef" at the ultra-modern Kern County Land Company's cattle feeding plant near Bakersfield, California.

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Havana.....402 Abreu Building	Washington 6, D. C.....1103 Cafritz Building

WESTERN CONSTRUCTION

October 1951 Vol. 26, No. 10

JAMES I. BALLARD . . . . . Editorial Director
JOHN J. TIMMER . . . . . Managing Editor

Toll road pressure is building up

INCREASING popular interest in toll roads should be met firmly, but with a careful regard for good public relations by highway departments of the West. Every time a motorist gets caught in a traffic jam he tells himself, and all his friends, that he would gladly pay extra for the opportunity to drive over a highway that was less congested, pleasanter and safer. Newspapers are beginning to take up this popular cry, and point out the possibility of toll roads as the proper solution to the ever increasing traffic problem. For highway engineers a suitable answer in terms of engineering logic is difficult, since it is always hard to oppose wishful-thinking and popular appeal with stern facts. Basically, there are very few locations in the Western states that can be considered worthy of serious toll-road study. Comparison with the few existing Eastern routes is extremely difficult. The one modern toll road in the West—Denver to Boulder—has not yet been completed, but has a prospect for doing a fine business during the football season, with the remainder of the year in questionable economics. The modern toll road cannot be applied to the metropolitan areas where the traffic congestion is most serious, and is equally unsuited for the majority of rural locations. There remain only those few situations where a heavy traffic potential exists between terminals not now served by a reasonable route. It is axiomatic that the free highway between any two points must be maintained, and will always carry its share of drivers who are not interested in the extra convenience for the extra cost. It is important that the West concentrate on continuing to build and improve its share of the national system of interstate highways. Western state highway departments would do well to have logical and quieting answers ready for well-meaning but uninformed proponents who consider toll roads the complete answer to our present highway problems.

When are engineering plans ready?

WHEN ARE PLANS and specifications ready for putting out for bids? Engineering interest in speed is a natural urge to cut delay at any stage of a construction project from concept to completion. In certain emergencies contractors may even be asked to start work guided only by preliminary drawings, with final agreement left for completion of plans. Normally, however, rushing a job out for bids before plans and specifications are ready is not sound engineering practice. Although the engineer may believe that inconvenience and worry for the bidding contractors are the only results to come from pre-"opening" changes, it is quite possible that the ultimate cost of the job will be adversely affected.

Bidders may form an opinion that any extensive changes in plans are indicative of engineering indecision on the work to be carried out under the contract. All bidders from the low to the high will then find it necessary to add an element of safety to anticipate further changes which will alter their planned construction program.

A case in point is the recent bid call for Folsom Dam, where changes, corrections and additions by the dozens were thrust at the bidders in two heavy installments, one only about a week ahead of the opening date. If the call for bids had been postponed for thirty or even sixty days, and the plans and specifications reached a state of equilibrium would the minimum of changes during bidding have been reflected in the figures submitted?

Notebook to drill jumbo

NOT OFTEN is it possible to trace the results of studies in engineering economics directly to changes in design and important modifications in resulting construction requirements. Within the last few years the Arizona State Highway Department has won national recognition in studies to find a logical answer to traffic slow-ups caused by heavy trucks moving at "crawl" speed up mountain grades. The answer was the adding of another lane at these locations to keep these trucks out of traffic. About the time these studies were producing results, plans were being prepared for the longest highway tunnel in the state, designed to provide a two-lane width of roadway. With a 6% upgrade the need for the extra trucking lane was easily demonstrated from the results of the study and the design changed to provide three lanes. Thus changes in construction methods and field procedures are traceable directly to the stopwatch and notebook of the traffic engineer.

Asphalt—Wheelbarrows—Henry J.

SEEMINGLY UNRELATED, these three are mentioned in the same short article in this issue (page 79). It describes the construction of one of the first sections of asphalt roads to be built in the State of Washington about 33 years ago, and that is an event worth recording as part of the history of Western road building. Then, the article states that Henry J. Kaiser signed the $94,000 contract personally in the name of his paving company. Lastly, the engineer who directed the project remembers that Henry J. put rubber tires on his wheelbarrows on this job to introduce this improvement for the first time. Thus, in the compass of one small paving job were brought together a historic chapter in Western highway work, the first rubber-tired wheelbarrow, and the name of the West's most widely known contractor and industrialist.

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A motor grader without power on the front wheels is like a horse with roller skates on his front feet.

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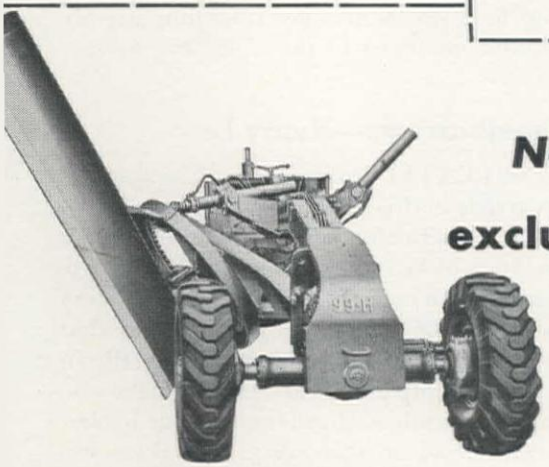

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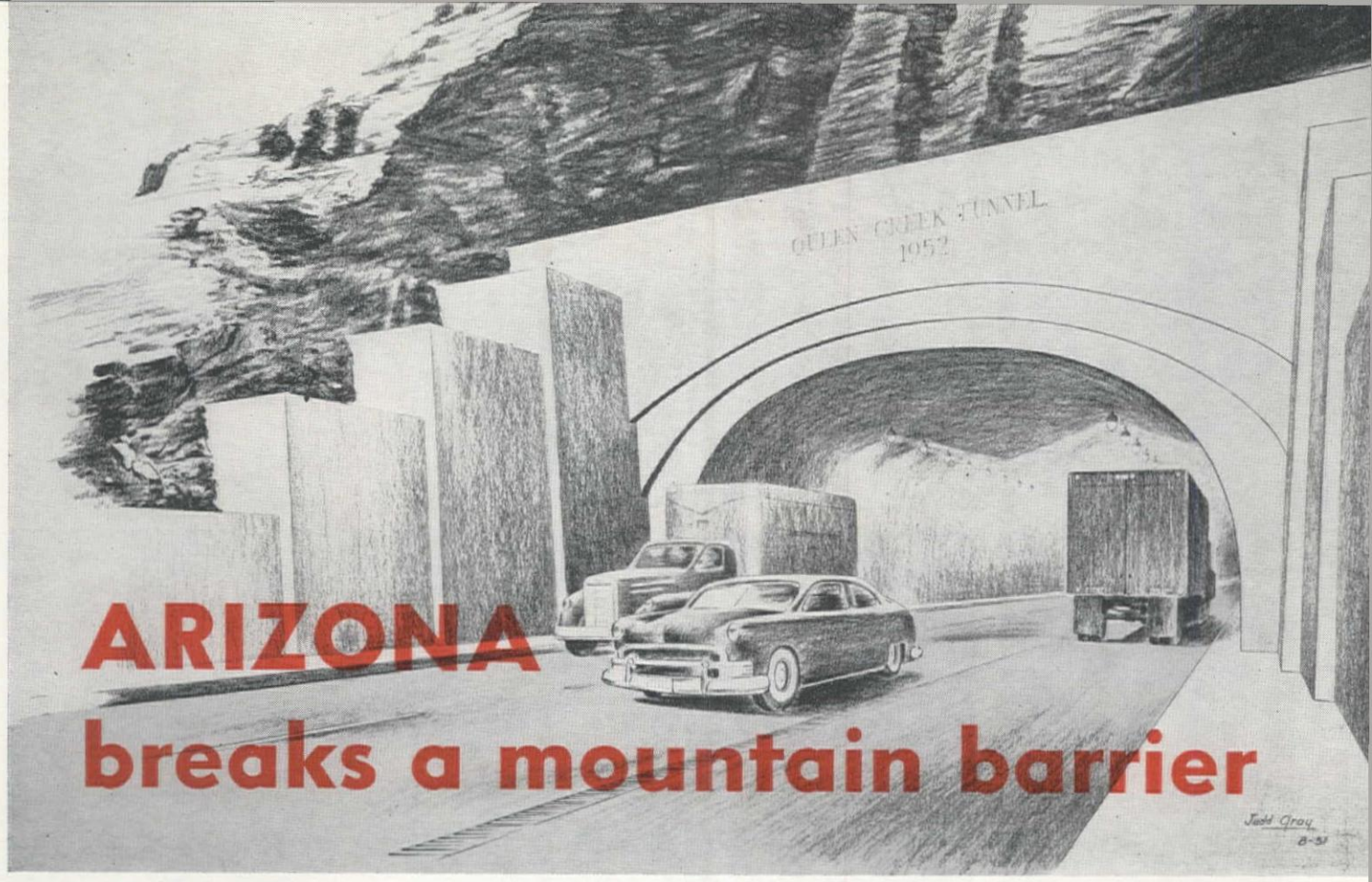


ARIZONA breaks a mountain barrier

On the tortuous Superior-Miami route, a major improvement program is being carried forward, including a 1,240-ft. tunnel which has an extra lane for trucks going up 6.4% grade — The new route cuts 21% off distance in 21 miles

By
R. C. PERKINS
State Highway Engineer
Arizona

OPENING of the improved highway link of the Superior-Miami highway next summer, when combined with the other sections recently completed, will bring to completion one of the most brilliant chapters of heavy road construction in the history of the Arizona Highway Department. The final units of the project include a 1,240-ft. tunnel and the striking bridges spanning Queen and Pinto Creek gorges. The project is located on U. S. 60 about 70 mi. east of Phoenix.

Men versus solid rock

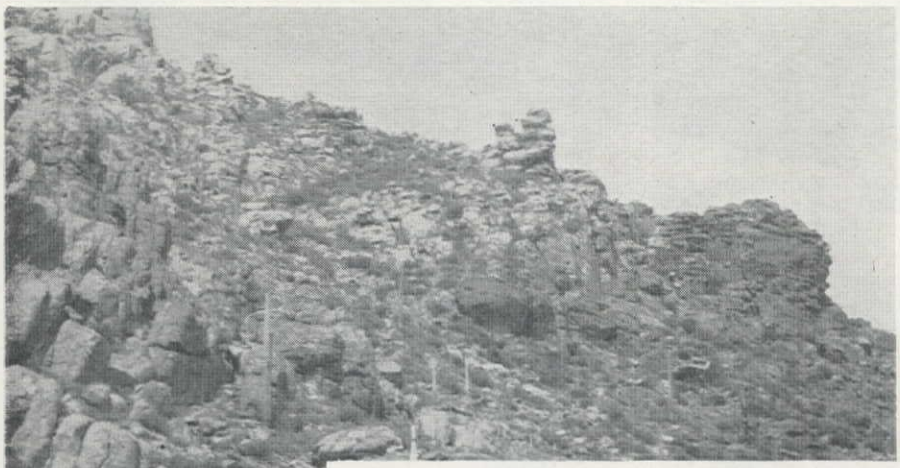
Beginning with the original 21-mi. section of road between Superior and Miami, two of Arizona's outstanding mining and smelting communities, the history of this route reveals a progressive improvement on this tortuous mountain crossing. It is a story of the battle between men and solid rock, from the initial work in the early twenties through the spectacular operations visible at the tunnel site today. The new distance between the two places will be only 16.5 mi., some 4.5 mi. shorter than before, and an even greater saving of time will be effected due to improved grade, alignment and width.

The original work was begun in 1920 under Federal-aid Project 16, a numerical designation that has been advanced many times during the intervening years. This early work consisted of constructing a graded and drained, 16-ft. roadway for a distance of 20.78 mi. Of this early day construction, the heaviest section was made up of 1.75 mi., including spans over Queen Creek and Devil's Canyon and a 257-ft. tunnel below the site of the one now being completed. The estimated cost of this heavy section was $300,000, or $170,000 per mile, an extremely high figure for those years. The principal items of work included 95,500 cu. yd. of roadway excavation and 4,500 cu. yd. excavation in the tunnel, plus major and minor structures.

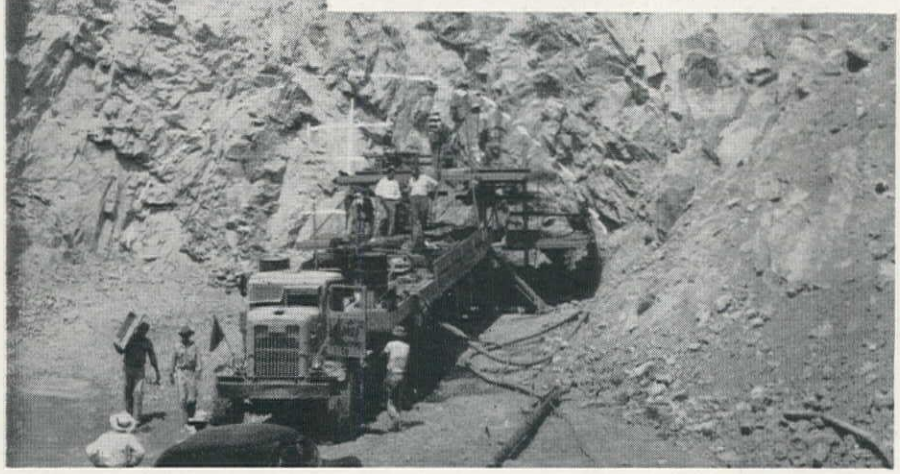
District Engineer Jas. A. Parker recalls that on this section, the initial work was accomplished in part by state prison labor. The prison fund in the amount of $60,000 per year was used for two years in conjunction with county, state and federal money, plus a special appropriation of $100,000 from the legislature. Engineers in charge of the work were F. G. Twitchell and H. B. Wright. Mr. Parker was the locating engineer and Thos. Maddock was state highway engineer. The overall route soon acquired the title, "Hunt's Million Dollar Highway," since it was substantially accomplished during the regime of the late Gov. George W. P. Hunt.

Money versus distance

The completed road was formally opened in 1922, having cost a total of $1,243,437, and shortened the distance between Phoenix and Globe from 113 mi. to 95 mi. The distance between Superior and Miami, which had formerly been negotiated via the Apache Trail, was shortened from 100 mi. to 21 mi.! By 1930, a mixed bituminous surface, 18 ft. in width, had been applied to the route at a cost of $134,688, financed by unmatched state funds. For eight years after this, the road served the motoring



PIERCING THIS RIDGE (left) with a 1,240-ft. tunnel was a major feature of the project. In this view, contractor has squared up the portal and the jumbo is ready for drilling the first round.



BACKED TO THE FACE, the contractor's jumbo (above) is mounted on a surplus Air Force trailer. Wet drilling and a fresh air supply of 21,000 cfm. was sufficient to keep dust below the required level.

public with ordinary maintenance.

Increasing traffic, however, began to make itself felt, and 1938 saw the initiation of a sustained improvement program, which has been carried through to date, interrupted only by wartime curtailments. With the completion of the current 1951-52 work, a total of slightly more than $6,000,000 will have been expended upon this route.

Traffic versus sufficiency

Traffic on this section has increased progressively from 750 vehicles per day in 1924 to more than 2,500 vehicles per day in 1950. This figure was undoubtedly reduced by the fact that traffic was delayed at intervals while work was going on in the tunnel area. The fact that these delays were given wide publicity through our Road Condition Bulletin, issued to all touring agencies and auto clubs, undoubtedly resulted in re-routing much traffic that would normally have used the section, thus making a much greater anticipated total. Higher figures will certainly be reflected in future traffic counts.

According to the Arizona Highway Department's Sufficiency Rating System developed by Wm. E. Willey of the Department of Economics and Statistics (*Western Construction*—March 1950, p. 85) the section now being completed carries a numerical rating of 31 points, making it the fifth lowest rated section on the entire Arizona state highway system. The Sufficiency Rating System is a method of rating each designated highway section according to its condition, safety and service. A perfect road (one fully sufficient for the volume of traffic it carries) is assigned a value of 100 points; any roadway characteristic that falls below the standard lowers the total point rating accordingly.

Other portions of this section of road vary in rating from 100 to 80 points. With the opening of the tunnel section, the average for the Superior-Miami stretch will be about 90 points, considerably above the average for the state system.

Evacuation versus facilities

Since great emphasis has been placed on Civil Defense activities recently, the Arizona Highway Department was asked to take over certain phases of this work, not the least of which was the pos-

sible evacuation of refugees from Pacific Coast States. Principal evacuation routes have been worked out, together with alternate routes. U. S. Route 60, particularly from the western border to Globe, constitutes one of the principal arterials for moving this type of traffic, and the current improvements may well prove more than worthwhile for such eventuality.

Movement of critical metals for the war effort stands as additional justification for these comparatively large expenditures. The topography of the area is such that railroad construction between Superior and Miami is out of the question. It would be necessary for the railroad companies to go many miles out of the way over easier terrain to connect the two communities, which are joined only by this highway.

Although the entire route is a 40-ft., two-lane highway, the tunnel, which is on a 6.4% grade, will be striped as a two-lane, 24-ft. roadway with an extra 12-ft. truck lane on the uphill side. This decision came as a direct result of the Arizona Highway Department's comprehensive study of "Uphill Truck Speeds." Since the grade through the tunnel represents the only tangent in the immediate area, and the studies having shown that heavy trucks will have to crawl the entire length at an estimated speed of 6 mph., the uphill passing lane is expected to do much toward alleviating the tempers of impatient motorists. The rapid acceleration of passing motor cars is expected to assist in blowing the heavy exhaust gases of the slow moving trucks out of the tunnel, aiding the functions of the ventilating ducts. A typical situation of this kind is depicted in the accompanying sketch.

The tunnel excavation contract has been completed at a cost of almost $600,000. This 1,240-ft. bore had to be driven through solid rock, which was drilled and shot the entire way. Including the approaches, more than 200,000 cu. yd. of rock was moved in order to open the 25-ft. height by 44-ft. width of tunnel. The next contract will call for the lining and lighting of the tunnel and providing for ventilation.

Ingenuity versus complexity

Following the facing off of the tunnel, an ingenious drill jumbo was developed and put into use by the contractor. The rig was mounted on a huge surplus Air Force trailer, with the air for the drills supplied by three 500-cfm. compressors. The ventilating fan which operated during driving of the tunnel supplied 21,000 cfm. The rate of ventilation, combined with wet drilling, was sufficient to reduce the dust concentrations below the maximum allowable concentration of 10

An extra uphill lane for slow trucks makes way for higher speed vehicles

By WILLIAM E. WILLEY
Engineer of Economics and Statistics
Arizona Highway Department

THREE YEARS AGO the Arizona Highway Department became fully aware that additional engineering information was needed relative to the speed performance of heavily loaded trucks on mountain grades. As a result a three-phase program was worked out with the U. S. Bureau of Public Roads.

The first part of the program was a study of uphill speed characteristics finished in 1949. This study was presented as a paper before the Highway Research Board the same year. The next portion of the project had to do with downhill speeds and this report was given to the 1951 meeting of the Highway Research Board in Washington, D. C., by the writer. The last item in this series will be an analysis of the importance of the congestion caused by slow moving trucks on upgrades.

The object of the first study was to determine by observation the actual speed of trucks on mountain grades, to assist the engineering division in the following: (1) Location of new highways by determining how far a heavy truck will travel up various rates of grades before the crawl speed will be reached, and (2) determination of the places on the present highway system where outside truck lanes or passing bays may be needed.

When the design of the tunnel, which is described in the article by R. C. Perkins, was being considered, a two-lane, 24-ft. roadway was advocated. Because of our studies of truck speeds and the resulting graphic chart, it was possible to show that for this length and per cent of grade the crawl speed would be 6 mph., and trucks would be in the tunnel approximately 2 min. This slow speed would cause serious congestion to the some 2,000 vehicles per day using the highway. The design was changed and, on the basis of the truck research, approval for an uphill truck lane was granted by the Bureau of Public Roads. Here is a concrete example of beneficial results already obtained in Arizona as a result of this study.

The end point of the uphill survey was a chart showing how far a heavily loaded truck would travel up various percentages of grades before reaching the crawl speed. The Arizona Highway Department is considering the design policy that no passenger vehicle should travel slower than 25 mph. under any condition. With this thought in mind a tentative 25-mph. speed line was added to the chart. To use the chart in Arizona it is only necessary to study the highway location plans and profile in connection with the portion above the 25-mph. line. If a 5% grade is longer than 1,500 ft., or a 6% grade is longer than 1,000 ft., then some design provisions should be made to allow the slow trucks to move over and provide room for the higher speed vehicles to pass without undue congestion and resultant loss of time.

A point worthy of consideration is what minimum speed other state highway departments and highway engineers would consider proper. In Arizona, we have tentatively established the value at 25 mph.

How far can a truck go up-grade before reaching crawl speed?

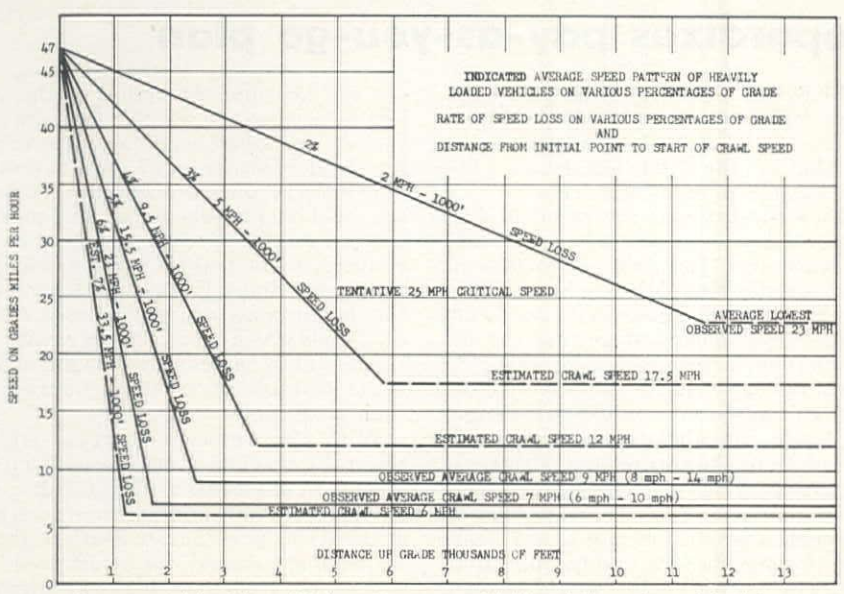
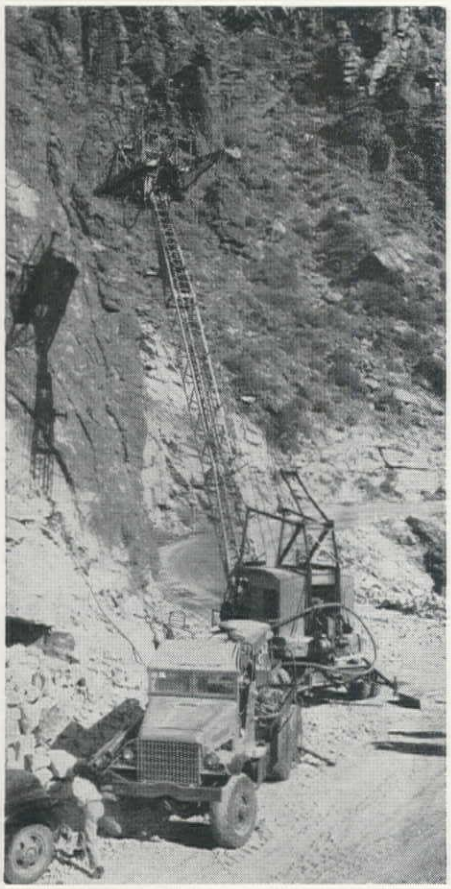
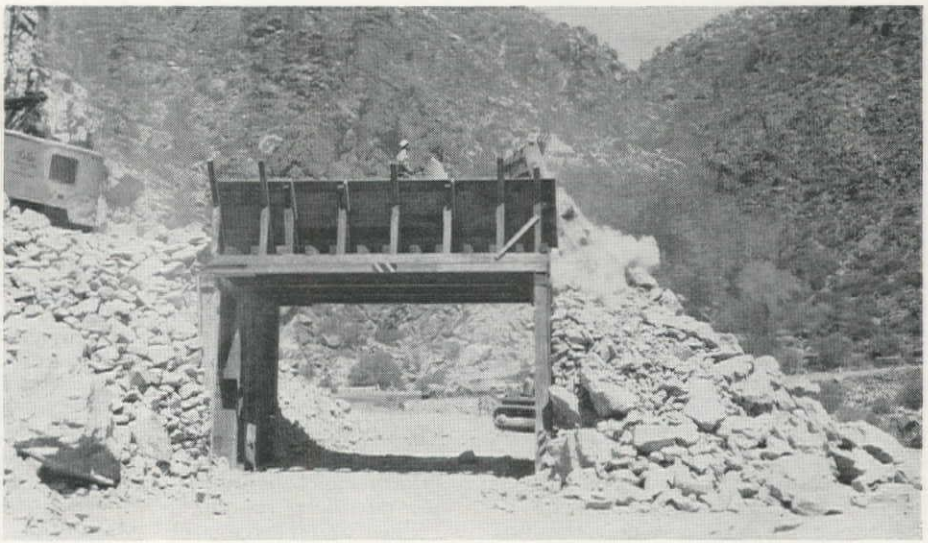


Chart prepared by Arizona Highway Department, Division of Economics and Statistics



FOR HIGH SCALING the contractor developed this drill platform mounted on a truck crane.



TO DISPOSE OF ROCK from the north portal of the tunnel without interfering with traffic on the existing highway, this bridge was built to get rock into the fill.

million particles per cubic foot. Also brought into use by the contractor was a large crane and platform (see illustration), for drilling on the higher rock faces of the project.

One of the more complex construction problems came about at the north end of the tunnel. Here the portal opens directly into a rather large canyon, at an elevation of 20 ft. above the present road. According to the schedule this canyon was to be filled, using material from part of the tunnel. The problem was complicated by the fact that the existing highway makes a sharp hairpin turn at the very same location, which precluded the use of ramps or detours, and traffic had to be maintained during construction. The problem was solved by the erection of a heavy timber bridge (see illustration) over the present roadway. This made it possible for traffic to go through the structure while dump trucks were operating overhead. In this way the rock from the tunnel was moved to the fill with a minimum of trouble to traffic on the existing route.

Hairpin versus mine shaft

Other difficulty was the fact that a shaft from a nearby mine surfaced close to the point of the hairpin turn. This mine opening was not only used as a fresh air inlet, but at certain times waste materials were removed through the shaft and dumped in the gorge. Location of the shaft and hoisting operations placed them under many feet of the rock fill. In order to make it possible for the mine to function it was necessary to install 174 ft. of 108-in. culvert pipe through the fill so that the cars could move in the same manner as they had previously been doing. The pipe was put in place and the fill was dumped and compacted in layers. When the new roadway reaches the proper level the temporary timber trestle will be removed and traffic routed over the fill and through the new tunnel.

Personnel and acknowledgments

Robert D. Canfield, Deputy State Highway Engineer, is responsible for all construction and maintenance. In direct administrative charge of this project is Cecil B. Browning, Construction Engineer. On the job are Roy Holland, district engineer; A. F. Rath, resident engineer, and Raymond Gardner, chief inspector. The contract is held by the Fisher Contracting Co. of Phoenix, headed by Del Fisher, with Ray Spangler, superintendent, and Ed Metz, tunnel foreman.

Vying with the tunnel for engineering attention are the twin bridges over Queen Creek and Pinto Creek. These structures were designed by the bridge division of the Arizona Highway Department headed by R. A. Hoffman, and were fabricated and erected by the Allison Steel Co. at a cost of around $500,000 each. The Pinto Creek Bridge received the 1949 award of the American Institute of Steel Construction for the most beautiful in its class.

Suffice it to say, then, that the Arizona Highway Department may take justifiable pride in its most recent accomplishment, and I feel that I will not be criticized for saying that I am proud to have been associated with this department since the early days of the original project, and with the men whose combined efforts made such a thing possible.

One-cent cut in New Mexico gas tax jeopardizes pay-as-you-go plan

AFTER BEING in effect for two years, a two-cent increase in the New Mexico gas tax has been cut back to a one-cent increase by the 1951 legislature. The basic gas tax remains at 5 cents.

When the tax was increased in 1949 the additional revenue was earmarked by the legislature for debt payments. At that time the New Mexico State Highway Department sponsored the 2-cent increase as a means of getting the department on a pay-as-you-go basis. At the rate the gas-tax revenues were coming in this addition would keep the highway department ahead of debt payments. Looking into the future, and with these revenues coming in at rates which were higher than anticipated, the prediction was made that by the end of six years the retirement fund would be built up to a point where the debts would be paid off completely. However, special interests in the state campaigned for a cut in the gas tax, and the action of the 1951 legislature was the result. The extra cent for two years had been helpful in relieving the debt situation to some extent.

When the one-cent cut was made, it was held in abeyance for several months with this extra revenue allocated to the counties to help them with debts they owed the State Highway Department for the purchase of right-of-way. About $1,000,000 was used in this way, with the surplus over the counties' right-of-way debts divided among the counties for their road funds.

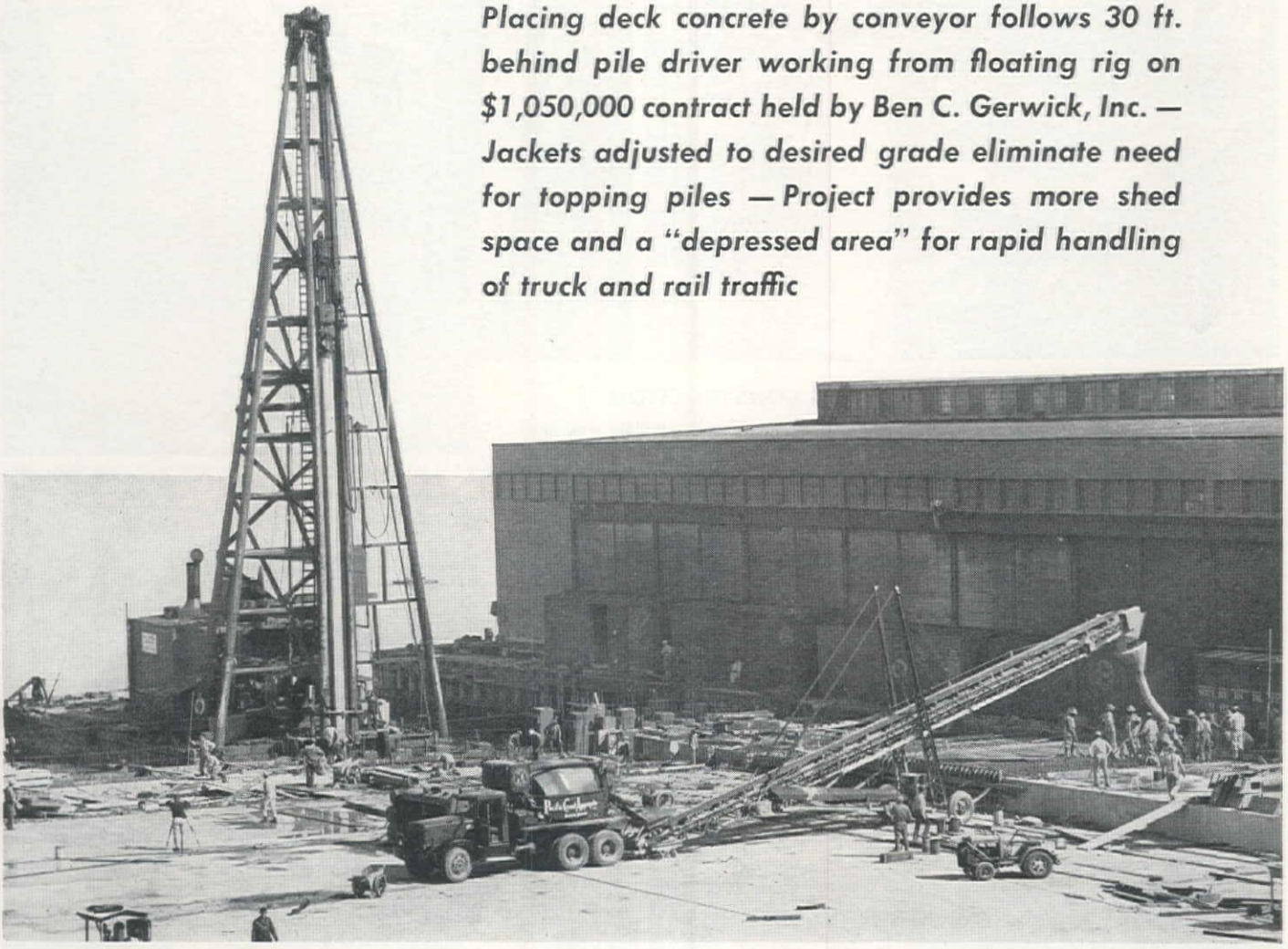
With the one-cent increase still in effect the revenue should be adequate to meet debt payments as they fall due, and the construction and maintenance program of the New Mexico State Highway Department should not be affected.

B. G. Dwyre is state highway engineer of New Mexico, and L. D. Wilson is administration engineer.

Two San Francisco piers combined with—

Concrete deck on 1600 concrete piles

Placing deck concrete by conveyor follows 30 ft. behind pile driver working from floating rig on $1,050,000 contract held by Ben C. Gerwick, Inc. — Jackets adjusted to desired grade eliminate need for topping piles — Project provides more shed space and a "depressed area" for rapid handling of truck and rail traffic



DEVELOPMENTS in the design of waterfront facilities now being applied by California's Board of State Harbor Commissioners to both alterations and new construction along San Francisco's Embarcadero are proving an effective mode of harbor rehabilitation that may be economically employed in many seaports of the United States.

Shipping operators along the Embarcadero have long been hampered by some "horse and buggy" characteristics of the pier facilities there. In particular, the design of pier sheds and warehouses, with their closely spaced columns, do not provide sufficient maneuvering space for today's truck-and-trailer combinations. Since the loading and unloading of ships entails great concentrations of materials and corresponding peaks of activity, congestion can only result. This congestion occurs in great numbers of trucks that stack up along the waterfront, causing delays that not only inconvenience outside traffic but mean great expense to shippers paying for the drayage services so stacked.

Mission Rock design

A partial solution was evolved by the Board of State Harbor Commissioners in its design for a new installation at Mission Rock, a small island and an area of shoal water lying just off the south end of the Embarcadero. Using a combination of mole and pier construction, a wide structure was built that featured peripheral warehouses and berthing space and a large central "depressed area" for the movement of trucking. Graded 3½ ft. lower than the surrounding aprons, this depressed area provides loading-dock convenience on each of its sides and effectively isolates trucking movements from the warehouse area except at three selected locations for each shed, where ramps connect the two areas.

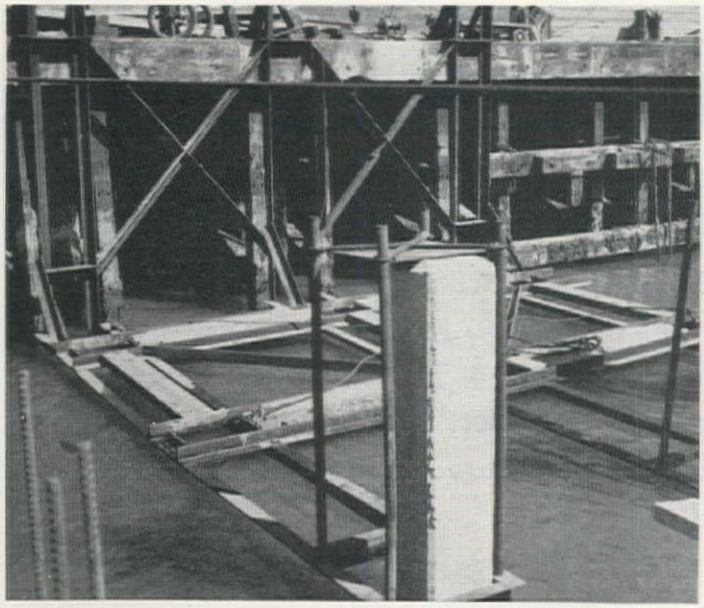
By

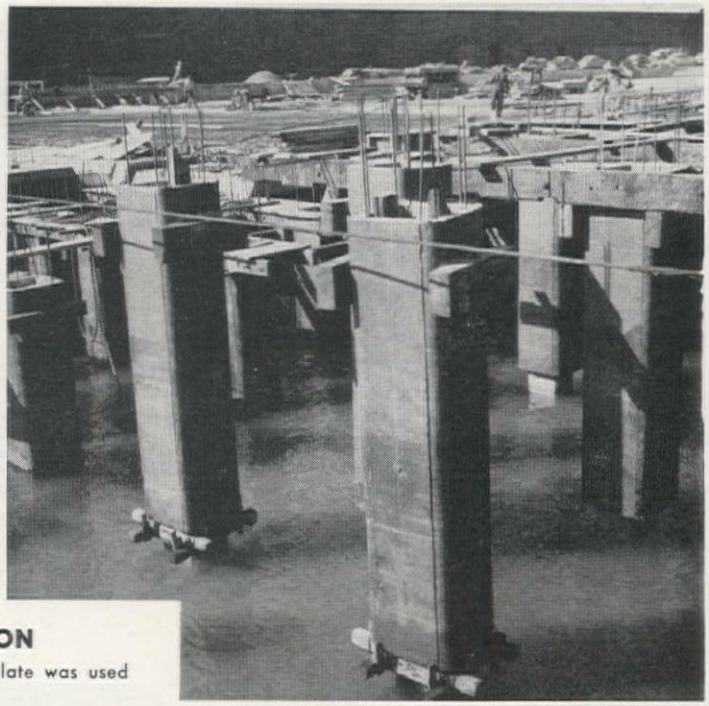
S. S. GORMAN

Assistant Chief Engineer
Board of State Harbor
Commissioners of
California

Officials of the Matson Navigation Co. observed the successful operation of this installation and saw in it the possibility of saving as much as a day in the cargo-handling time incident to each arrival or departure. Therefore, they requested alterations to provide facilities of a similar nature at Piers 30 and 32, which they rent from the Board of State Harbor Commissioners. The following described project was then designed by the Board, advertised, and let for construction on a series of four contracts.

Piers 30 and 32 are located just south of the San Francisco-Oakland Bay Bridge, from which transbay travellers have had excellent opportunity to observe the progress of construction under the first contract, held by Ben C. Ger-





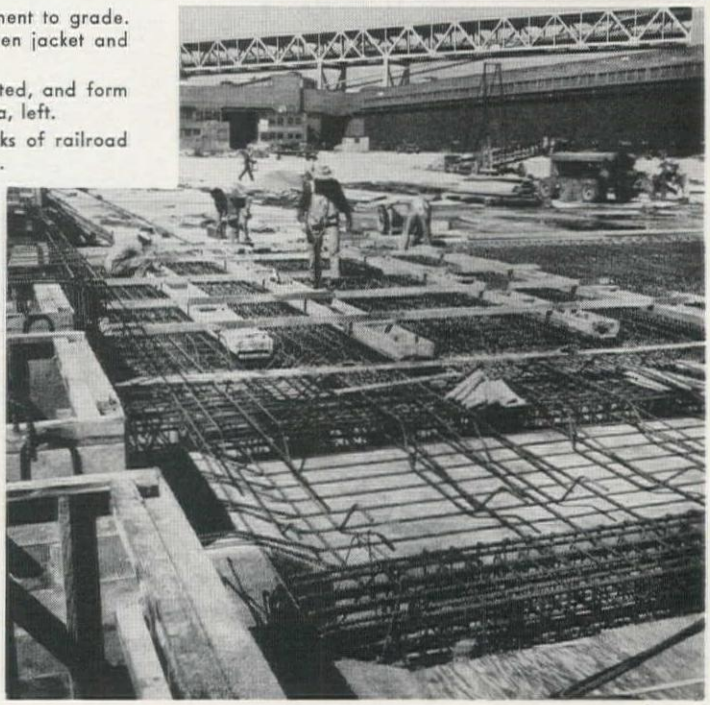
DETAILS OF PILE, JACKET, DECK CONSTRUCTION

ABOVE LEFT—At tight spots inaccessible to floating pile driver, this template was used to spot and support piles driven from crane-supported leads.

ABOVE RIGHT—Jackets, slipped over piles, were poured full after adjustment to grade. Yoke at bottom of jacket has been raised to wedge sealing material between jacket and pile. Wooden seats for beam and deck forms are bolted to jackets.

BELOW LEFT—General view shows bare piles, jacketed piles being concreted, and form work following close behind. 3½-ft. drop from pier apron to depressed area, left.

BELOW RIGHT—Heaviest reinforcement is provided in beams under tracks of railroad spur alongside loading dock. Wooden troughs form grooves to receive rails.



wick, Inc., on a bid price of $1,050,000. Prior to the work, the piers were each 200 ft. wide and extended 681 ft. from the quayside, or bulkhead, itself a broad wharf projecting 210 ft. from shore. Separated by 222 ft. of open water, they provided berthing space for four vessels. As the improvement plan nears completion, the area between the piers has been filled in with a reinforced concrete deck supported on over 1,600 concrete piles, creating one great pier 622 x 681 ft., with far greater cargo handling area, and berthing facilities for at least three vessels. The remaining contracts cover construction of nearly 60,000 sq. ft. of additional connecting shed space.

Principal features of the new pier construction include (1) design of the depressed area, (2) technique of jacketing the concrete piles, and (3) relocation of the State Belt Railroad spur tracks on the piers.

Depressed area

Especially sought by Matson, the depressed area now situated between Piers 30 and 32 is 150 ft. wide and 613 ft. long, with a continuous loading dock 3½ ft. high on all sides broken only by ramps for the entry and exit of trains and trucking. New facilities of the State Belt Railroad occupy the depressed area immediately adjacent to this loading dock, which thereby enhances rail service also. Despite its considerable length and breadth, the depressed area is not intended for the storage of cargoes; rather, it is strictly a traffic way, built to sufficient proportions to allow parking and maneuvering by the largest trucks.

At its inshore end, three access ramps have been built, two of which are 16 ft., 2 in. wide and 130 ft. long, having a slope of 3%. The other, a central ramp, is 44 ft. wide and 65 ft. long, has a slope of 6%. Single-track rail traffic enters via the two longer side ramps, which direct it alongside the loading docks. In the depressed area, double trackage is provided for 365 ft. of the pier length. A single truck ramp 44 ft., 8 in. wide and 60 ft. long rises on a 6% grade to the apron at the seaward end of the depressed area.

Jacketed concrete piles

Bids were received by the Board of State Harbor Commissioners for construction in accordance with various designs that featured the use either of wood or concrete pile and either precast or cast-in-place deck construction. The reinforced concrete pile design ulti-

mately adopted was $77,833 costlier, but is expected to yield savings in maintenance of far more than that figure. Such ultimate economy was in part achieved through incorporation of concrete jackets in the pile design. The reasoning was this: reinforced concrete piles are expensive, foot for foot, as is the method of topping those that remain above grade when the specified driving resistance has been met. Therefore, it was planned to use somewhat shorter piles, and to fit them with concrete sleeves, or jackets, which might be adjusted to extend above the pile as necessary to maintain the desired grade.

Pile driving data

Application of such reasoning and achievement of the economy planned thereunder had to be based on thorough knowledge of soil conditions. This knowledge existed in the form of longitudinal profiles drawn from records of driving resistance encountered in the affected area during the original construction of Piers 30 and 32. Coupled with data from a few test piles driven in the intervening 222-ft. slip, these gave excellent material whereby to determine needed quantities of each length pile. In practice, most piles went down about as expected; very few met refusal. Those which tended to hang up while still exposed more than was desired were simply beaten until they did sink. Reinforced concrete piling suffers no significant damage from continued driving unless complete failure occurs. Consequently, penetrations of as little as ⅛ in. per blow were occasionally observed.

All the 1,656 reinforced concrete piles for the job (60 wooden fender piles 75 ft. long were also driven) were cast at the contractor's yard in Petaluma, Calif., in lengths ranging from 54 to 90 ft. Of 18-in. square section, chamfered at the corners, all were formed with chisel points to facilitate driving. Reinforcing was composed of eight 1-in. square bars with ¼-in. bands at 12-in. centers. Piles were poured in trough-like forms, which were stacked atop each other, in order to save yard space, as pouring continued. Transit-mix concrete was supplied locally and was a 1:5 mix using Type I cement. Maximum aggregate size was 1½ in. Surfaces of the piles were sealed with an oil emulsion to retain moisture during the curing period.

Use hanging leads

Pile driving operations were for the most part carried out by a floating rig working in conjunction with a 25-ton crawler crane which assisted in handling the piles. Some locations were inaccessible to this rig, so piles were here driven from crane-supported hanging leads. In these areas a template was employed to spot pile locations; consisting of a rectangular framework, it had holes at the proper spacing, and when secured among surrounding piles provided lateral support for piles driven by the crane.

Jackets for the concrete piles were also cast at Petaluma, using collapsible steel forms inside and out. The jackets were made in two lengths, 9 and 11 ft., all 20 in. square inside with walls formed 4 in. thick. Inside and outside corners were chamfered. Reinforcing in the jackets consisted of eight ⅝-in. bars in pairs at the corners, and ¼-in. bands at 6-in. centers. Concrete mix was 1:4½, with a maximum aggregate size of ¾ in., and included an air entraining admixture. Sprinkling inside and application of wet sacks outside the jackets maintained proper moisture for curing after the forms were stripped.

Positioning jackets

Jackets were positioned in height on the piling as follows: a hole drilled in the jacket received a bolt, which in turn pierced a timber dropped inside the jacket. Cut to order, the timber then rested on the pile top, supporting the jacket at the proper height. Jacket overlap varied, but was not less than 2 ft., and meant that the bottom edge of the jacket was within 6 in. of elev. 0, mean lower low water. In any case, adjustment was such that addition of concrete beam and deck thickness resulted in a deck elevation of 12.83 ft. on the pier apron, and 9.33 ft. in the depressed area.

Following temporary positioning of the jacket, it was necessary to seal the 1-in. annular space between it and the pile, then grout and concrete the jacket to its top. The seal used in the lower edge of the jacket was, in this case, wood, though rubber and rope have been used in similar operations elsewhere. This wood seal was placed by means of a collapsible wooden yoke which was fitted around the pile below the jacket, and which held the seal material. Hauling up on the yoke forced the wooden seal into the annular space, after which the yoke was released to float upon the water while dismantled for moving to the next jacket to be sealed.

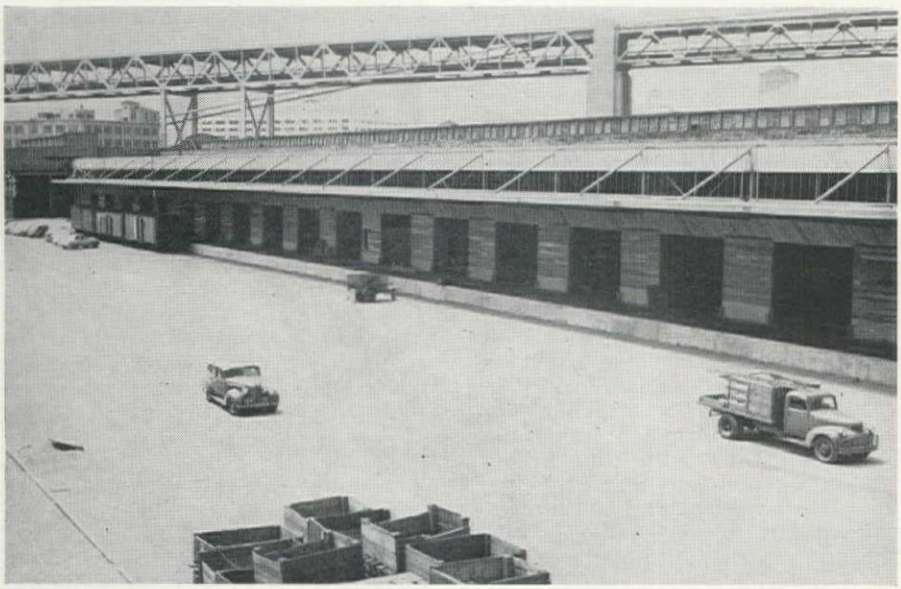
Completing piles

Above the edge seal the annular space was grouted to the top of the pile, this operation being carried in the dry. Curing emulsion having been cleaned from the pile, enough bond was hereby achieved to permit removal of the bolt and timber assembly that had held the jacket. Vertical steel was then placed in the jacket, with enough extra length to be bent later into the deck beams. Concrete was then poured into the jacket to

FEATURES OF SHED DESIGN

CONNECTING to existing sheds, new shed space is 43 ft. wide, adds 60,000 sq. ft. to warehouse facilities. Construction involved three contracts—structural steel, roof and walls, and doors.

CANOPY projects 30 ft. from shed for most of its length, protects 15-ft. apron width and transfer of cargoes to and from vehicles in depressed area.



GENERAL VIEW shows extent of traffic way in depressed area and convenience afforded by continuous loading dock along sheds. Entire job is scheduled for completion by end of 1951.

its top edge, completing the pile installation.

Pier piling exposed to the tidal cycle deteriorates faster than piling that is either wet or dry 100% of the time. Accordingly, that portion of the jacket in the tidal range was treated for preservation. Asphalt has been used, but on this job a product known as Farbertite was used, it having the advantage that it may be applied cold—merely by mixing with water and brushing on.

Deck design

Forming of beams and deck slab followed immediately upon completion of concrete jackets. In fact, the pace was such that, with pile bents 10 ft. apart, concrete pouring was in progress only 30 ft. behind the pile driver. Forms were supported on seats bolted to the jackets and were assembled to provide an 8-in. deck slab and 16-in. beams. These beams, 30 in. wide, the same as their supporting jackets, were carried in one direction only, across the 222-ft. slip. In this direction, pile spacing gave support at 9-ft., 9-in. centers, as opposed to the 10-ft. spacing maintained between bents. Near the loading dock, where railroad tracks were to be placed, deck thickness was increased to 14 in., and the beams to 26 in.

Deck reinforcement

Reinforcing steel in the slab was made up of ⅝-in. bars. Spacing in the bottom of the slab was 5 in., with alternate bars bent up to the top of the slab when passing over a beam. Top reinforcing was composed of straight bars at 10-in. centers. Beam reinforcing was of two designs, one for each thickness of beam. In those portions of 16-in. thickness, ⅞-in. bars were used: three continuous straight bars in the bottom, two continuous straight bars in the top, and three bars in the bottom bent to the top over each pile.

In the heavy, 26-in. beams, reinforcing was composed of both ⅞-in. and 1-in. round bars: seven 1-in. continuous straight bars in the bottom, five ⅞-in. straight bars in the top interrupted at grooves provided for installation of railroad rails, and six 1-in. straight bars at intermediate depth placed only under the rail grooves. Stirrups for both beam types were of ⅜-in. steel.

Concrete placement

Transit-mix concrete had been placed in the jackets from buggies. For the beams and slab, a conveyor was used that carried the concrete from a centrally located receiving hopper to the pouring location, where it was placed through an elephant trunk. Beams and slab were poured as an integral unit, using a 1:5 mix. It is interesting to note the economy with which the contractor employed the conveyor in conjunction with transit-mix concrete, in preference to the more conventional system of ramps and buggies operating from a central mixing plant or hopper.

Installing rails

Forms contained castings of many deck drains installed to accommodate rain runoff, thus obviating shaping of a crown and gutters on the deck surface. Forms were also used to leave grooves in which State Belt rails might be laid. These grooves were of such depth that 7-in. girder rails would project 1½ in. above the concrete deck surface, which was later to receive an asphalt wearing surface built up flush with the rails.

Leveling plates for rails were then laid in the grooves on a bed of 1:2 mortar and the rails secured by angle iron clips fitted over bolts previously embedded in the concrete. A thin concrete mix, proportioned 1:9, was then placed in the grooves up to the level of surrounding concrete. Application of the 1½-in. asphalt wearing course completed construction of the deck, both in the depressed area and on the apron extensions at the original elevation of the pier.

The original piers had included aprons outside the sheds on the three exposed sides. These open areas, accommodating rail traffic and mooring facilities, measured 22 ft. in width along the sides of the sheds, and 12 ft. across the ends. Construction of the 150 x 613-ft. depressed area in a former slip 222 x 681 ft. resulted in additions to this arpon area—36 ft. at the sides and 68 ft. at the seaward end. On the new aprons adjacent to the depressed area, now totaling 58 ft. each in width, it was planned to construct additional connecting shed space.

These new additions, each 43 ft. wide and 691 ft. long, are being built under three contracts, the first, for provision and erection of structural steel, held by Judson Pacific-Murphy Corp. on a bid of $282.80 per ton for 425 tons of steel —total cost about $120,200. Trusses for the new sheds are 43 ft. long and are 3 ft. deep where supported by an existing crane rail 21½ ft. above the apron deck on the wall of the existing sheds. At their outer ends, these trusses are 8½ ft. deep and are supported on 10-in., 33-lb. WF columns, leaving an apron 15 ft. wide extending to the edge of the depressed area. Purlins are composed of 9-in. channels, girts of 5-in. channels. A canopy projects 30 ft. beyond each new shed, overhanging both the apron and the railroad track in the depressed area. Beams used in canopy construction are 16-in., 40-lb. WF, with 12-in. channel purlins.

Remaining work

A second contract for work on the new sheds is held by Clinton Construction Co. for $224,500. Work being done includes construction of both wood and concrete wall sections, 2-in. wood roofing, installation of windows and electrical equipment, etc.

Only doors remain for provision and installation under the third contract. Fifty-one of them, ranging in size from 7 x 10 ft. to 29 x 22½ ft., are being supplied and hung by The Kinnear Manufacturing Company of Calif. on a bid of $65,000.

The entire job, commenced in June 1950, will be completed by 1952. Construction of the new aprons and depressed area was finished last July. Steel erection is now complete. Work by Clinton Construction Co. is practically done, while the Kinnear contract is 35% finished.

Personnel

For the Board of State Harbor Commissioners, Harry Squire is chief engineer. Don Smith has recently been succeeded by William Kirby as resident engineer for the Board. Superintendent for construction by Ben C. Gerwick, Inc., was Don Weaver, assisted by Harry Larsen and Dick Vlach. For Judson Pacific-Murphy, Francis J. Murphy is outside erection superintendent, and Art Scott superintendent for the job. F. D. Scott is general superintendent for Clinton Construction Co., and Hal Nourse superintendent on the job. Job superintendent for The Kinnear Manufacturing Co. was Fred Brown; plant superintendent in charge of fabrication was Sam Young.

In Wyoming, contractors develop spray bar techniques for—

Placing asphalt membrane from above or below

RECENT LARGE installations of buried membrane canal lining, notably by the Bureau of Reclamation on its Riverton, Wyoming, and Columbia Basin Projects (totaling about 1,500,000 sq. yd. of lining), have led several contractors to develop speedier and more efficient methods of asphalt application. Although the contractors originally used hand spray methods, which were suitable for small-scale installations, nearly all asphaltic materials for membrane lining are now being applied through spray bars up to 20 ft. in length. The new methods not only apply the asphalt much more rapidly, but waste is avoided and a much more watertight and uniform membrane is secured. The savings effected by the new methods have resulted in a steady decrease in cost of applied asphalt in this type of lining.

The side slopes used for the membrane lining are usually 1¾ :1, and from 1.25 to 1.75 gal. per sq. yd. of catalytically blown asphalt are applied. To obtain this quantity on the side slopes, from two to three separate applications are made, the side slopes being completed before beginning the bottom portion of the canal. The applications on the side slopes frequently follow each other in from 1 to 3 or 4 hours. The repeated applications, besides permitting the building up of membranes of from 5/16- to ⅜-in. thickness, also automatically corrects voids or holidays which may have occurred in previous applications. In the bottom of the canal it is customary to apply all the asphaltic material required in one application. Using the new methods, only 15 min. are required to apply a 1,000-gal. distributor load, and from 5,000 to over 10,000 gal. of asphalt per day are being applied by each distributor crew.

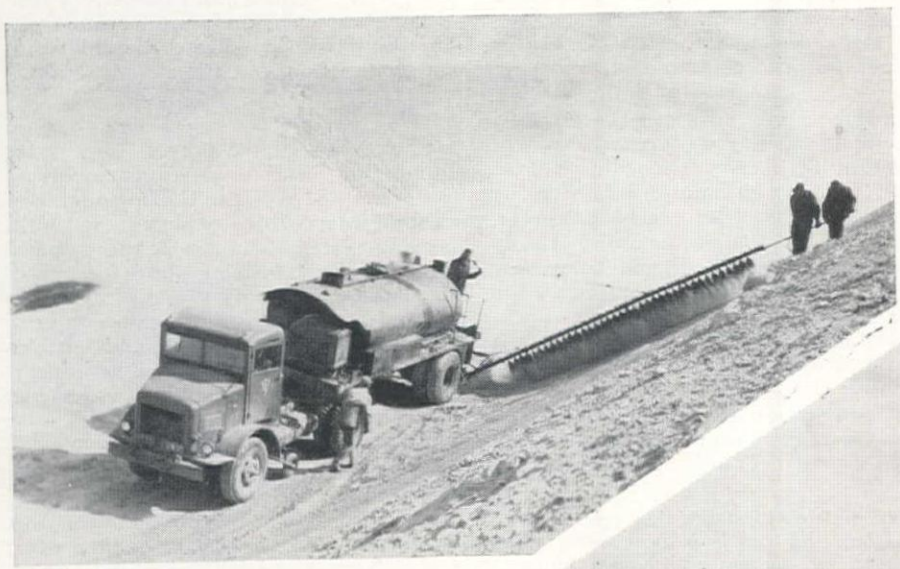
Various problems are encountered in the application of the asphaltic membrane. In some instances, it is possible to operate distribution equipment directly in the bottom of the canal, permitting distributor-attached spray bars to be used. However, in the majority of jobs, all operations must be conducted from the top of the banks, and in a few cases, from the outside of the embankments. Considerable ingenuity therefore must be exercised by some contractors to secure efficient operations.

The Woodward Construction Co. of Rock Springs, Wyoming, subcontractor for Sharrock and Pursel of Casper, applied approximately 140,000 sq. yd. of asphalt lining in the Wyoming Canal on the Riverton Project. The subcontractor was able to operate all equipment within the canal section (see illustration). Using a Wainwright bar extended to a 20-ft. length on the side slopes, he applied asphalt in two applications on the slopes and one application in the bottom. In spite of adverse weather conditions, the work was completed well ahead of schedule and an excellent job was obtained.

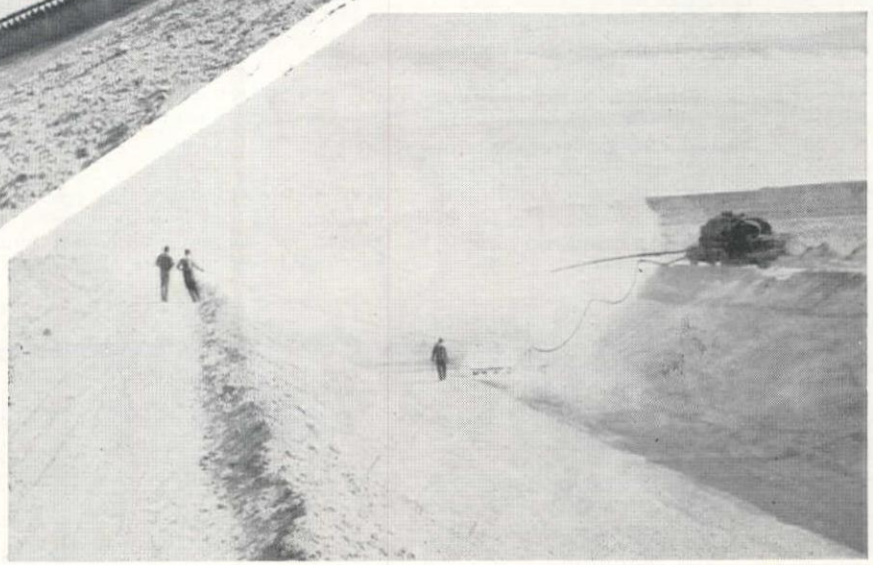
The Studer Construction Co. of Billings, Montana, recently completed about 500,000 sq. yd. of membrane lining in the Pilot and Wyoming Canals on the Riverton Project in Wyoming. A large portion of this work was done in old canals and canals of rather small cross section, which prevented equipment from operating within the canal proper. For this purpose, a boom was swung from the distributor and a spray bar and hose were suspended from this source (see illustration). The bar was guided by handholds and ropes and a very satisfactory job was obtained.

In the Wyoming construction, the asphalt is being supplied by the Husky Oil Company of Cody, Wyoming.

The more complicated work being performed by the Columbia Asphalt Paving Company of Yakima, Wash., which holds subcontracts for the construction of approximately 750,000 sq. yd. of membrane lining on canals and laterals of the Columbia Basin Project, Wash., was reviewed pictorially on pages 62 and 63 in the September 1951 issue of *Western Construction.*



WORKMEN of Woodward Construction Co., Rock Springs, Wyo., are shown applying membrane in canal on Riverton Project (left). Firm subgrade in canal permitted operation of equipment in canal section.



STUDER Construction Co. of Billings, Mont., placing asphalt membrane for canal on the Riverton Project (right). Both boom and bar are job-rigged to apply from 1.25 to 1.5 gal. per sq. yd. of 400 deg. F. catalytically blown asphalt.

Designer and builder of 200 x 240-ft. Bakersfield building made the most of precasting technique with wall panels, columns, girders and beams cast separately and assembled in erection

Concrete warehouse 100% precast

DEMONSTRATING the feasibility of precast reinforced concrete construction in its broadest sense is a warehouse recently built in Bakersfield, Calif., for Dan Sill of the Kern Rock Company. Designed by F. Thomas Collins, consulting engineer of San Gabriel, Calif., the warehouse has been leased to Lockheed Aircraft Corp., even as work gets under way on a second unit.

Collins and Sill, who directed the construction, have gone far beyond the rather general use of tilt-up walls for buildings of this type. Precast sections employed in this structure, in addition to the exterior wall panels, include dock walls 4½ ft. high, frame members—columns, girders and beams—and roof slabs spanning between the beams. The use of cast-in-place concrete was confined to the pad footings for columns, the "splices" between dock panels, and the 6-in. floor slab resting on compacted fill. Gunite was used to construct a reinforced bond, or tie, beam completely around the structure at the top of the walls, and to fill and seal openings such as at the roof slab and beam connections.

The new warehouse has outside dimensions of 240 x 200 ft., with an additional 10-ft. width of loading dock on all sides. A railroad spur serves the dock area on the north side of the building. The layout of the building is in rectangular bays of 40 x 20 ft. The columns are 40 ft. on centers in the east-west direction and 20 ft. transversely. Interior columns are typically 14 in. square and exterior columns up to 24 x 16 in. Girder units 4 ft. deep and 1 ft. wide span 40 ft. east to west, and end girders are supported at the wall line in recessed seats provided in the exterior columns. Beams 14 in. deep and 10 in. wide span 20 ft. over the girders and are spaced on 5-ft. centers. Roof slabs—32 units per bay—are 5 x 5 ft., and 2¾ in. thick. The north and south walls of the building are 7 in. thick, designed as bearing walls to carry marginal roof load delivered by the beams. The east and west walls are 6 in. thick, of non-bearing type. Wall panels in general are 20 ft. high and about 18 ft. long, with door openings provided in adjacent panels or in alternate panels along the docks. There are no windows.

Order of work

The first stage of construction was to excavate the pits for column footing pads, cast the concrete footings and precast the columns and dock panels. These precast items were made on casting beds adjacent to the building site; in the case of dock panels, casting was directly against the earth. Adjoining these operations, steel reinforcement was fabricated and spot-welded in standard assemblies and stacked systematically for use in various precast sections.

Set in each footing pad, four 1¼-in. bolts projected, positioned accurately by template, with nuts turned to correct elevation to receive the column base plate. The precast column was lifted by a single top insert set exactly at center, so that the column was automatically plumbed in placing. Placing the base plate over the bolts, turning down top nuts, adjusting as necessary, dry-packing the space below the plate and placing plastic mortar covering to protect the top nuts, completed the joinery.

After erection of the columns, dock panels were set with the finished surface exposed and connecting splices cast. Then fill material was placed and compacted and the floor slab poured. This floor became the casting bed for subsequent operations, the main object being to cast all members near their final location for easiest and least costly handling, realizing the utmost economy at some sacrifice of construction speed. Wall panels were cast and erected, followed in order by girders, beams and roof slabs.

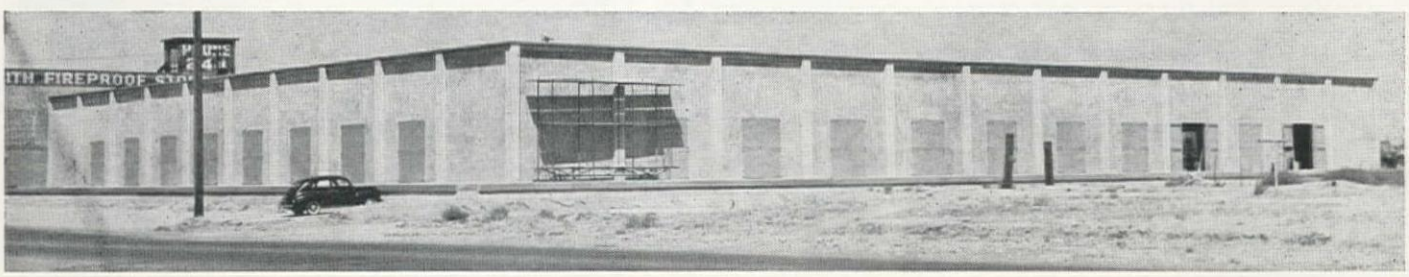
Wall panels were tilted up against the wall columns, engaging shoulders cast in the columns. Matching V-grooves in columns and panel ends provided for grouting from the top. No braces were used, but walls were temporarily held in alignment by wood pieces inserted in the V-grooves, thereby releasing the erection crew. Before grouting, U-clamps replaced the wood. Matching weld plates were set in column and panel edges and V-bent bars welded for connection, thus providing a tie with some flexibility in the event of cold weather contraction.

Connection details

Connection of the precast girders to supporting interior columns involved the use of plates cast in the bottom faces of the girders which made contact with bearing plates anchored in the column tops. Similarly, bearing plates anchored in the top faces of the girders were located at the points of beam support, and plates cast in the end and bottom of the beams matched them. The joinery of these member assemblies was made by welding.

As a means of securely connecting the roof slabs to the beams, ⅝-in. hooked bars extended at 5-ft. intervals from the beams, entering a pocket between the roof slabs. The beam bars hooked over the slab steel and with the final gunite

FINISHED WAREHOUSE has only footing and floor slab cast in place. Loading dock panels, wall columns and panels, girders, beams and roof slabs are all precast.



encasement furnished a secure tie. Joining of one slab to another was accomplished by welding steel extending from adjacent slabs in cut-away corner pockets.

The gunite bond beam at the junction of wall panels and roof was shot against an inside form from an outside scaffold traveling on the dock. The roof slabs projected out over the bond beam. At 5-ft. intervals pockets in the panels allowed a U-shaped tie bar to drop into the bond beam section, where it was anchored to connect the roof slabs securely to the wall. The ties also served to transmit shear from lateral loads, wind or seismic, into the beam, thence to be distributed to the walls and thus to the footings.

Seismic considerations

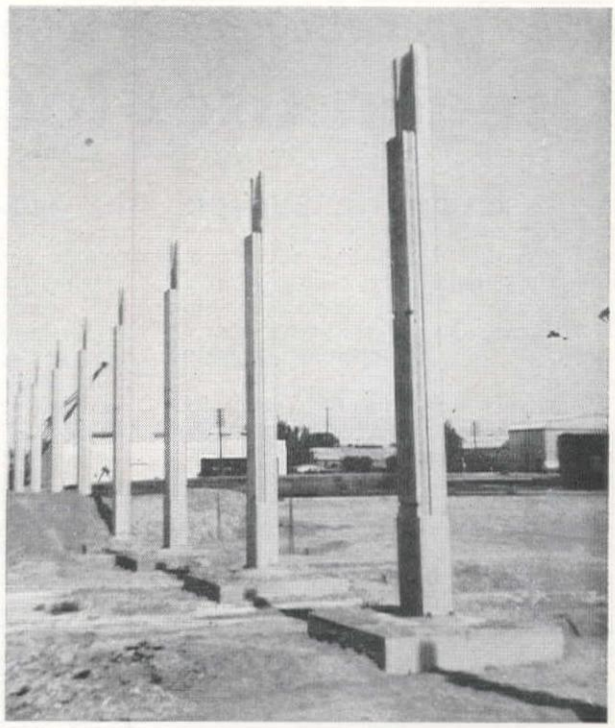
Lateral forces were given full consideration in the design, and though the site is in a Zone 2 area as defined by the Uniform Building Code, it is believed to be capable of a higher degree of lateral force resistance than so required. The system of interior columns is fully restrained by the floor slab and rigidly connected to heavy footings which are up to 8½ ft. square, so that column resistance is high in the aggregate. The precast slab roof, as connected, acts as a shear-resistant diaphragm, transfering stress to the outer walls. Interconnection of all parts of the structure has been provided in great detail, in order to achieve a real integrity. Good joinery is all-important in precast concrete construction.

Construction economies

Low cost was the primary objective, achieved by Sill in his direction of work and scheduling of operations. Methods and procedures were in part determined as construction progressed. Among the items leading to economical conduct of the job were: repeated use of steel forms; casting of sections in position where handling for erection was easy and direct; preparatory planning and simplification of steel fabrication; general use of a wheeled scaffold; efficient and only occasional rental of expensive equipment, such as a truck crane; tapering of wall lifting inserts for easy removal and re-use; operation of light traveler on roof to winch new slabs directly upward and move them across slabs previously laid; coordination of operations to combine a minimum crew with maximum production.

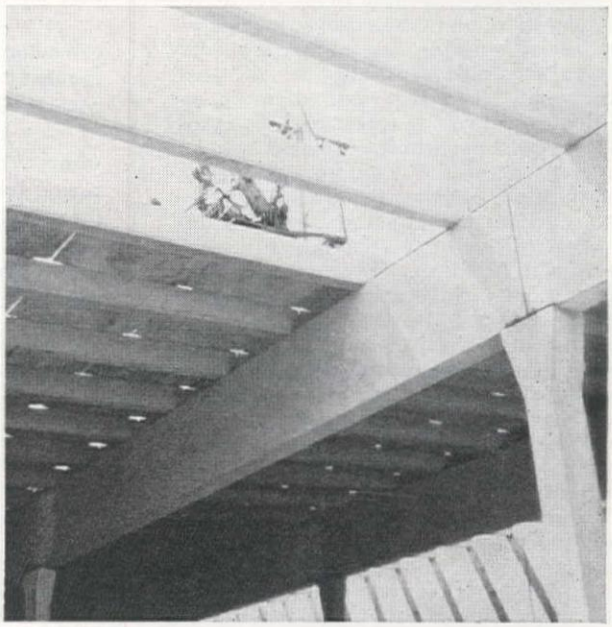
A direction of development

This project well illustrates some of the up-to-date ideas that are influencing precast concrete construction, and indicates one of the directions that its development may follow. Here is an assembly of members ranging in weight from 600-lb. roof slabs to 12-ton wall panel and girders. Elsewhere, heavy bents and walls of twice that weight are being erected. Doubtless both schemes of construction will have their place. Later comparison of the development of these techniques will be instructive to designers and builders of precast concrete structures.

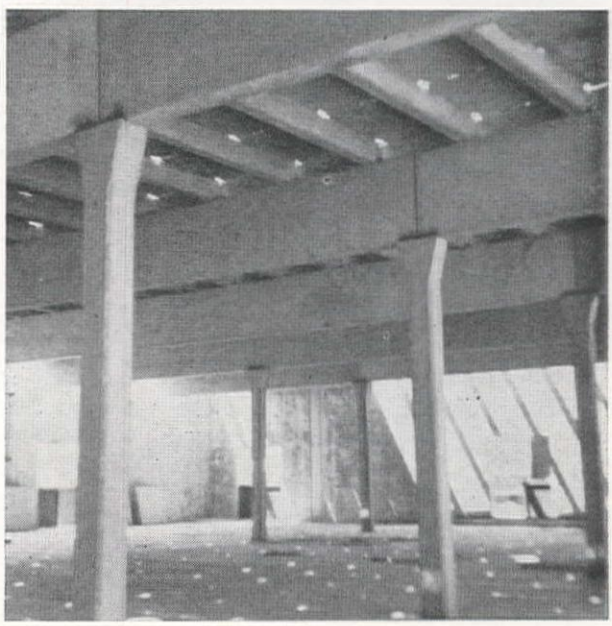


EXTERIOR COLUMNS. Note shoulders for wall panels and seats for girders 4 ft. deep and 1 ft. wide. Broad footings, when combined with cast-in-place floor slab, provide good lateral force resistance.

DETAIL of interior footing shows column base plate bolted and dry-packed in position.



LAYING 5 x 5-ft. roof slabs, 2¾ in. thick, using traveler working from roof. Beams span 20 ft. between girders, which rest on columns spread at 40 ft.



STRUCTURAL work completed, the assembly is ready for gunite at roof joints and tops of walls.

Usual types of aggregate not available, so—

Oregon uses local cinders in hot mix

RATHER THAN IMPORT the more usual rock for a 28-mi. resurfacing project in the semi-arid and sparsely populated area west of Bend, the Oregon State Highway Commission is utilizing a native volcanic cinder as aggregate for a plant-mixed asphaltic concrete.

Marking the first time the cinders have been used on a large scale for a major resurfacing job in Oregon, the project, which includes shoulder rehabilitation, preliminary patching, application of a 4-in. asphaltic concrete mat, and seal coat, is being carried out as a joint venture by Babler Bros. and Rogers Construction Co., Portland, on a $591,810 contract. The job is scheduled to be completed Oct. 31.

Previous use

In the area around Bend where the volcanic cinders are the only native material suitable for aggregate, they have been used with penetration asphalt in small patching and maintenance operations by state forces for some time. During the past three years their use has increased and they now form the aggregate in penetration asphalt work in the state's contract maintenance projects.

One of the longest sections of heavily traveled highway where cinders have been used with penetration asphalt is on Oregon U. S. 97 north of Klamath Falls. Here they have proved to be highly satisfactory and to possess good wearing qualities under the abrasive action of heavy traffic. The only previous use of the cinders in a plant mix was a small street surfacing job in Redmond, Ore., where 5,000 tons of material was used.

Due to their porosity and the amount of moisture they often contain, the cinders have not proved satisfactory with the portable mixing plants Oregon uses in its maintenance work. (Oregon's portable plants were reviewed in *Western Construction*, June 1951.) At times the material has a high moisture content and the small heating drums cannot handle it sufficiently fast to maintain an economical rate of production. In penetration work the amount of asphalt required with the cinder aggregate is comparable to that required by rock aggregate. However, when used in a hot mix the amount of asphalt required is greater due to the vesicular structure of the cinders that in effect soak up or absorb the bitumen.

Cinder descriptions and tests

Entirely volcanic in origin, the cinder material is classified as a volcanic scoria, is red in color and has a specific gravity of 2.63. Tests for abrasion loss with the Los Angeles Rattler show a rating of 38.1. However, structurally the material is very sound and although the usual testing procedure for hardness with the Rattler shows the cinders to be of inferior quality when compared to ordinary rock, such abrasion tests are not entirely conclusive due to the highly vesicular nature of the material.

Pit run cinder material has a loose weight of 54.0 lb. per cu. ft. In the testing laboratory cinders were crushed to ¾ in., and the ¾ to ¼ in. material was found to have a loose weight of 58 lb. per cu. ft. The ¼-in. to zero material has a loose weight of 65 lb. per cu. ft. Cinder aggregates combined in a "B" mix (Oregon Standard Specification) had a loose weight of 75 lb. per cu. ft. This figure compared with a loose weight of 105 to 115 lb. per cu. ft. of ordinary rock combined as aggregate in a "B" mix. Further tests of a compacted mix showed the cinders to have a weight of 92 lb. per cu. ft. with 14.5% of asphalt added. (Specification and analysis of cinders appear in accompanying tables.)

BECAUSE INTEREST in the economies of engineering and construction seems to be approaching the stage of a lost art, it is particularly refreshing to review a project where planning and ingenuity have cut costs in Oregon. When usual types of aggregate were not available within economic haul for a long surfacing job near Bend, engineers of the state highway department took the local supply of volcanic cinders and adapted it to effective use in a hot asphaltic mix.—Editor.

Cost comparison favorable

Although an average of 16% asphalt is being used on the job, the overall costs compare favorably with a mix using standard rock. This is due to the fact that by weight the mix containing cinders may be spread over a 50% greater area. The in-place cost of the cinder mix has been averaging $8.69 per ton. This, due to the 50% increase in spread, compares to $5.78 when ordinary rock is used.

A total of 46,800 tons of mixed material is being used for the current project with 5,000 tons used for preliminary patching, 39,800 tons applied in two lifts, and 2,000 tons in a seal coat. Due to the uncertainty of the amount of asphalt that would be used this item was let on a separate bid. The job is expected to require about 7,600 tons of 86-100 penetration asphalt, paving grade, and 330 tons of RC1 or RC2 for the seal coat.

In addition to providing a suitable wearing surface it is believed that due to the porosity and cellular structure of the cinders a certain amount of insulation to the sub-base will be provided and the thermal character of the aggregates will maintain, or to a degree equalize, the thawing action of center and outer sections of the sub-base beneath the road surface.

The road being surfaced was constructed some years ago to link Bend with eastern Oregon and was not designed for its present use. Traffic, particularly heavy trucks, has increased during the past two or three years, and the road has undergone the effects of two severe winters. Traversing open country the road is usually heavily blanketed with snow during the winter months. When opened for traffic the snowplows clear a lane and pile the snow along the outer edges of the road.

This snowbank on the edge of the road has a tendency to keep the sub-base beneath the edges of the road in a frozen condition, while the sub-base under the portion that has been cleared starts thawing as soon as the temperature rises or the warm sun starts a thermal action on the road surface. Due to this thawing in the center section, the sub-base softens and the surface loses adequate support. Following the past two severe winters, shortly after such a period of thaw, the center section of the roadway has broken down and chuckholes have appeared in the surface.

Stripping at the pit

The main source of the cinders for the surfacing project is a pit near the top of a small hill located about the center of the project and about 2½ mi. north of the highway. The 43,000 cu. yd. of cinders used in the shoulder rehabilitation work were extracted from a smaller pit a short distance to the east of the main pit. Using only a dozer the contractor constructed an access road from the highway to the pit area and applied some of the first material mixed to provide a suitable surface.

As the material was being stripped from the top of a hill, the contractor took advantage of the slope and established his screening plant at a lower elevation than the pit and the mixing plant at a still lower elevation. This enabled him to move material from pit to screening plant and from screening plant to mixing plant with dozers and thus eliminate the need for a conveyor system.

As the cinders are generally soft in the pit, the stripping with tractor and scraper could be used to remove them without difficulty. Pit run material resembled a fine gravel with only a few larger chunks. In some small areas of the pit a crust of white cinders required a limited amount of ripper work to loosen it for wasting. One tractor and scraper unit working in the pit was sufficient to maintain production.

Due to the looseness of the pit run material, no pusher tractor was needed

to assist the scraper unit. After loading, the tractor and scraper have a relatively short haul to the edge of the pit, and to the hopper that fed the screening plant. The pit unit would dump its load near the hopper and another dozer would carry out the operation of feeding the plant.

Screening

Due to the fact that the material in the pit ran small in size only a small amount of screening was necessary to prepare a specification product. The majority of the pit run cinders was ¼ in. to No. 10, with a small percentage of ¾ in., and a meager amount of oversize.

The plant was set on a level area about 20 ft. below the level of the pit. Material falling into the hopper at the edge of the pit would be picked up at the bottom of the hopper and carried by conveyor to the first screen, a 3½-in. mesh, that removed oversize. There was no primary crushing. Material passing the first screen was carried by a conveyor to another section of the plant, where it passed through a double-deck screen.

Aggregate specifications:

Size	Per cent
¾ to ¼	26-38
¼ to #10	22-30
#10 to #200	25-35
Passing	4-7

Granulometric analysis of asphaltic mixture:

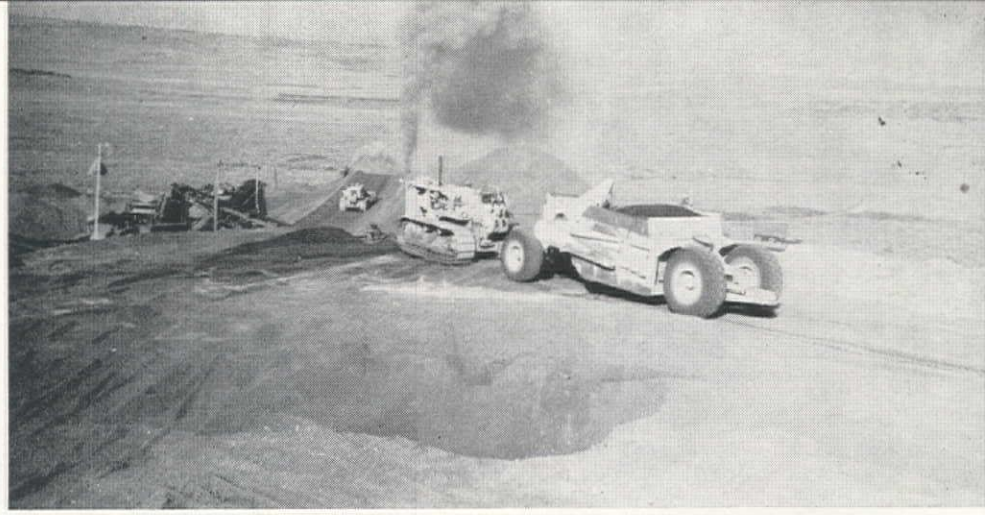
Retained	Per cent single sieve
¾	0
½	5.8
¼	23.7
#10	25.7
#200	22.1
Past 200	5.9
Bitumen	16.8

Pit run analysis:

Retained	Per cent
2½	0
2	2.8
1½	10.2
1	13
¾	5.4
½	8.8
¼	22.4
10	27.2
40	4.4
Past 40	5.8

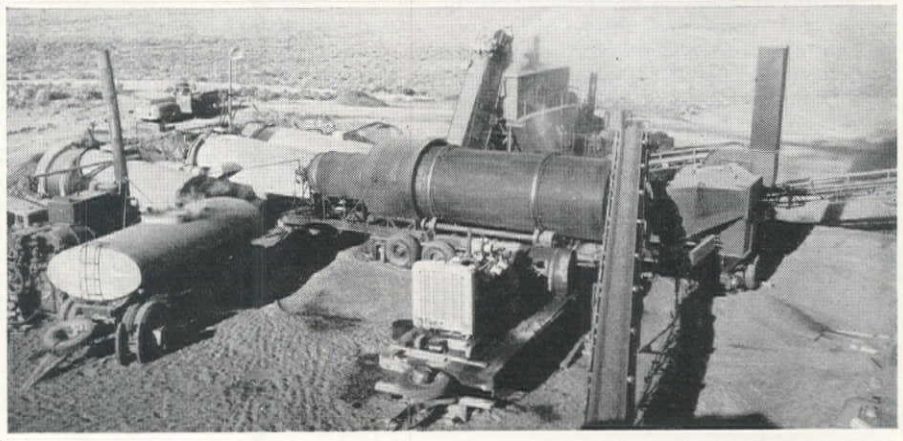
The top deck of this screen was divided in two sections with half having ⅞-in. mesh and half having ½-in. mesh. Material retained by the top deck was routed to a roll crusher. From the crusher the material was carried by conveyor to the base of the conveyor that received the material passing the first screen, where it was transferred and carried back to the double-deck screen.

Material passing the top deck of the second set of screens fell to a screen with a ⅜-in. mesh. Cinders retained by this screen passed directly to the finish storage surge. That which passed the second deck was conveyed to a sizer for additional screening and removal of the excess fines. Usable material was carried



STRIPPING CINDERS from hill-top pit by tractor and scraper was easy with screening plant at lower elevation (top of plant may be seen at far left). Tractor at left background is dozing screened material to mixing plant hopper.

NO PRIMARY CRUSHING was required in preparing cinders for mixing in portable screening plant (below). Small crusher at left had an easy job breaking up small amount of oversize.



PORTABLE MIXING PLANT (above) has re-screening unit between hot elevator and bins for three sizes of aggregate. This feature aided in removing excess fines. Overhead chute, on opposite side of plant, permitted rapid truck loading.

TRUCK AND PAVER move as a unit during paving operations (below). This method permitted paving an average of 2½ mi. of single lane per day.

from the sizer to the conveyor that led to the finish storage surge and unusable or fines were conveyed to their individual storage pile, where they were held until needed for use in the seal coat.

Mixing

A Pioneer continuous mix Model 101 hot plant was set up about 200 ft. from the screening plant and at a level 50 ft. lower in elevation. This location permitted use of a dozer to move material from the finish storage surge at the screening plant to the mixing plant feed hopper. The hopper for the mixing plant was set at a slightly lower elevation than the surge and gave the dozer a down-hill grade when moving material. A reclaiming tunnel was established under the hopper and the plant's rotating heating drum was fed by a conveyor that led into the tunnel. Drying required 1¾ gal. of fuel oil for each ton of aggregate.

From the drying drum material was taken by hot elevator to a tri-sectional rescreening plant located above bins that set over the plant's mixing unit. Material was rescreened in three sizes, ¾ to ¼ in., ¼ in. to No. 10, and minus No. 10, and stored in individual bins ready for mixing. The plant was equipped with facilities for wasting a certain size if the bin was full. This feature also permitted removal of excess fines. Amount of aggregates in the three bins was indicated by three lights on a panel board at the operator's station. Three lights for each bin indicated whether the bin was empty, normal, or full.

In production this plant averaged about 100 tons per hour of mixed material. The top day in production was 1,046 tons in about 8 hr. This figure is equivalent to the production of a plant producing about 40% more mix containing the more usual rock as aggregate. In mixing with 16% of asphalt the plant used roughly 45,000 gal. of asphalt per day. This represented about eight truck and trailer units of 5,600 gal. each, or about 22 tons each. Asphalt was hauled from Portland, about 240 mi.

Temperature

During the early stages of the job it was discovered that the heated mix had certain qualities that caused it to stick to the roller. The corrective measure was to mix material at the lowest temperature at which proper placing on the road could be made, and postpone rolling until placed material had become cooler. Temperature of mix from the plant is 285 deg. F. Loss in temperature, plant to paver, is about 10 deg., depending on distance hauled.

Trucks are covered immediately after loading to enable transporting the material to the placing site at the lowest possible mixing temperature.

In practice trucks receive their load from the hot plant and travel about 50 ft. to the scale for weighing. While being weighed the driver unrolls the canvas and covers the load. The canvas cover is attached to the front end of the truck's dump bed and has a weight attached to the other, or free end. This enables the operator to roll cover back of the cab to receive the load and easily drop it over the load when at the scale house.

PAUSING momentarily during paving operations are James Fulston (left), superintendent for Babler and Rogers, Earl Daniels (on machine), paver operator, and James Fulston, Jr.

As the contract calls for payment to be made according to the tonnage of material placed on the road the state's forces maintain a constant check of the weights hauled. Drivers are given a weight slip at the scale house and when dumping their load into the hopper of the paving machine another state employee takes the weight ticket and issues a receipt showing the amount the truck transported.

Road operation

Prior to commencing surfacing operation the contractor built up shoulders on 21 mi. of the project. In carrying out this operation bottom-dump units, loaded by ¾-yd. shovels, were used. The bottom-dump units would drop their load along the edge of the road and the existing shoulder and a blade would push the material off the roadway and form the shoulder grade. About 43,000 cu. yd. of material was used for the shoulder work.

Preliminary patching

Patching operations to fill chuck holes and generally level rough areas were carried out with a paving machine before work started on laying the surface mat. The contractor took advantage of a tilt trailer that permitted the paving machine to be quickly loaded and unloaded. In operation the trailer and paver would arrive at an area to be patched, the trailer would be tipped and the paver would move off under its own power to carry out the patching work. As the paver approached the end of the patch area the trailer would be set in position, tilted, and as the paver finished the patch it would keep moving ahead and up on the trailer. Patching was generally in sections from 200 to 1,000 ft. in length and required a total of 5,000 tons of mixed material.

The asphaltic concrete mat was placed in two lifts with the first lift 2 in. thick and the second lift of 1½ in. A compaction of ¾ in. was allowed for the first lift and ½ in. for the second lift. The percentage of fines in the top lift was increased slightly as a means of making the final product less open in texture. The procedure was to make one pass over one-half of the roadway in a single direction during one day, then return and make a pass over the remaining half the following day. The first lift was laid over the entire job before the second lift was started. In operation daily production averaged about 2½ mi. of single lane per day. When placing the 2-in. lift a ton of material could be spread about 15½ sq. yd. Using an aggregate such as basalt the spread would be about 9 sq. yd. per ton.

Rolling

Two rollers, a 3-ton and a 12-ton tandem unit, were used for the rolling operation. Due to the adhering qualities of the heated mix it was found necessary during the heat of the day to wait about 4 hr. before placing the 3-ton roller on the newly placed mat. In the morning or early evening a wait of about 2 hr. was sufficient. The usual practice was to start the 3-ton roller about 3 to 4 hr. behind the paver and to continue rolling until finished with the strip paved, about 7:30 to 8 p. m.

The following morning the 12-ton unit would begin work on the section of the mat placed the previous day. The 3-ton roller generally made three passes and the 12-ton roller made sufficient passes to remove all wrinkles and carry out final compaction. It was discovered that it was very important to keep ample water on the rollers during these operations. During the early rolling it was also found that if the oil content was low the mix would be mealy and have a tendency to cake and be picked up by traffic, as well as be difficult to roll. By keeping the sand content low and the asphalt percentage high such difficulties were eliminated.

Due to the open texture of the mix used a seal coat was deemed necessary. Using the ¼ in. to No. 10 fines removed during the screening operations and RC1 or RC2 the seal coat was placed according to standard techniques of spreading the oil with distributor and applying the fine aggregates with a spreader box attached to a dump truck. The final operation in placing the seal coat was brushing with a mechanical broom fixed to the end of an upraised dump truck body. The pressure of the broom on the roadway was regulated by the position of the dump bed.

Crew and equipment

For the shoulder work two shovel operators, three bottom-dump haul unit operators and one blade operator were required. In the general operation the contractor used three tractor operators for pit and material handling work, two screening plant operators, two foremen and three operators at the hot plant, 8 to 15 truck drivers, paving machine operator and platform man, and two rakers and a shovel handler. For con-

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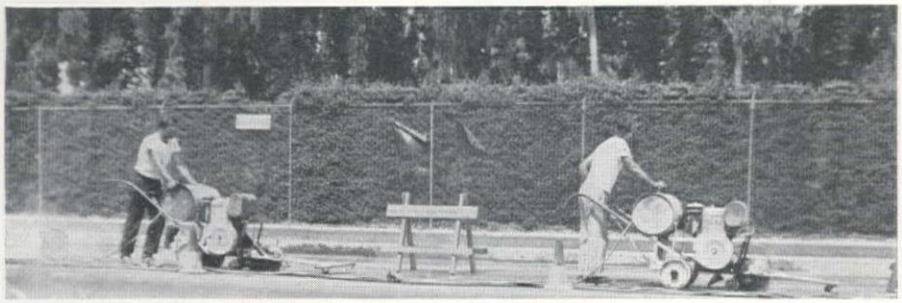


SAW CUTTING for better pavement patching

THE USE of the concrete saw for cutting the top edges of openings in pavements has developed so rapidly in the last few years that a new idea of standard practice has developed. It is being generally applied in the opening of portland cement concrete pavement and is also commonly employed in cutting asphaltic concrete.

Several types of machines are in use by city departments, utility companies and contractors, including such makes as Concut, Cutcrete, Clipper, Tri-line and Felker. A pavement cut for a trench opening is usually 1½ to 2 in. deep and is made by a power-driven disk blade having a rim which contains fine particles of diamonds.

Saw-cutting produces clean outlines, eliminates unsightly and irregular patches prone to feathering and spalling, improves the quality of replacements, and reduces maintenance costs on patched pavements. Yet the modern methods and equipment available are such that these advantages may be had at reasonable cost, and in fact for many types of work they may be had with real economy.

Economy . . . and the public

In reviewing the trend of practice in the Los Angeles metropolitan area, it is probable that both economy and good public relations have influenced the Southern California Gas Company in adopting saw-cutting as standard procedure. A large part of the work of this company involves pavement openings for small diameter pipe lines, and with saw-cutting much of this work is done in trenches of 9- to 12-in. width. The aggregate of many such openings of minimum width and minimum cost of replacement results in a real economy.

Some require it

Many cities in Southern California, as well as the unincorporated area of Los Angeles County, have in effect, required the use of saw-cutting in opening pavements. The City of San Bernardino has required it by ordinance when openings longer than 25 ft. are made. The engineering departments of Long Beach and Pasadena issue permits based on the use of saw-cutting. El Monte, Whittier, Beverly Hills and other cities are making general use of the method.

In Long Beach, the municipally-owned utilities, the Water and Gas Departments, each have saw-cutting machines and use them for all pavement cutting. The Water Department, which has been using the saw-cut for 4 or 5 years, also owns its own pavement breaker and rooter.

The usual procedure for pavement opening is to saw-cut the outline of the opening to the necessary depth, considered to be about ¼ the slab thickness. A pavement breaker follows, operating within the saw-cut outlines. On trench work, a rooter attached to a bulldozer blade tears out and piles broken material which may then be handled by a skip-loader for removal.

Users of the method have estimated the production of a typical sawing machine at 250 to 300 trench feet per day. This is equivalent to 500 to 600 lin. ft. of saw-cut. Wear on the blades and their life before replacement is, of course, one of the important items of cost. A user of the machines has commented that blades will cut faster and last longer in cutting dense, strong concrete, than working in weak concrete which is not of uniform quality.

Manufacturers of sawing machines are developing new units which will aid in economical use of saw-cutting. A new machine is in use which is self-propelled and has control features not available in older types. Such a machine will materially increase production on the job. One firm has brought out a new dual-blade model which will speed up large jobs and trench sawing. These and other makers produce both large and small machines. The small models are being used in growing amount for such work as the sawing of contraction joints in floors. Some large construction companies have adopted the practice of laying floor slabs in large panels and sawing intermediate contraction joints on the following day.

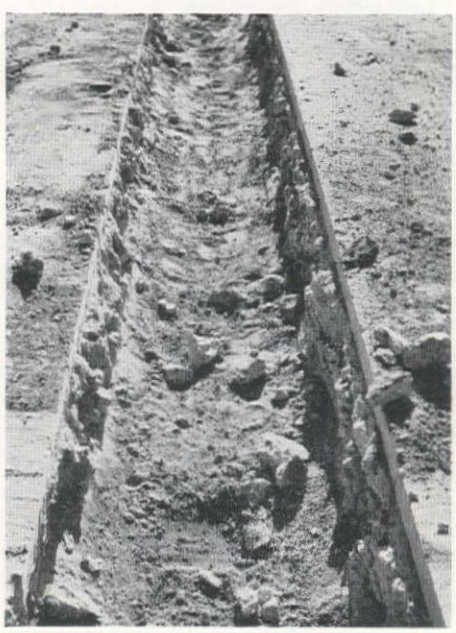
A promising field

Floor slab sawing for contraction joints seems to be one of the fields promising rapid development. Cutting such joints in roads, streets and airfield pavements holds unlimited possibilities for development as the economy of sawing is improved as may be anticipated. Other appropriate uses of the method include reconstruction such as widening and trimming old joints and outlining cuts for repairs, sawing for the installation of signals, conduit, pipes, etc., grooving ramps and steps as safety measures, and many other operations which may be better controlled or executed with the aid of sawing.

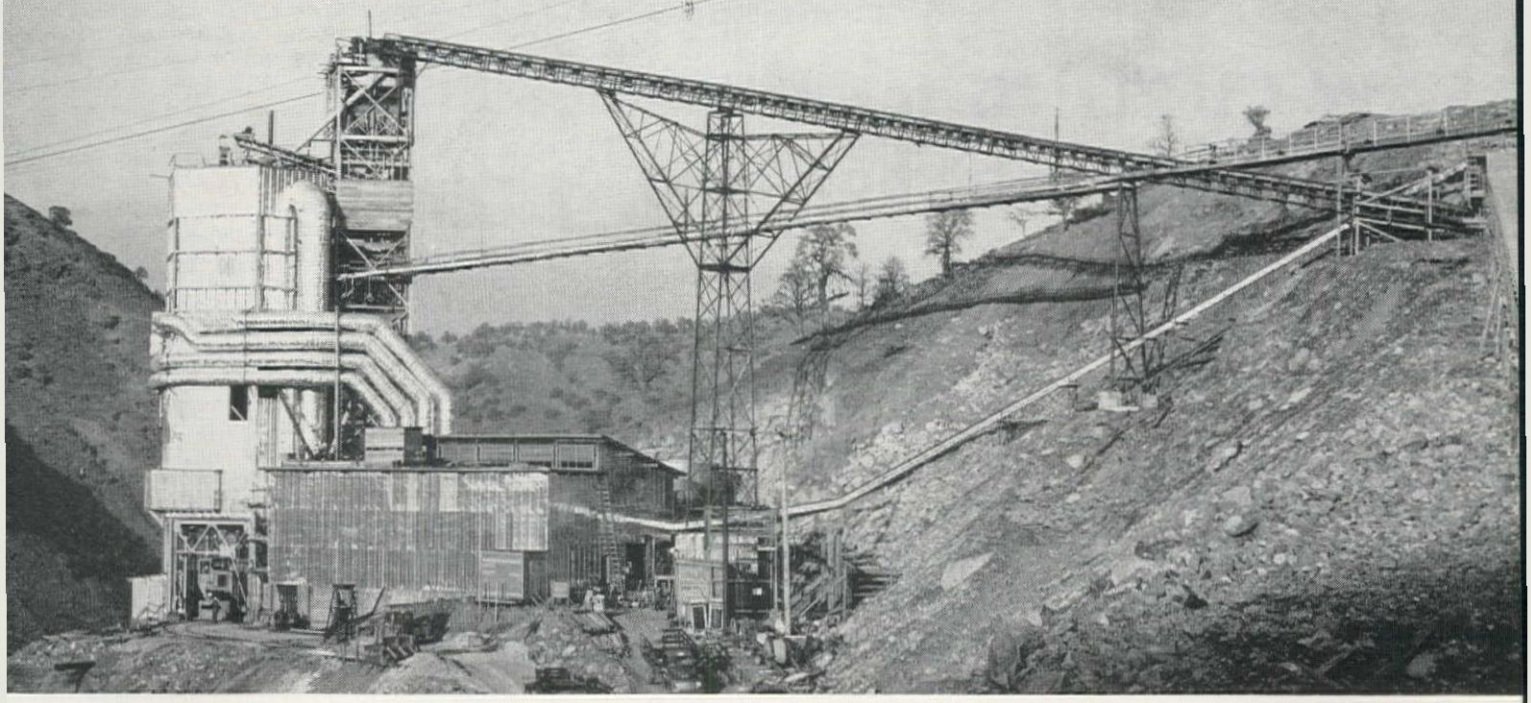
LEFT—A backfilled trench in black-top pavement on concrete base. Top has been trimmed by saw for final replacement.

CENTER—Ability of saws to cut trench lines on curve increases their usefulness.

RIGHT—Note clean outlines of saw-cut trench. Broken material has been removed.



Accuracy and speed at the Pine Flat batching plant



Weighing aggregate for Corps of Engineers project calls for 5,000,000 individual scale operations in a plant designed for 2,500 cu. yd. of concrete in 8 hr. — Batcher operation provides photo-electric cell control into weighing hoppers and printed record of the batch — Six mixes can be pre-set by operator

ACCURACY AND SPEED are the two major requirements for a modern, large-size batching plant—accuracy for the engineer, and speed for the contractor. At Pine Flat Dam the materials in the 2,200,000 cu. yd. of concrete are going through a batching plant designed for an output of 2,500 cu. yd. in eight hours which will involve about 5,000,000 individual scale operations during the course of the job. This batching plant was designed and built for Pine Flat Contractors by the Noble Company. The project is being built by the Corps of Engineers on the Kings River, about 23 miles northeast of Fresno, Calif. The September 1951 issue of *Western Construction* (pages 71-75) presented a comprehensive review of the aggregate production and preparation from the gravel pit through three screening plants to the aggregate bins at the batching-mixing plant.

Some items from the specs

The basic engineering requirements for the batching of ingredients for mass concrete provide for weighing these separate parts with accuracies of from 1% for cement and water to a possible 3% tolerance for the cobble size of aggregate. This may involve as many as eight separate scale operations for each batch—at Pine Flat there are five sizes of aggregate, cement, water and ice to be weighed. Next, the engineer wants these ingredients delivered into the mixer in a manner and with a sequence which will insure proper mixing in the required time. Lastly, on most of the major concrete dam jobs since the days of Hoover Dam, the engineer also demands some form of permanent record which will show the weights of material making up each batch. To these major requirements are usually added such minor details as specifying that provision must be made so that the type of mix may be pre-set on the batcher, as well as provision for the extreme possibility that any one weighing may have to be adjusted up or down while in the weighing hopper. These and other requirements of the engineer are established for those concerned with building a batching plant.

PICTURED ABOVE—

AGGREGATE MOVES to the batching plant and mixing plant over the top conveyor and the coarse sizes are re-screened for proper size before going into the bins. Cement moves pneumatically along the horizontal bridge. From the refrigerating plant cold air moves through the large pipes to cool the aggregate in the bins.

Then, the contractor adds requirements which relate principally to the speed of batching and the reliability of equipment which must carry on millions of repetitions under close tolerances. Any delays in the functioning of a batching plant are extremely important on a large size job.

Weighing

As an indication of the speed with which aggregate must be weighed in a modern batching plant to keep the mixers turning steadily, the batcher at Pine Flat weighs out approximately 4,300 lb. of cobble size aggregate in three to four seconds, and with a 3% tolerance in weight. Push button control which requires only one man to operate the plant, and inter-locking devices to insure against dumping any batch which has been incorrectly weighed, are further requirements of a contractor.

These demands of the engineer and the contractor have been met with the

present plant designed with a capacity to turn out 2,500 cu. yd. of weighed materials in an eight hour shift.

Each bin of aggregate discharges into a separate weighing hopper where the action of a beam scale provides the simplest and most accurate method of balancing the load of aggregate in the hopper against a known weight. During this weighing operation there is no mechanical connection between the scale and any control. The cut-off and final dribble feed are controlled exclusively by photo-electric cells. As weighed to the pre-determined amount, each separate element of the batch records visually on the panel before the operator. These visual indicators, which come promptly to the zero reading, permit the operator to check at a glance the final weighing of all ingredients. Any lag in these indicators provides a quick means of determining any drag which has developed in the weighing procedure.

Completion of these weighing operations for the eight separate ingredients consumes 4 to 7 sec. from the time the operator starts the cycle, having dumped the previous batch into the mixer. As the last of the eight scales reaches the zero position it closes a circuit to the printing mechanism which stamps the weights of the eight materials in pounds on a record sheet. The printed record also includes the type of mix, the time, and batch number on the permanent record.

The printing of these weights requires a brief explanation. At Hoover Dam, for the first time, the specifications required a permanent record of the materials in each batch of concrete. The plant on the job, and most of the batchers on succeeding larger dams, provided a series of pens which ruled lines on graph paper to record the weights. This procedure supplied an acceptable record but involved two major difficulties: (1) the reading of the inked lines was difficult, and (2) any vibration in the plant tended to introduce inaccuracies in the graph. For the first time on the Pine Flat job the record of all weights is actually printed rather than inked.

As indicated, all of these separate materials are weighed and held ready to go into the charging hopper when released by the operator with the pressure of a button. Original plans called for the simultaneous dumping of all ingredients. Careful inspection of the mixing operation indicated that an improvement would be made in the mix if the ingredients entered the mixer in a delaying sequence. As a result, a timing mechanism was designed by the batcher manufacturer and installed. With this, delays of fractions of a second are provided in the release of the materials, starting with the water. The entire delay in the opening of the bins consumes a total of from 3 to 4 sec.

Several variations in the dumping sequence have been used, depending on the condition of the aggregate and other factors. One of these provides the following times:

Water	0 sec.
Cobbles	1 "
1½ to 3 in.	1½ "
Sand	2 "
Cement, ice and ¾ in.	3½ "
1½ in.	4 "

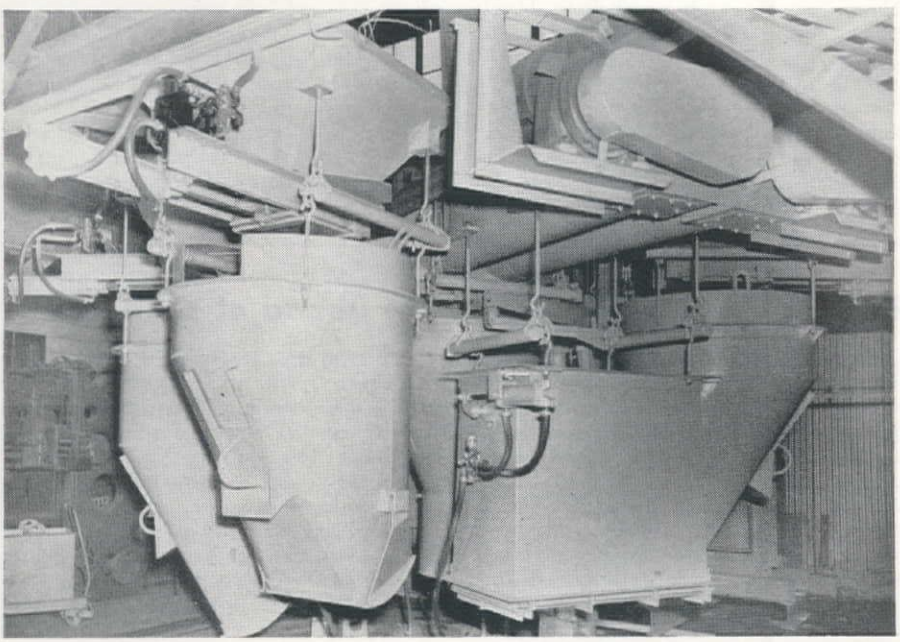
Lowest slump practicable

The mix used at the present time for the regular mass interior concrete contains 2.25 sacks of cement per cubic yard. It places quite satisfactorily with a water-cement ratio of 8.5 gal. per sack.

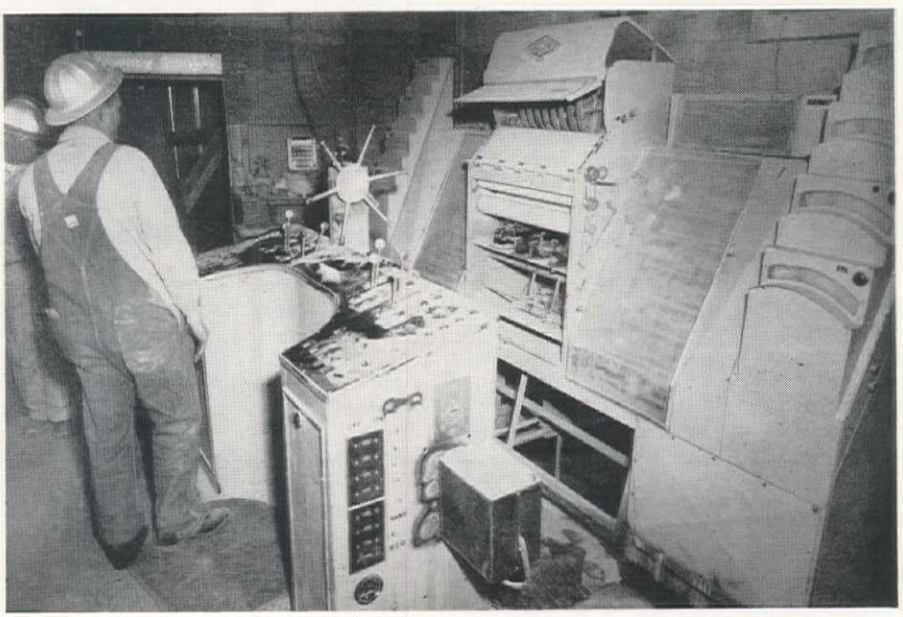
Corps of Engineers personnel in charge of concrete operations are observing the suitability of a 2.00-sack mix with a water-cement ratio of 9.6 gal. per sack. Based on a limited experience with this mix, the preliminary indications are that it, too, will be satisfactory until the winter concreting season arrives.

Slump is not fixed by the specifications, but their intent is to provide that concrete will be placed at the lowest slump practicable. At present the placing slump is running 1½ to 2 in.

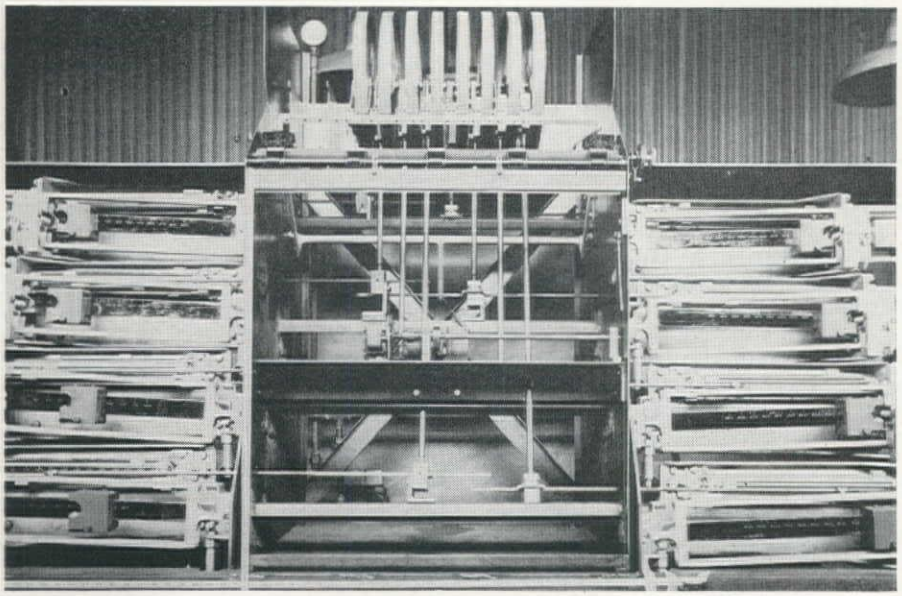
At the re-screens located over the storage bins on the top floor of the plant, rinsing sprays are provided and the coarse aggregates normally carry the customary small amount of surface moisture. During a week-end or holiday



ARRANGEMENT of the weighing hoppers is indicated in this shop pre-assembly view (above). During the weighing there is no mechanical connection between the scale and any controls — the cut-off is controlled entirely by photo-electric cell.



IN THE PLANT the operator has all controls for weighing and dumping (right). The spoked-selector beyond the control table enables the pre-setting of the scales for any one of six different mixes. Printing wheels for recording weights of materials in each batch can be seen under the raised hood. On the near side of the operator's stand is the timer added on the job, which provides delays for dumping the various hoppers into the mixer.



EXPOSED VIEW of eight scale beams with their connections to the printing wheels which record the batch weights. When the mix is changed, arms actuated by hydraulic controls come forward and move the poises to the new settings.

shut-down of the plant this moisture tends to leave the coarse aggregate because of the cold air draft required for cooling. As a result there is a noticeable accumulation of dust in the first batch or two after such a shut-down. This may tend to disturb the consistency of the mix for a very brief period.

Batches are dumped into the charging hopper (not held) and through a spout which rotates to feed each of the four 4-yd. Smith mixers.

Pre-set of the mixes

One of the major problems in the design of this type of batching plant is the provision for changing from one type of concrete mix to another with a minimum of delay. At Pine Flat Dam, as in most of the structures involving large yardage, as many as six different concrete mixes are required. The mix for the mass concrete is changed near the surface of the dam, and is enriched near foundation rock and openings. Some of the mixes for structures eliminate the use of cobbles entirely, and one mix uses the 1½-in. size aggregate as a maximum. The switch from one of these mixes to another must be accomplished by presetting the weights of the aggregate rather than making the scale changes each time. This is in the interest of speed as well as assurance that the proper weights will be secured with each change.

The batcher at Pine Flat provides another innovation at this point. A hydraulic system of controls has been designed into the plant which moves the poise on each of the eight scale beams in accordance with a pre-determined setting.

When the operator is ordered to turn out a different mix, his first action is to select this mix from the six available on a selector. Then, at the pressing of a button, hydraulic arms move into position on the eight scale beams, shifting the poises to the new settings. This involves only about two seconds and the operator is then ready to weigh out the next batch with a completely different group of weights.

The admixture dispenser or batcher is a completely automatic unit. Admixture is batched by volume rather than by weight. The quantity of the admixture desired for each mix is pre-set on the batch selector the same as any one of the aggregates, cement, water, or ice. As the water is weighed, the admixture is measured in the dispenser. When the batch is dumped, the admixture is discharged directly into the water in the water-weigh batcher as the dump cycle is started. Agitation of the water leaving the weigh hopper and dropping directly into the water distributor tank and on through to the mixer thoroughly blends the admixture into the water.

Personnel

Contract for the dam is held by a group of well known Western contractors as a joint venture. The group, known as Pine Flat Contractors, consists of Guy F. Atkinson Company (sponsor); Bressi & Bevanda Constructors, Inc.; Chas. L. Harney, Inc.; J. A. Jones Construction Co., and A. Teichert & Son, Inc.

Earl M. Jennett is project manager for Pine Flat Contractors and George Archibald is project superintendent. Guy Heimsoth is assistant project manager and R. G. Rofelty project engineer. Norman Chonle is superintendent in charge of the batching and mixing plant.

Under the direction of the Sacramento District, Corps of Engineers, the following personnel have been assigned to the construction phase of the dam: Robert Jenkinson, project engineer; C. F. Beattie, assistant project engineer; and W. G. Mitchell, concrete control engineer.

Shadehill Dam completed 15% ahead of schedule

COMPLETION in 85% of scheduled construction time of Shadehill Dam, key structure of the Grand Division of the Missouri River Basin Reclamation project near Lemmon, South Dakota, was announced September 6. The Missouri River Basin project is designed to provide comprehensive conservation for irrigation, hydroelectric power production, flood control, recreation, fish and wildlife protection and other benefits. The water resources of the 10-state area will be developed to furnish irrigation water for approximately five million acres of land in the basin and nearly 2,500,000 kw. of installed hydroelectric generating capacity for farms, homes and industries in the region.

The dam on the Grand River in Perkins County, will furnish reservoir space for 134,000 acre-feet of irrigation water. The reservoir will provide additional space for flood storage in the master plan to bring the Missouri and its tributaries under control.

The rolled earth-fill structure consisting of main dam approximately 1,800 ft. long and 120 ft. high and a dike approximately 11,000 ft. long and 30 ft. high with a total volume for the dam and dike of 3,500,000 cu. yd., was constructed by the S. J. Groves & Sons Co., of Minneapolis, and J. L. McLaughlin, of Great Falls, Montana, on a low bid of $5,116,-796.75. D. M. Forester was the construction engineer for the USBR.

Progress on $445,000,000 Feather River Project

PROGRESS toward construction of Oroville Dam and Reservoir on the Feather River, Calif., has been marked by California Water Project Authority approval of seven steps recommended by the State Engineer as groundwork for the project. Included among the recommendations are application to the Federal Power Commission for license to construct and operate the $445,000,000 project, and entry into negotiations with affected parties for the relocation of or payment for railroad, highway, irrigation and power facilities.

The Feather River Project, to be financed by sale of revenue bonds, provides not only flood control and power benefits in California's Central Valley but also makes possible the diversion of excess conserved waters into arid areas of Southern California more than 400 mi. distant. Key to the scheme is the proposed Oroville Dam, planned as a gravity structure 711 ft. high and 5,700 ft. long, containing 13,800,000 cu. yd. of mass concrete. It will impound 3,500,000 acre-feet of water in a reservoir covering 15,450 acres.

An old highway job in Washington combines—

Asphalt — Wheelbarrows — Henry J.

THIRTY-THREE YEARS AGO one of the first sections of asphalt highway pavement was laid in Washington. The project consisted of 6.7 mi. of 16-ft. two-course, plant-mix bituminous surfacing in Skagit County near Avon. Contract for the $96,475 job was signed by Henry J. Kaiser in 1918, in the name of Kaiser Paving Co. of Portland, Oregon. The following information on this historic highway job was obtained from Lee J. Wright, senior engineer of Skagit County, who has been connected with the Skagit County Road Department for many years.

Plans called for a 5-in. thickness of pavement with a 4-in. crown laid on "a prepared base." The foundation course of 3½-in. thickness, was topped by a 1½-in. surface course, and covered by a seal coat rolled into the surface.

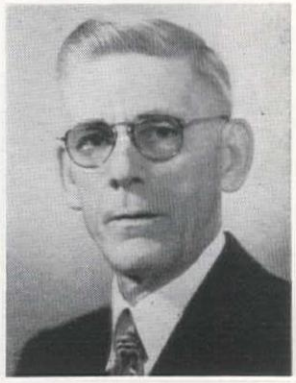
Specifications, according to modern standards, were extremely simple and "loose." For the foundation course they stated that the material was to be "laid hot—between 200 and 300 deg. F.", and was to include "gravel or crushed rock, the largest particle of which shall pass a 3-in. ring, mixed with sand." These dry aggregates were to be preheated together in a rotary heater to a temperature of from 200 to 300 deg., and then "conveyed to a mixer where it shall be thoroughly mixed with a bituminous cement until each particle is coated." That was the entire specification for the foundation course; no specified grading of aggregate sizes, no description whatever of the asphalt or the tentative amount per yard or ton of aggregate.

On the surface course the requirements really got tough, providing both maximum and minimum screening specifications (1½-in. and 200 mesh) and stating that "if there is not enough fines, additional pulverized mineral shall be added." However, this specification gave no indication as to the grading between these limits, and no hint as to how to determine if there are insufficient fines. As to the resulting mix these old specifications stated the materials "shall be combined in such proportions as to secure density or low percentage of voids, and inherent stability or resistance to displacement . . . "

Both courses received the same treatment out on the job, being rolled with a "heavy" roller. Finally, the seal coat was placed, consisting of "approximately ¼ gal. of bitulithic cement, into which shall be incorporated approximately 25 lb. of mineral aggregate not larger than ¼ in." This seal was rolled into the surface course.

Looking back on these old specifications, Mr. Wright commented that it is now evident the local engineer needed only "a thermometer and a beautiful faith in Mr. Kaiser and the asphalt industry."

From the time of completion in 1919 until 1941 this section of pavement received only ordinary maintenance and some special patching. This special work was a result of fire burning in the peat subgrade which resulted in dropping the surface from one to three feet. Throughout its length natural subsidence created a roller-coaster condition in the surface. In one 2-mi. section the edges settled enough to produce a 10- to 12-in. crown.



INFORMATION for this historical sketch was prepared by LEE J. WRIGHT, senior engineer employed by Skagit County Engineer Hjalmar Walberg. Mr. Wright has been connected with the Skagit County road department for many years, and previously served as County Engineer.

In 1941 these center two miles were completely covered with a 2-ft. depth of gravel. About 1946 the southerly two miles was levelled and resurfaced with bituminous lifts. The northerly end still remains as originally laid (see illustration) and is in fair condition. There is no present intention of resurfacing this stretch.

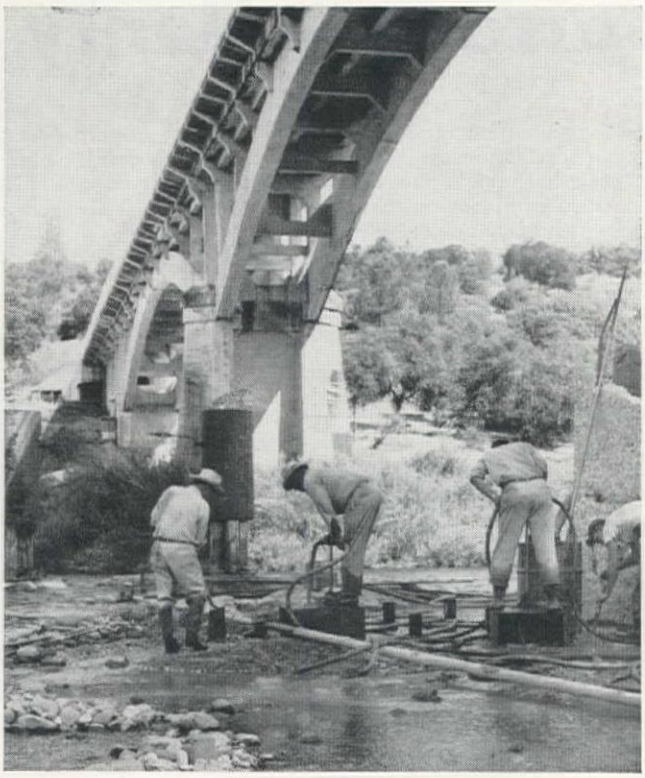
Of particular historic interest is the report from those familiar with the original contract operations that Henry J. Kaiser originated the use of pneumatic tires for wheelbarrows on this job. As Mr. Wright expresses it, "On this job Henry Kaiser made his first bid for fame by putting a rubber tire on the lowly wheelbarrow. Since that time he has done several other outstanding things, but the rubber tire for the wheelbarrow is a lot of glory for any one man."

Principal Quantities

Clear and grub	(acres)	33
Common excavation	(cu. yd.)	14,828
Culvert pipe	(lin. ft.)	160
Drain tile (6-in.)	(lin. ft.)	700
Timber bridges	(M. ft. b.m.	20
Portland cement concrete	(cu. yd.)	45
Bitulithic pavement	(sq. yd.)	64,203
Total bid price		$96,475

TODAY'S TEXTURE of the surface course which was laid 1½ in. thick and "proportioned to secure maximum density."

AFTER 33 YEARS sections of the 16-ft. asphalt highway in Skagit County are in service with no immediate plans for resurfacing.



These men are jetting fines out of riverbed gravels around piers of a 32-year-old bridge. Remaining material will be stabilized with intruded grout to a depth of 35 ft. and 4 ft. thick around each pier as . . .

Prepakt protects old bridge piers

HYDRAULIC MINING near Timbuctoo almost 100 years ago has resulted in a problem today for engineers of California's Division of Highways. Just a mile downstream from the Yuba County ghost town, and 15 mi. east of Marysville, the Yuba River channel has been flushed of hydraulic mining debris at an accelerated rate during recent years, threatening stability of the State Highway 20 bridge at Parks Bar. Grouting of river bed gravels around the bridge piers is being performed by crews of Intrusion-Prepakt, Inc., to reduce scour and prevent exposure of bridge foundation piling.

Threat develops

The bridge itself is a 4-span Thomas arch structure, built in 1913, and estimated by Bridge Department engineers to have a remaining useful life of 25 years under foreseeable traffic conditions. Its original foundation design called for spread footings to be poured inside three octagonal concrete caissons that had been jetted into the river bottom. However, instability of the river channel at that time, choked as it still was with debris from early California hydraulic mining operations, dictated a change in design. As built, the bridge rests on concrete-encased clusters of 32 wooden piles that were driven inside each of the caissons. Records show these piles to be 35 ft. long and the caissons to be 15 ft. deep, though the latter are thought in actuality to be somewhat deeper.

Threat countered

Through the years, degradation of the river channel has exposed these caissons and permitted their deterioration. An average of 20 ft. of gravels has been washed away since 1913, 9 ft. of this since 1940, and the caissons, never intended as structural features, are fast breaking up and ceasing to function in preventing scour. Eventual threat to the bridge looms in these two possibilities, (1) that continued degradation would remove a source of lateral support from the piers, or (2) that such degradation would ultimately permit abrasive destruction of pier piling. Preventative measures now in progress will duplicate the existing caissons in function by providing supplementary caissons of grouted gravel 35 ft. deep and 4 ft. thick around each pier.

Two of three piers are being encased during the low-stage months of August and September this year. At this location the meandering river has currently aggraded around the third pier, which will await a later season for treatment as may become necessary.

The scheme

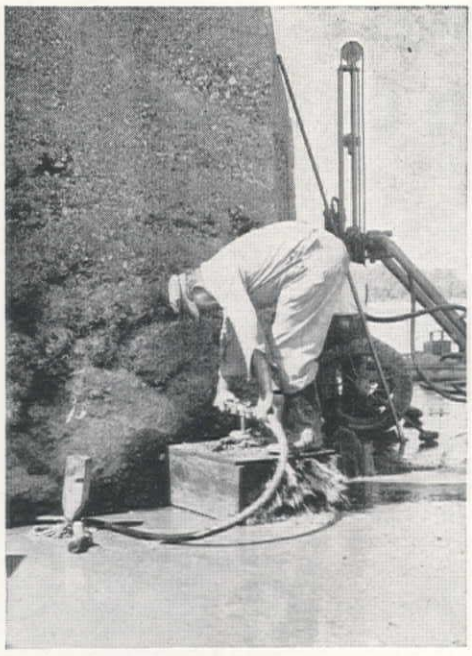
The first item of work in August was to bulldoze river bed gravels up to water surface elevation at the two work sites and provide a dry access route from the camp location on the left bank. This material was stabilized for a working platform around each pier by random grouting. Briefly outlined, the scheme of further work is as follows: (1) drill through the grout cap, using wagon drills to establish a 100-ft. perimeter of 3-in. holes at 3-ft. centers in a "teardrop" streamlined pattern around each pier, (2) jet a 5-ft. lift below this cap free of fines, and (3) grout a 3-ft. lift below this cap to achieve a solid concrete mass extending 4 ft. from the existing caisson. Repetition of these steps through about 12 complete cycles is intended to reach the specified ultimate depth of 35 ft.

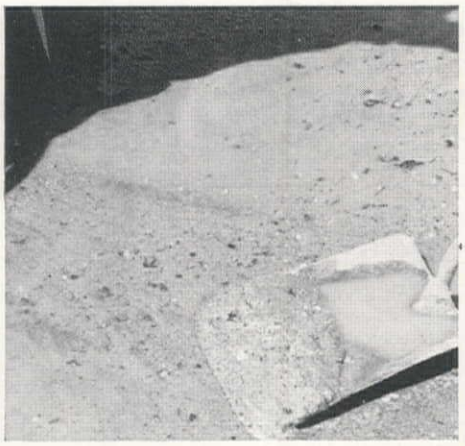
Holes drilled

Each existing octagonal caisson has two elongated sides to provide a measure of streamlining. Drill holes are approximately 1 ft. from the caisson along its sides and upstream end. Downstream, however, the line of drill holes tapers off to a point about 8 ft. away. Two wagon drills operate to cut through each preceding lift of hardened concrete, averaging about 2 min. per ft. drilled. Occasionally it is necessary to recall a drill to break up large cobbles encountered during the jetting operation which follows.

The jet used employs both air and water, which enter the jet pipe at a T-connection fitted with valves for separate control of the two components. In practice the operator uses the air and water singly or together as he forces the pipe gradually down to a depth of at least 5 ft. below the last lift of grouted gravels. Over a period of about an hour several such vertical cycles result in discharge around the jet pipe of clear, unburdened water. Early jetting was faster, but fine clay has occurred below 8 ft. (see illustrations).

Theory of the jet operation considers effects of hydrostatic pressure exerted by underflowing river waters in the jetted area. Air and water injected at 100 psi. return to the surface immediately with an initial load of fines, following





LEFT—Jetting follows wagon drill in preparing next lift of gravels for grouting.

ABOVE—Jetted material ranges from fine clay to ¼-in. gravel, is mostly sand as shown here.

RIGHT—Seen from bridge deck, downstream teardrop pattern of plugged grout holes is apparent. Cloud of fine material in deep water (top) shows effect of jetting.

which the water is cut off temporarily. The air is continued, however, and bubbles to the surface constantly while hydrostatic pressure from the river channel forces river water into the partially evacuated area surrounding the jet. This water brings with it a load of fines from the peripheral zone 3 and 4 ft. out from the bridge pier. A new introduction of jet water provides the extra carrying capacity to flush this added fine material to the surface.

Intruded grout

Grouting is performed after jetting of a 5-ft. lift completely encircling the bridge pier. The grout is intruded with ¾-in. pipes fed from a double vertical tub grout mixer via 1½-in. pipes and hoses led from shore to the work. Wood wedges and burlap were used to seal the 3-in. holes around the grout pipes during operations above a depth of 12 ft.; below that point the grout does not overflow the holes. One lift from 2 to 3 ft. thick, grouted in succession from each of 32 holes, can be finished in one working day. Assuming a section 4 ft. wide and 100 ft. long (along the line of holes), and estimating voids at 40%, a lift 2 ft. in depth requires intrusion of nearly 12 cu. yd. of mortar.

The grout mix design conforms to standards prescribed by Intrusion-Prepakt, Inc., proprietors of the process, whose crews are performing the work. Proportions are as follows: cement, 3 cu. ft.; sand, 3 cu. ft.; water, 20 gal.; Alfesil, 1 cu. ft., and Intrusion Aid, 2½ lb. These quantities give a ratio of 5 gal. of water per sack of cementing materials, including the Alfesil. Alfesil and Intrusion Aid are admixtures designed to counteract the normal shrinkage tendency in hardening concrete, act as lubricant in the grout, retard setting to insure thoroughness in the operation, maintain the grout as mixed without settling of its constituents, and promote displacement of surrounding water by the grout in preference to mixing and dilution of the two. (A more complete summary of the Prepakt process and its application in construction of Whittier Narrows Dam for the Corps of Engineers was published in *Western Construction* for July 1951, pp. 69-72.)

Batching equipment

Mixing time in the double vertical tub grout mixer is 2 min. (minimum). Capacity of the mixer is a 6½-cu. ft. batch, which empties into a grout pump for transport 400 ft. to the work site at about 100 psi. These two pieces of equipment, mixer and pump, are special items designed and provided by Intrusion-Prepakt, Inc.

Other equipment used on the job includes the following:

2 wagon drills
1 3-stage jet pump (185 psi., 400 gpm.)
2 365-cfm. compressors (95-110 psi.)
1 small pump providing water for grout mixing

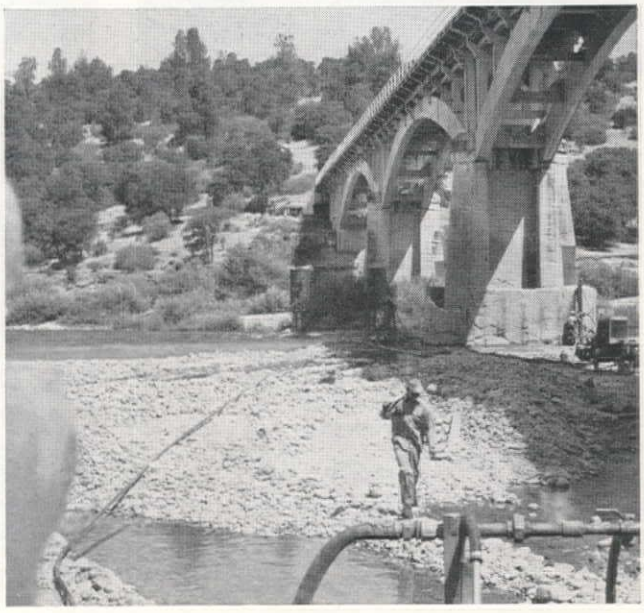
The contractor's crew numbers fifteen men, as follows:

1 superintendent
1 foreman
1 operator (compressors and pump)
3 mix crew personnel
3 insert crew personnel
6 laborers

This bridge pier rehabilitation marks the first use of Prepakt methods by the State of California. Observations of the piers are being taken regularly from a level set-up to insure that the work causes neither heaving nor settling of the piers during grouting or jetting operations. Extent of the grout curtain achieved will be checked at the conclusion of the job by taking diamond drill cores from random locations near the outside edge of the grouted areas.

Personnel

For the Bridge Department of the State Division of Highways, G. S. Smith is resident engineer. A. H. Hawkins is superintendent for Intrusion-Prepakt, Inc., and Jim Clark is foreman.



VIEW from mixer platform on left bank shows length of grout line, deterioration of caissons exposed by riverbed degradation.

Shepherd planning, pallets and personnel give Seabees—

Rebuilt heavy construction equipment

A BIG REPAIR JOB is the $1,500,000 Navy contract let to Shepherd Tractor & Equipment Co., Los Angeles, for rehabilitation of 230 weather-worn units of heavy construction equipment salvaged from World War II Seabee bases. Pictured here are some phases of Shepherd's work, involving a large percentage of its shop space and over 100 technical personnel.

Navy surveys in 1949 indicated the engineering feasibility of returning and repairing cranes, tractors, etc.

A unit trucked from the Navy's Port Hueneme base is dissembled for ease of handling on a series of pallets. Stacking saves space as pallets are fitted with risers made from 2½ x 2½-in. angle iron fabricated into frameworks 4 ft. square and 2 ft. high. Inspection by Navy and Shepherd technicians reveals work to be done, new parts needed.

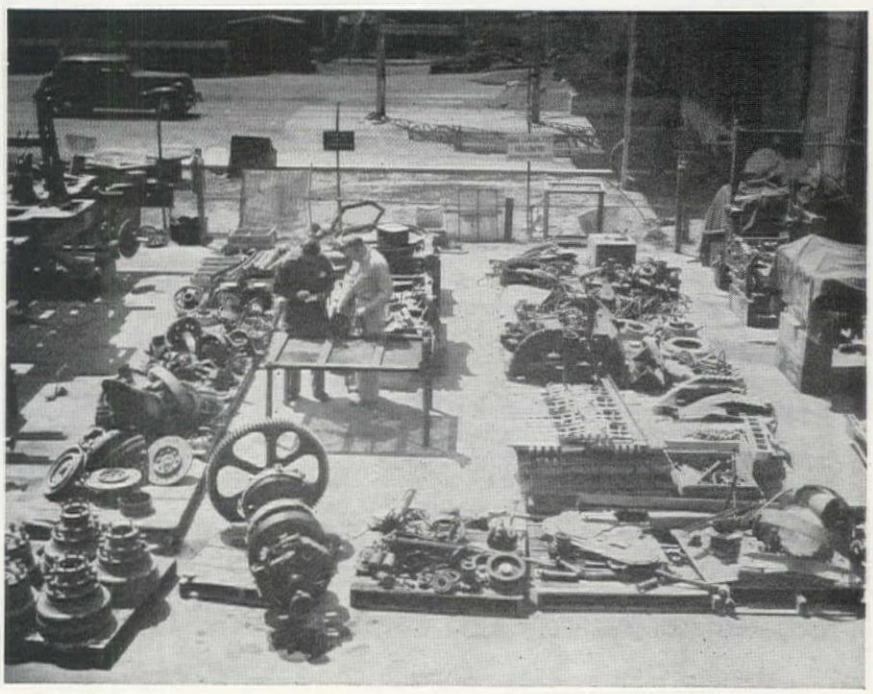
Shortages that dictated the entire rehabilitation program render impossible the mass repair of similar equipment. Therefore, an item is stored until the new parts ordered for it arrive.

Still handled by pallet, each load representing all parts from a major assembly—injection system, transmission, or block—the equipment passes into Shepherd's shops. Engine blocks are positioned in cantilever stands that rotate, giving complete accessibility to the repair men. Diesel engines have rusted and corroded. Oil left in crankcases 6 years ago has resulted in acid damage to bearings. Valve springs, valve guides, and combustion chambers need repair.

Welding, machining, hardfacing, steam cleaning, and painting with 2 primer coats precedes re-assembly. Cranes and hoists assist 6 crews in their work assembling components, trucks, and transmissions, in rewiring, brake refitting, and engine assembly.

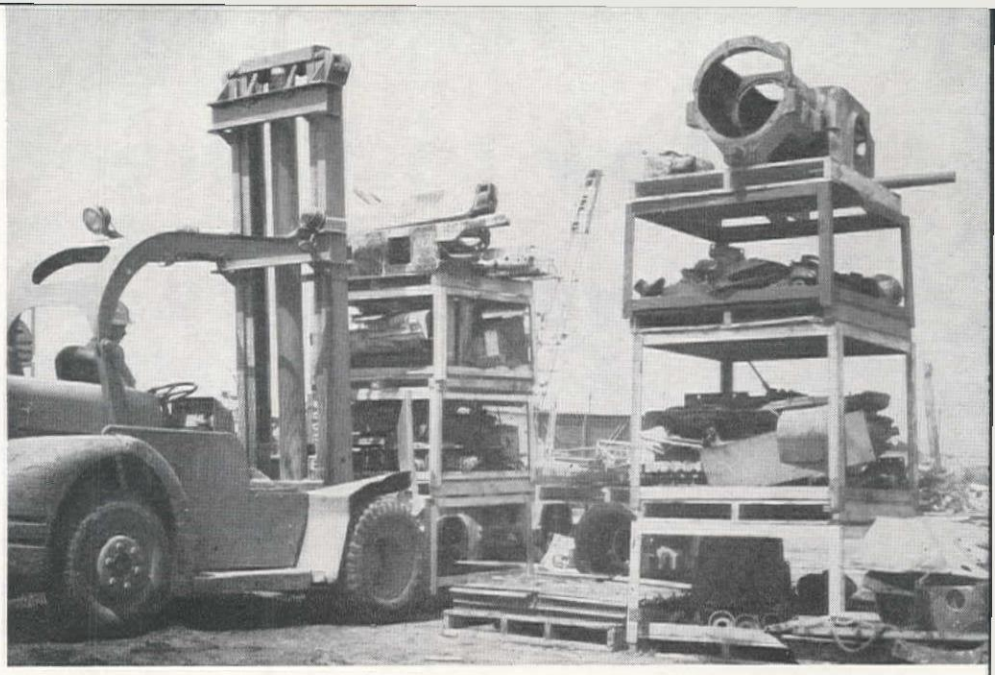
As work progresses on the contract, with about 30 units completed per month, some conclusions may be drawn as to its efficacy. Diesel equipment has proved to be less susceptible to weather damage and therefore more suited to large-scale rehabilitation than has gasoline-powered machinery, about 15% of which has required new engine blocks. About 50% of bearings need replacement, and about the same percentage of diesel injection equipment. These results may spur further plans for recovery and re-use of equipment from overseas.

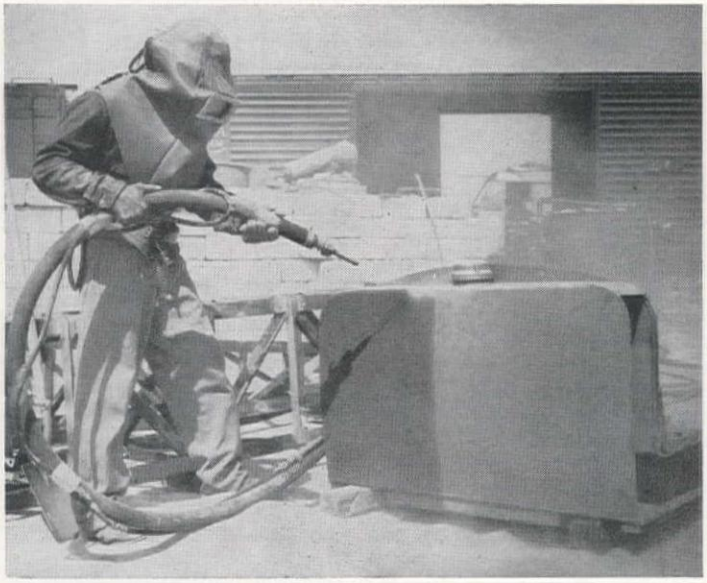
WEATHER-BEATEN Seabee construction equipment crowds shops of Shepherd Tractor & Equipment Co. in Los Angeles, where it is being rebuilt for further service in current military expansion program.



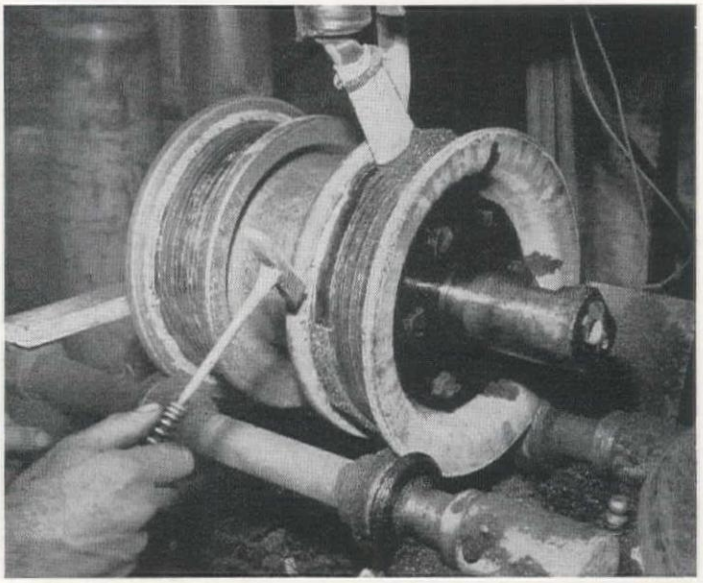
THIS "EXPLODED VIEW" shows parts of a Northwest crane, dismantled and placed on pallets for easy routing through repair facilities. Inspectors determine need for new parts, order all for one machine on a single purchase order.

UNTIL NEW PARTS arrive, machine is stored in yard. Risers on pallets permit stacking, conserve space and keep assemblies close together. No work is done until all replacements for assembly are on hand.



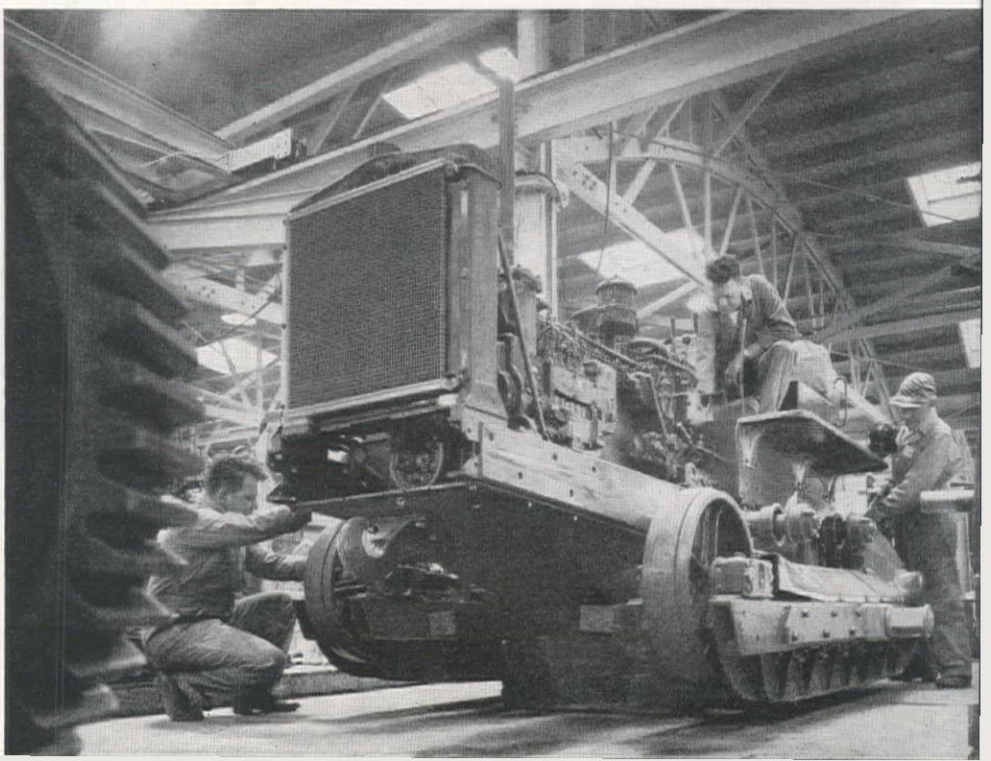


SANDBLASTING constitutes first cleaning operation on rusty, corroded equipment. Wet sand has been introduced to reduce dust. Solvent is also used to clean precision assemblies.



HARDFACING tractor idler wheels is typical repair item. However, strict Navy specs prohibit many otherwise conventional rebuilding techniques—use of shims, undersize parts, etc.

LIKE NEW, a tractor comes to the end of the Shepherd line. After two coats of the familiar olive-green paint, it will be "recommissioned and rejoin the fleet." One year contract goal is 230 units.



Low cost street repair by level course or seal coat

Formalized methods achieve economy in street repair for Berkeley, Calif., where application of leveling course or seal coat follows priority system based on traffic volume and "roughometer" readings — Costs receive careful study

By
RICHARD GALLAGHER
Director of Public Works
Berkeley, California

PAVEMENTS on secondary streets in California's older cities are deteriorating at such a rate as to present a continuous problem of maintenance and, thereby, one of economics. Berkeley, California, has evolved a rehabilitation plan which, though formalized as much as possible, retains a flexibility that has permitted efficient distribution of city maintenance funds during the past two years.

First step in the program was establishment of priorities among the streets needing treatment. Ratings hereunder were established in accordance with just two criteria, traffic volume and pavement roughness. The former was determined by survey, the latter by use of an electronic viagraph, or roughometer, operation of which was described in *Western Construction* for October 1950, pp. 90-92.

Two treatments

Based on the nature of its deterioration, a street receives one of two treatments when its priority number "comes up," either a leveling course or a seal coat. A leveling course application consists of grading and rolling as much as 1 in. of MC-3 asphaltic plant mix on top of the existing pavement. The treatment with Class B double seal coat includes two coats of L3X asphaltic emulsion, each followed by distribution, rolling and brooming of crushed aggregate. On some smoother secondary streets, a single course seal coat is applied.

Notice of repair work of either type by Berkeley's Department of Public Works is given abutting property owners and residents in the form of mimeographed notices distributed the preceding day and by erection of barricades and signs to prohibit parking. About 2,000 lin. ft. of 25-ft. roadway constitutes a day's work, with traffic prohibited between 7:00 a. m. and 6:00 p. m.

The first work preparatory to laying down a leveling course is that of sweeping the street clean. Two passes are generally made, the first with a macadam broom, the second with a fine one. It is seldom necessary to wash down the roadway. Application of a tack coat of L3X asphaltic penetration emulsion follows, using a city-owned distributor truck equipped with an 8-ft. spray bar. The emulsion temperature averages 120 deg. F., and is maintained by insulation of the 400-gal. tank and, when necessary, use of a kerosene heater-blower that circulates hot gases through pipes in the tank. Coverage with a "fog" coat of emulsion varies, being applied by eye from the operator's experience. Adjusting his truck speed according to the appearance of the pavement, he spreads about 0.03 gal. of emulsion per sq. yd. Timing of the operation is not essential at this point: it is permissible for the emulsion to "break" prior to application of the leveling course.

Plant mix applied

MC-3 plant mix, mixed at 200 deg. F., is then delivered and roughly spread from a series of four trucks operating steadily from a local hot plant. This mix nominally contains 6.2% asphalt by weight, and conforms in grading generally to California State Highway specifications for No. 4 maximum. Distribution is done with a motor grader, which blades the material to the desired thickness and contour. The thickness averages between ½ and ¾ in., but is deeper in settled areas. Ideally, the high spots are barely covered. Distribution of the mix does not usually extend into the gutters, as many of these have already been improved under a separate maintenance program. It is notable that the repairs here described, other than patching, constitute the only rehabilitation accorded Berkeley's secondary streets in some 30 years of their existence.

The efficient operation of the motor grader lends particularly to the overall economy of the work. Operators make every pass pay on the narrow, often steep, streets being treated. Turnaround time is eliminated through their skill in achieving satisfactory blading results even when backing up.

It is occasionally necessary to follow the grader with hand labor to fill in low spots, but generally an 8-ton tandem roller moves right on the job and commences compaction. Roller passes overlap about one-half the previous rolled strip, resulting in double coverage over most of the leveling course. If necessary, final discrepancies in grade are remedied by hand casting of plant mix from a truck and distribution by two laborers, one using a shovel and the other a lute, in effect a hand-operated grader or screed.

Upon completion of the work, it is preferable for the leveling course to be free of traffic for four hours. This, of course, is not always possible in industrial districts.

Paving crew organization

Only one of the City's two paving crews is needed for the leveling course program. Currently, the men and equipment employed are as follows:

1 foreman
3 city-owned dump trucks and drivers
1 rented dump truck and driver—use varies with progress of work
1 rented motor grader and operator
1 city-owned roller and operator
1 city-owned distributor truck and driver
1 bootman for distributor truck
2 rakers

All phases of the operation take place simultaneously in a 100-yd. length of roadway after work is well under way. The resulting new course weighs 6 to 8 lb. per sq. ft. in place. For example, in work conducted on Blake Street on August 27, 200 gal. of L3X emulsion was applied to a roadway 25 ft. wide and 2,400 ft. long, giving a coverage of 0.03 gal. per sq. yd. On this same stretch, 192 tons of MC-3 was used, or 6.4 lb. per sq. ft. A sample from work on Carle-

ton Street the following day tested at 6.0% asphalt by weight.

Results have been appraised by roughness values recorded before and after the work. Some differentials achieved are: before 450, after 210; before 460, after 200; before 460, after 250. The unit of measurement is vertical in. per lin. mi. Roughness values are furnished the City by the Institute of Transportation and Traffic Engineering, University of California, with which the City is engaged in a cooperative research project. Original plans for addition of a one-course seal coat after a year's wear have not been carried out, inasmuch as inspection of 7,000 lin. ft. of pavement leveled in June 1949 shows only a negligible number of holes after two years of use by an increased volume of traffic attracted by the improvements.

City cost estimate for a leveling course of this type is presently $0.025 per sq. ft. in place. During the fiscal year 1949-50, about 10 mi. of streets of various widths were improved by this method at a cost of $39,714. Last year's program covered 8 mi. at a cost of $30,635. The current program, valued at $41,899, will cover about 9 mi. Life of the new surfacing is from five to seven years.

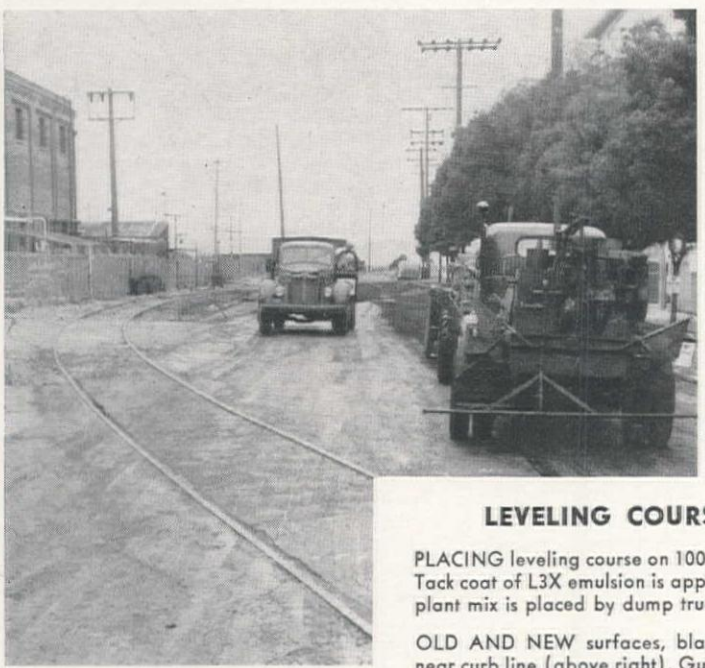
Programming of the work is done during the winter and tentative schedules presented before a spring conference with engineers of Pacific Gas & Electric Co., Pacific Telephone and Telegraph Co., and the East Bay Municipal Utility District. Here compromises are effected to avoid conflicts with the utilities' excavation plans. Both the City and the utilities save money, as well as the taxpayers' tempers.

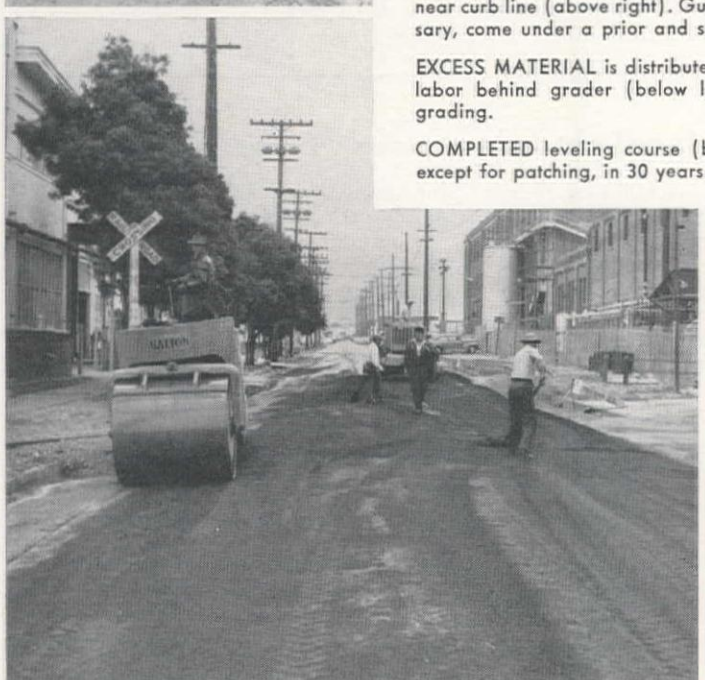
Seal coat treatment

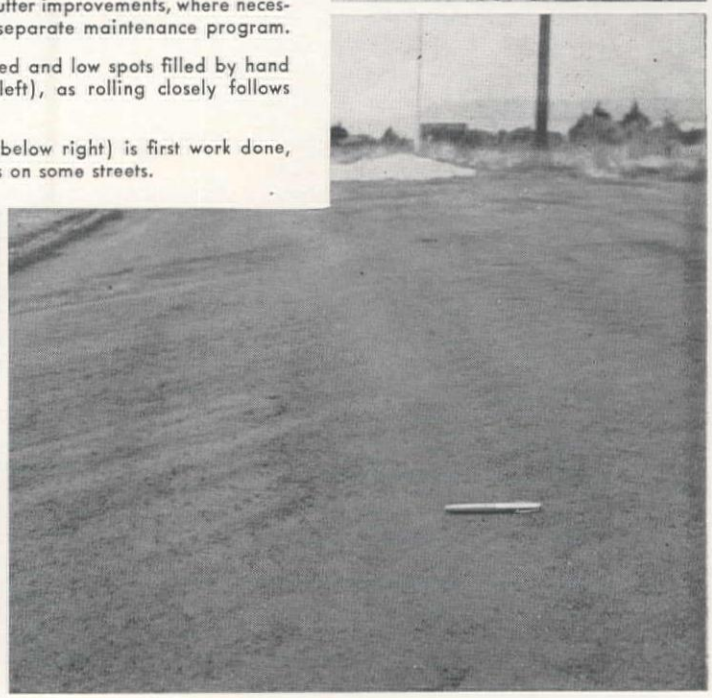
On the more heavily traveled streets that are shattered and cracked, but still are not very rough, a Class B double seal coat is used to extend the useful life of the pavement for at least five years.

Preparatory work for a double seal coat includes careful cleaning of the pavement to undergo treatment. Chuckholes and large depressions are patched, and the entire area hand swept. Where possible it is also washed down with a fire hose. This washing clears all accumulated dirt from pavement cracks and makes for better penetration of the emulsion.

Distribution of L3X follows, using a larger distributor truck than previously described. Emulsion for the seal coat treatment is metered in passage to a 12-ft. spreader bar, giving precise coverage desired, usually between 0.15 and 0.25 gal. per sq. yd. Two passes suffice for a 25-ft. pavement width. Operating technique is usually to complete one pass, then back up on the un-oiled strip to commence the second pass at the same point as the first. Despite a positive cut-off control on the distributor, heavy







LEVELING COURSE OPERATIONS

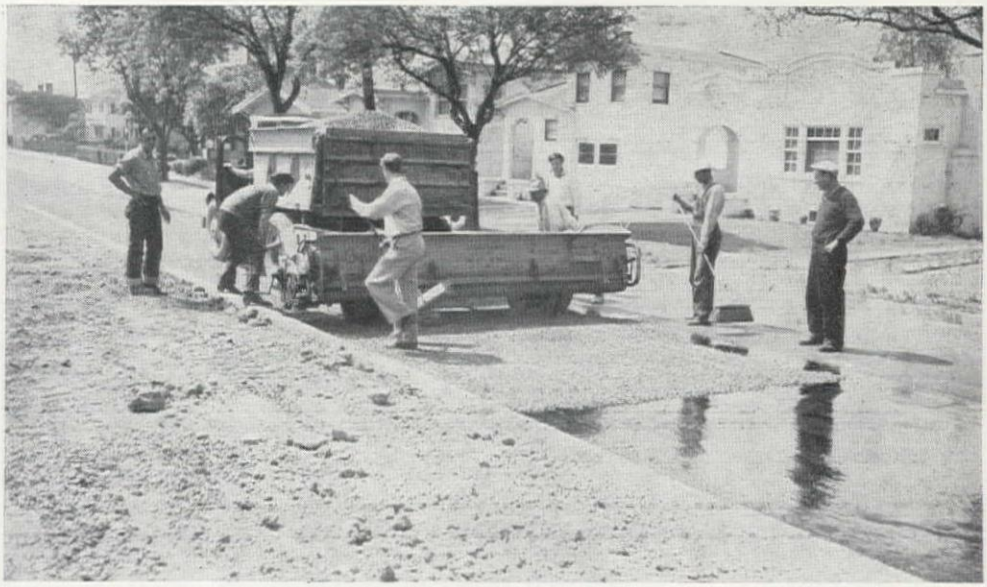
PLACING leveling course on 100 yards of roadway (above left). Tack coat of L3X emulsion is applied by distributor truck at right, plant mix is placed by dump truck.

OLD AND NEW surfaces, bladed but not rolled, are shown near curb line (above right). Gutter improvements, where necessary, come under a prior and separate maintenance program.

EXCESS MATERIAL is distributed and low spots filled by hand labor behind grader (below left), as rolling closely follows grading.

COMPLETED leveling course (below right) is first work done, except for patching, in 30 years on some streets.

BUILDING PAPER assures neat joints between units receiving seal coat, keeps excess penetration emulsion off completed work.



SPREADER BACKS over freshly oiled strip, rolling over rock course as it is spread, to avoid running on the fresh oil. Hand labor distributes excess rock and sweeps in overflow from gutter.

DRAG BROOM evens surface before street is opened to traffic. Slow speed is necessary to avoid jiggling of broom that would cause ripples in roadway.

building paper is laid at transverse joints to prevent application of emulsion on a previously completed course. Such overlap would create a lump at the joint and lead to rapid deterioration under traffic pounding.

Need for fast work

Aggregate used on this first course is ½-in. x No. 4, spread about 23 to 28 lb. per sq. yd. It's wet down prior to spreading, either at the plant or by hose en route, to minimize dust. This is an important consideration, especially in cities.

The aggregate is spread from a truck equipped with a Buckeye spreader and two operators, in addition to the driver, to spread the rock evenly across the course. Hand casting covers "holidays" and the outside 1 ft. of roadway.

Hand labor follows the spreader to scatter excess rock, fill low spots, and sweep back overflow from the gutters. An 8-ton tandem roller follows immediately upon this work, moving fairly fast to pack and set the rock without breaking it.

After allowing about two hours for the new course to set, repair crews return to draw a drag broom over the roadway. Towed by a truck, this broom, 12 x 7 ft., is shaped like a letter M lying on its side. It is drawn at only 3 to 4 mph. in order to prevent jiggling of the broom and resulting ripples in the road surface. Dragging corrects minor discrepancies in grade and is followed by another fast rolling treatment.

Application of the second course is performed in much the same manner as the first, except that slightly less L3X emulsion is used. Also, the aggregate used is ¼-in. x No. 10, spread about 16 to 20 lb. per sq. yd. The described materials and method conform to California State Highway specifications. A final operation, carried out not more than four days later, is power brooming to remove excess rock from the new surface. Total costs on recent work reduce to $0.021 per sq. ft. for a double seal coat, and $0.016 for a Class C-fine single seal coat.

Men and equipment employed to apply the Class B double seal coat treatment are summarized as follows:

1 foreman
1 rented distributor truck, driver and bootman
2 city-owned dump trucks and drivers
4 rented dump trucks and drivers
1 city-owned roller and operator
1 Buckeye spreader
2 spreader operators
4 laborers
1 rented drag broom
1 rented power broom

Personnel

These maintenance and repair techniques are being carried out under the direction of J. H. Kreitler, Chief, Street and Sanitation Division of Berkeley's Department of Public Works. Roughness evaluation was supervised by John Shupe, formerly of the Institute of Transportation and Traffic Engineering. Conception and development of the leveling course method is in part credited to G. A. Turner, Chief Construction Inspector for the City. Foremen on current work are John Peabody and Joe DeSilva.

Oregon uses local cinders . . . continued from page 74

trolling the constant stream of tourist traffic two flagmen and a pilot car operator were used.

The contractor's equipment included: Pioneer portable crushing and screening plant, Pioneer continuous mix model 101 hot plant, Barber-Greene paving machine; a three-ton and 12-ton Buffalo-Springfield roller, three Caterpillar DW-10 bottom dump units, Caterpillar tractor and scraper, Lorain and Koehring shovels with ¾-yd. buckets, Caterpillar D-6 and D-8 handling material in pit and at plant. Trucks were generally Ford F-7 or F-10. Supplementary equipment included a Caterpillar D-397 power plant and panel house for operating screening plant, Caterpillar D-17,000 power plant for mixing plant; four 4,000-gal. storage tanks for gas and diesel fuel; 8,000-gal. fuel oil storage tank for supplying drying drum; two 13,000-gal. asphalt storage tanks and one 10,000-gal. auxiliary asphalt storage tank and heating unit to maintain temperature of asphalt in tanks.

James Fulston is general superintendent for Babler and Rogers. Elvin Haman is crusher foreman with D. Negus filling the post of road foreman. C. A. (Red) Riehboff and Henry Negus are plant foremen.

For the Oregon State Highway Commission Garnet W. Harra is materials engineer and supervised testing of material. David Chandler is Division Engineer for the area where the cinders are located, with Dean Swift as assistant division engineer. H. S. Cox is resident engineer on the surfacing project, and Robert Coates, inspector. R. H. Baldock is state highway engineer of Oregon.

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Tips on the best use of your concrete vibrators

By W. J. MILLER
President, Master Vibrator Company
Dayton, Ohio

VIBRATION itself does not directly improve the quality of concrete. The advantages of vibration are gained indirectly by the changes that can be made in the concrete mix.

Concrete mixtures include coarse aggregate, fine aggregate, cement, and water, and the ratio of these ingredients in the mix is varied as to the results desired. It is through the changing of these ratios that the benefits of a concrete vibrator are obtained.

As the concrete mixture dries or sets, most of the water hydrates with the cement, while the remainder evaporates. Examination of concrete walls after the forms have been removed often shows the surface containing numerous small voids. These voids are caused by the evaporation of the water as the concrete sets up. Elimination, or at least reduction in these voids, can be accomplished by cutting down the amount of water in the mixture until it will all hydrate with the cement as it dries. However, when this is done the mixture becomes so stiff that it is difficult to place in the forms. In fact, it is impossible to place such a mixture by hand methods. This is where the concrete vibrator comes into play; regardless of how stiff the batch, it can be efficiently placed with a vibrator.

Concrete can be made much stronger through the use of vibration, and the mixture can also be made cheaper by cutting down the cement content. Since harsh batches can be placed with a vibrator it is possible to increase the amount of coarse aggregate and decrease the amount of fine aggregate. There is not as much area to be coated with mortar, and this enables us to cut down the cement content. In increasing the density of the concrete structure to obtain additional strength, greater water-tightness is secured also, which in building construction is of tremendous importance.

Benefits for the contractor

First, placing costs are reduced, as one man with a vibrator can replace from three to eight puddlers. This is in itself quite an item, with labor costs at their present level. Second, drier concrete cuts evaporation and there will be fewer voids on the surface of the finished wall, thus reducing finishing costs. Third, the mixture being placed drier, sets up more quickly making it possible to remove the forms sooner, and move them to another location on the job. This of course cuts down the investment in forms for the job. Fourth, the job progresses faster, thereby eliminating penalties for failure to finish on schedule. Fifth, the concrete being drier escapes damage from frost more quickly when work is being done in freezing weather. This serves to cut down heating costs.

Concrete vibrators, like all other tools, must be properly applied to the job for which they were intended. And in some cases it may be necessary to alter the job to make it fit the vibrator.

How far do the vibrations carry through the concrete? This is a hard question to answer, since the slump will govern to a certain degree the distance to which the vibrations will carry. The best way to answer this question is to tell how to determine on any particular job how far out the vibrations are reaching. Of course, the reason for asking this question in the first place is to find out how far to move the vibrator each time.

It will be noted after the vibrator has been in the concrete a short time that the mixture forms a plastic mass. This area will extend for a certain distance around the vibrator, so that all that is necessary is to move the vibrator a distance equal to the diameter of the area which it has affected. This distance will vary depending on the slump of the concrete.

Where? How long?

Vibrating can be carried on with a disregard for the reinforcing bars as far as moving distances are concerned, since the vibrations will carry through and around the bars. For example, if a wall 18 in. in width is being vibrated, and steel is placed from 2 to 4 in. from each face, it is only necessary to vibrate in the middle of the wall. It is not necessary to insert the vibrator between reinforcing bars and forms.

After it has been determined how far to move the vibrator each time, the question arises, how long should the vibrator be left submerged in the concrete before it is moved? Here again a variable is involved in that the lower the slump, the longer the vibrator should be left in the same spot. The way to determine the length of time to vibrate properly is to watch the mass surrounding the vibrator. As soon as the mixture forms a plastic mass the vibrating head should be moved.

Care should be taken not to overvibrate, that is to leave the vibrating head too long in one place. This practice will tend to cause separation of the aggregate. The manner in which overvibration can be detected is by noting closely the area adjacent to the vibrating head. When an excessive amount of mortar appears close to the vibrator or when there is a marked absence of mortar, it is indicative that over-vibration has occurred. Therefore, the rule to follow in operating the vibrator is to vibrate in one place only such time as is required for the vibrator to form a plastic mass.

When a wall is being poured in lifts, extreme caution should be exercised to prevent the vibrating head penetrating into lower lifts which have already been vibrated. Since this mass will have already taken its initial set, additional vibration will do more harm than good. This unnecessary vibrating will also cut down the production of the vibrating unit.

Rules for mass concrete

Although this discussion has dealt primarily with the vibration of walls, the rules for successful operation of a vibrating unit in dams, piers, columns, slabs, etc., are practically the same. With the exception of thin slabs measuring from 4 to 10 in. in thickness it is good practice to lay the vibrator down and simply drag it slowly through the mass. Lifts of any depth can be vibrated satisfactorily since the vibrating unit can be completely submerged in the mass. No harm will result from following this practice, as the core and casing are fastened to the vibrating head in such a manner that it is impossible for foreign materials to enter. The outside of the casing is rubber, which protects the inner structure from water and other substance with which the unit comes in contact.

Air Force wants topographic engineer-officers

MEN IN CIVIL LIFE, either veterans or non-veterans with a degree in civil engineering, geology, or photogrammetric engineering, can now enter the Air Force directly as officers, with a topographic engineer commission. This announcement was made at First Air Force headquarters at Mitchel Air Force Base, New York, by Major Charles D. Morat, Jr., Director of Military Personnel Procurement.

Major Morat said that experience to qualify a man for this commission must be in these fields: engineering, surveying, cartography, topographic drafting, geodetic surveying, or other related fields. Experience in lithographic and reproduction work is also desirable. More specifically, an applicant must have technical knowledge of survey work, such as determining exact locations and measurements of points, elevation lines, areas and contours on the earth's surface; or, should be experienced in photogrammetric and cartographic draftsmanship; or, photographic laboratory methods, photo-transferring and lithographic processes, or the operation and maintenance of lithographic equipment.

Appointments will be made in grades from first lieutenant through lieutenant colonel, depending on age. Inquiries should be addressed to the Department of Military Personnel Procurement, Headquarters First Air Force, Mitchel Air Force Base, New York.

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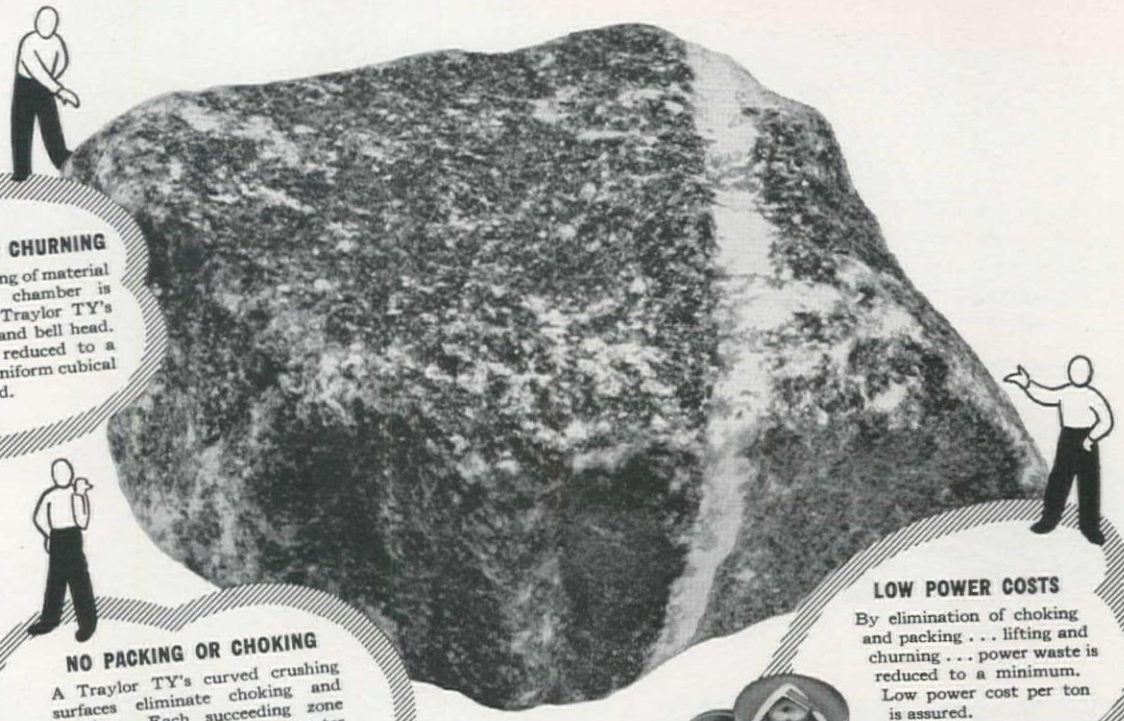

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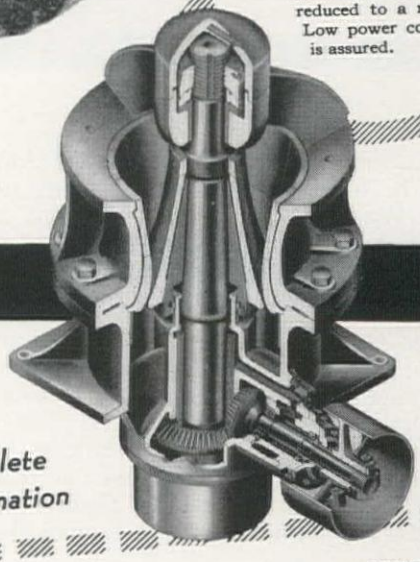

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LETTERS TO THE EDITOR . . .

Oregon also has problems relating to registration

From the May issue of The Oregon Professional Engineer the following comment by Charles F. Craig presents a different approach to the subject of registration for engineers. Mr. Craig states:

"A recent refusal by the California State Board for Professional Registration to recognize construction experience as civil engineering experience poses serious food for thought.

"Certainly any graduate from a recognized engineering school possesses the technical attributes necessary to cope with the examination for a professional license. Therefore, among graduates, the paramount question is, "What experience will be acceptable to the Board of Examiners in fulfilling the two years of engineering experience required after graduation?"

"We note that the California Board does not now accept experience gained working for a contractor on construction projects for fulfilling the experience requirement. Would they accept the experience gained on the same construction projects by engineering inspectors for the government or consulting engineers? What constitutes acceptable engineering experience?

"In this day of specialization, we find civil engineers with descriptive titles ranging through field, construction, sales, soils, office, safety, bridge, consulting, hydraulic, structural, highway and many others. Some of these titles are very general and encompass as many non-engineering as engineering duties. How, then, does one differentiate the acceptable from the unacceptable engineering experience?

"There seems to be some controversy on this subject, so shouldn't young engineering graduates attempting to fulfill the practical experience requirements for registration be advised as to what fields or duties offer experience acceptable in the eyes of the State Board of Engineering Examiners? Should certain employers or types of employers, be designated as acceptable, and others not? Just what **does** constitute an engineer?"

Commenting on Mr. Craig's statement, the editor of the Oregon engineers' journal, R. F. DeGrace, says:

"For some time a special PEO committee has been studying the requirement of qualifying experience for registration. Although the committee has only started its study under a rather general assignment it has discussed this problem actively and taken up a few specific cases for consideration. In these cases the committee found that the applicant did not have sufficient experience, as the Board had decided, or had failed to present it in a manner which would properly indicate his qualifications. Recently the question came to a head in California, when the Board refused to admit an applicant to examination on the ground that his experience with a contracting firm was not qualifying. Although The Oregon Professional Engineer cannot take sides on this or other questions, comments from Oregon engineers are always welcomed."

Another view of licensing for California engineers

Sir:

I have read with interest your editorials and the various letters concerning qualifications for Civil Engineer licensing.

I am quite certain that those who have entered the discussion are not fully familiar with the problems of the Board in professional licensing. The issue of credit for construction experience is a questionable one, due to the various types of work that could be applicable.

The law requires 2 years' experience in addition to a college degree before admission to an examination. In the majority of the states, this time requirement is 4 years. Therefore, with this very obviously small amount of required experience, it is equitable that the experience be, in accordance with the law, under the direction of a registered civil engineer. There possibly could be a borderline case occasionally that, due to various reasons of improper presentation on the application, and/or the lack of complete support by the applicant's references, an otherwise qualified applicant may be rejected. It has been my experience with the many men I have been in contact with that the Board's interpretation of experience has been just.

It is rather interesting to note that the registration is of such great value that men with only 2 years' experience feel they must have their license. I am quite sure most construction men would not feel that anything less than 4 or 5 years' experience would qualify a man as an engineer. Two primary requirements of a good engineer are satisfactory experience and good judgment.

There are many phases of civil engineering that have special interests, such as construction, water supply, sanitation, city planning, materials testing and other groups who feel that their particular activity should be represented on the Board. With only 3 members as Civil Engineer and Land Surveyor representatives, it seems equitable that those in general practice can serve to better advantage.

As a consulting Civil Engineer with a construction industries background, and with a full knowledge of the value and abilities of engineering in construction, it is my opinion that construction engineers have not been discriminated against, and that in general applicants have been given equal and proper consideration. There is no reason for civil engineer graduates to feel that employment in the construction field will hinder them from obtaining registration.

Jack Y. Long
J. Y. Long Co., Engineers
Oakland, Calif.

WASHO Test Road site selected in Idaho and design established for base and surface

SITE of the Western States test road, authorized by the Western Association of State Highway Officials (*Western Construction*—August 1951, pp. 78-79) has been selected and design details have been determined. The following information has been supplied by W. C. Williams, Assistant State Highway Engineer of Oregon, and Chairman of the Advisory Committee of WASHO.

Site of the test road is to be on U. S. 191 approximately 10 mi. south of Malad, Idaho, and two miles north of the Idaho-Utah state line. The test road will be built in two ovals of two lanes each, and it is proposed to run tests for four different weights of axle loads. The test ovals, each approximately 3,600 ft. in over-all length, will be constructed by varying thicknesses of gravel base and plant mix and bituminous plant mix surfacing. Five different thicknesses of gravel base are to be used, and two different thicknesses of bituminous plant mix. The over-all thicknesses of the sections to be constructed are 6 in., 10 in., 18 in., and 22 in.

The project has been officially designated as the "WASHO Test Road," and the policy definition as adopted by the Advisory Committee of WASHO reads, "the construction of test road of varying thicknesses of base and bituminous plant mix for a minimum thickness to represent existing roads and past practice up to a maximum to determine future design and to be tested by various axle loads."

Cooperating with the Western Association of State Highway Officials in the project are the Highway Research Board, which will supervise construction and testing, the Bureau of Public Roads, the trucking industry, the petroleum industry and Council of State Governors.

It is expected that grading and base surfacing of the test road will be completed during the year 1951 and that the bituminous plant mix surfacing will be constructed in the spring or early summer of 1952, with actual tests being started immediately after completion of the bituminous surfacing.

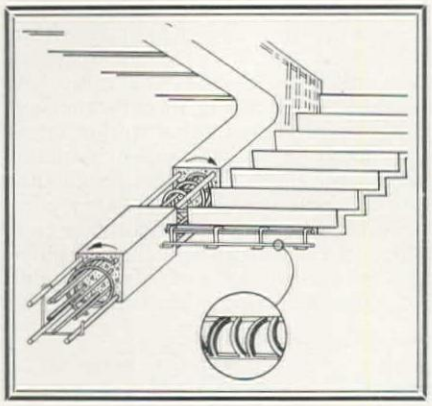
Further determinations as to axle weights, length of the test, speed of operation, etc., will be ascertained at a future meeting of the WASHO Advisory Committee and reviewed in the pages of *Western Construction.*

HOW IT WAS DONE...

Stairway cantilevered from floor slabs, spandrel beams

A CANTILEVER design stairway entirely supported from the floor slab and spandrel beam at each floor lends interesting architectural appeal to the lobby of the office building at the new Lever Brothers Company's Los Angeles plant. A saving in cost was also a feature effected by the elimination of the stairwell walls which in this building could have served no useful purpose.

Upper and lower stairway flights are cantilever-supported from a central beam of reinforced concrete that extends upward four floors in jack-knife fashion. Bethlehem Pacific



CUTAWAY of cantilevered central beam that extends upward four floors in jack-knife fashion. Reinforcing bar for each tread and riser was carried back and interlocked into this main beam.

fabricated this beam at its Los Angeles plant. It is built up of six ½-in. reinforcing bars equally spaced inside a 10-in. spiral cage of 5/16-in. diameter rod. Outside of the spirals, four ⅞-in. reinforcing bars were placed in a rectangular pattern. These are retained in position by ⅜-in. stirrups.

A ½-in. reinforcing bar for each tread and riser was carried back and interlocked into the reinforcing structure of the main beam (note drawing). All concrete used in these stairs was required to pass a 3,000-psi. minimum test after 28 days of cure.

The spiral coils were placed in right hand rotation on the lower flights of the beam and left hand rotation on the upper

flights to transmit torsional stresses into compressive forces within the supporting member. Ample overlap was provided in the center of the beam to provide reserve strength to resist any reversal of shear due to unbalanced or partial live loading.

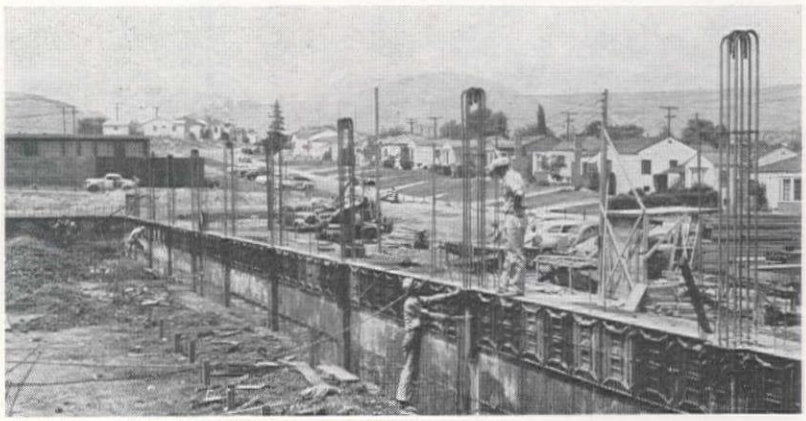
When the plans were submitted to the county building department, approval was withheld because of the unorthodox design. After the 28-day curing period had elapsed, tests were conducted under the supervision of the county building inspectors to determine compliance with building code requirements. A 24-hour balanced static loading of 200 psi. of horizontal projection and an unbalanced static loading of 100 psi. were imposed. In both tests a deflection less than theoretically calculated was measured.

The architect-engineer, as well as general contractor, was the Bechtel Corporation, San Francisco and Los Angeles.

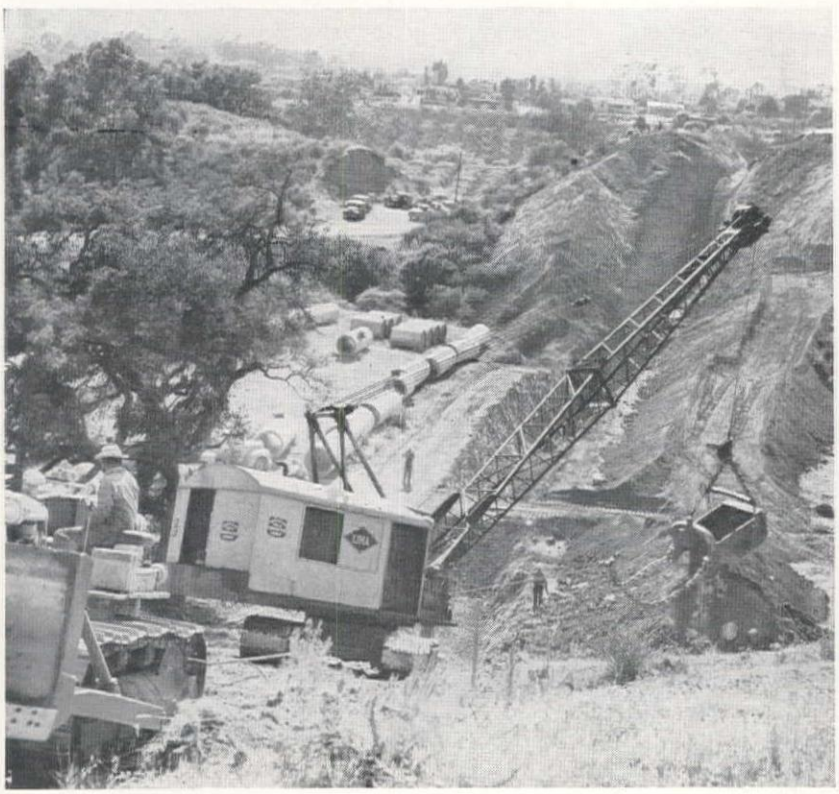
NEWEST "CATS" IN NORTHWEST—First of the big new Caterpillar DW-20 high speed rubber-tired tractors along with Caterpillar W-20 bottom-dump wagons to appear in the Northwest are being used by R. A. Heintz, Portland contractor, for earthwork at Paine Field, Washington. In this view, a Euclid elevating grader is loading the 25-yd. capacity W-20. Supplied by Interstate Tractor & Equipment Co., Portland, the DW-20 has a 275-hp. engine, electric starting, and 26.6-mph. speed with loaded wagon. Heintz has a subcontract to clear 380 acres at Paine.

LOADER TEAMS WITH TRUCK TRAILERS—On a 5½-mi section of the Santa Ana Freeway near Los Angeles, about 30% of 540,000 cu. yd. of excavation is being handled by big Fruehauf trailer units and a Caterpillar motor grader equipped with a Domor elevating loader attachment. On this stretch of the freeway, a 20-ft. cut is being made and material is hauled 5 mi. to be used for fill. United Concrete Pipe Corp. & Ralph A. Bell are contractors for this section.

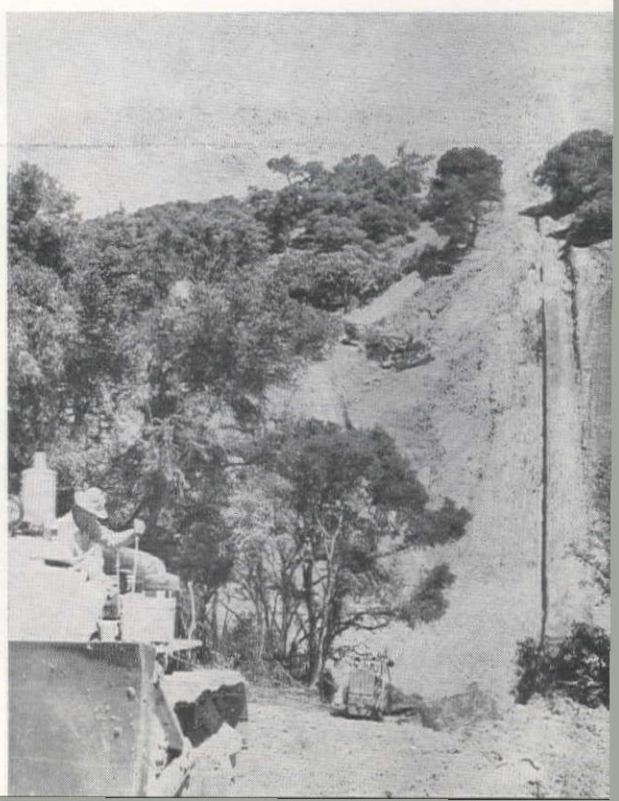
METAL FORMS CLIMB—Forms for reinforced concrete walls of a new factory building at Alhambra, Calif., consist of fabricated 30-in. squares, joined together by a series of pins and clamps, which are moved upward as the wall is poured. William J. Moran Co., consulting engineers and general contractors of Alhambra, is builder of the new factory for the Birtcher Corp., manufacturer of electro-surgical medical instruments.



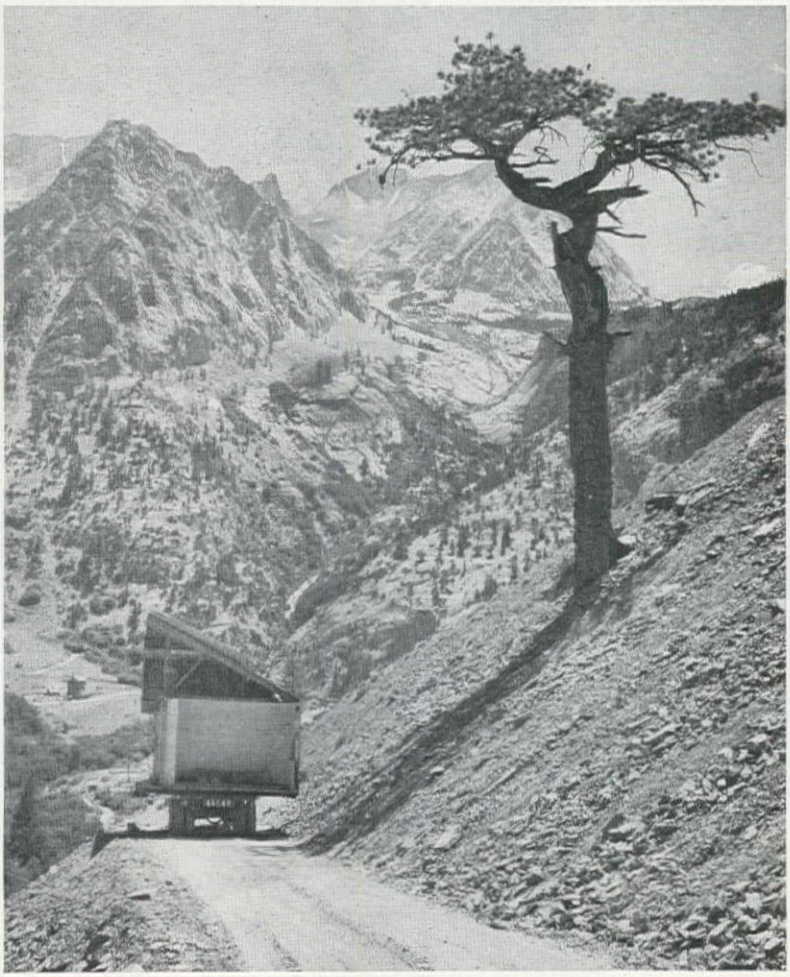
17-TON "SHOVEL SITTER"—Steep slopes along the route of the south coast conduit section of the Cachuma Project near Santa Barbara, Calif. made trenching and placing of pipe sections difficult. Below, a big Lima dragline requires the aid of a "sitter" to keep on its precarious perch, the sitter being a Caterpillar diesel tractor with its cable attached to the dragline. With some slopes as steep as 73%, the contractor designed special high lines to carry 9½-ton pipe sections to point of placement. American Pipe and Construction is engineer-contractor on the Bureau of Reclamation project.



DITCHER WINCHED UP-GRADE—At times during construction of a 40-mi. oil pipeline in Southern California, the pipeline ditch sliced through mountainous countryside and tractors were used to winch the Buckeye ditcher upgrade (below). Bechtel Corporation was the contractor for General Petroleum Corporation to install the pipeline between San Ardo and Estero Bay. A 4-in. pipe and an 8-in. pipe were installed to replace truck hauling of crude and fuel oil between the two locations. Other equipment on the job included a Northwest hoe and Caterpillar D7 and D8 tractors.



Camp moving vs. Western mountains



SCENERY is breathtaking but narrow road and rock outcroppings made camp building relocation a tough job. In view below, valley is about 5,000 ft. down from the edge of the road. At right below, rock outcropping has forced truck and trailer to the outer edge of the road. Frequently during the moving job, the outer of the dual tires hung off the road.

MOVING A CAMP with all its buildings is a tough job any time, but when it's in Western mountains, the job is even tougher. The men of R. J. Goulet Construction Co. of Bishop, Calif., can testify to that. Recently, this firm moved a group of buildings from the 11,000-ft. level at a mining camp near Bishop down a winding and narrow dirt road to a new location 4,000 ft. below. Sharp turns, treacherous drafts and jutting rock walls made the job anything but easy. Here's how Real J. Goulet and his crew handled the job.

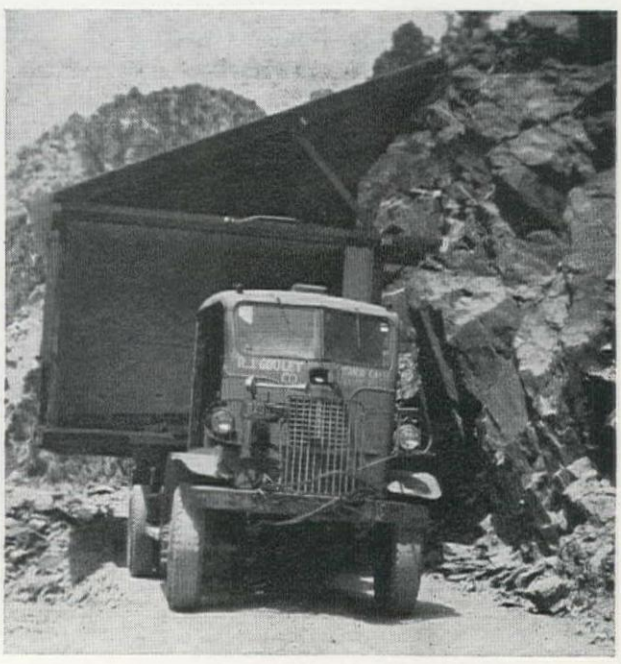
A short wheelbase, tractor-pulled semi-trailer was taken up to the 11,000-ft. camp. There, a 15-ft. rectangular wooden frame was nailed horizontally on the bed of the semi-trailer. The buildings to be moved were cut into 15-ft. sections, just narrow enough to squeeze past outcropping rock on the uphill side of the dirt road. Lighter sides of the building sections were ballasted with chunks of concrete.

A trial run of the trailer with the frame attached preceded the actual moving of sections. During this trial, a hand level and straight edge was frequently raised to a vertical position from the edge of the wooden frame to determine whether the 15-ft. building sections would pass by the irregular rock outcroppings. It was found that the roadbed had to be built up 4 or more inches on the inside track at some locations to tilt the building section away from the cliff at tight locations.

Biggest headaches during the actual moving operations were jackknifing of the trailer around some hairpin turns, and the crossing of stretches where the road was so narrow that the outside tire of the dual tires on the trailer hung off the road. With each trip it was necessary for a man to walk ahead of the load to direct the driver. One man walked the entire length of the road each day to pick up rocks that may have rolled down the mountainside and settled on the road.

At the new camp location, the buildings were reassembled on concrete foundations previously placed by the Goulet firm.

The job was carried out for the United States Vanadium Co. The buildings and bunkhouses at the upper level were no longer needed to accommodate miners since a 7,000-ft. access tunnel was being driven to tap the mine workings from below.



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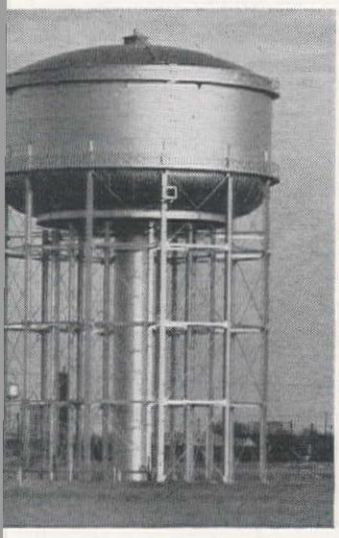

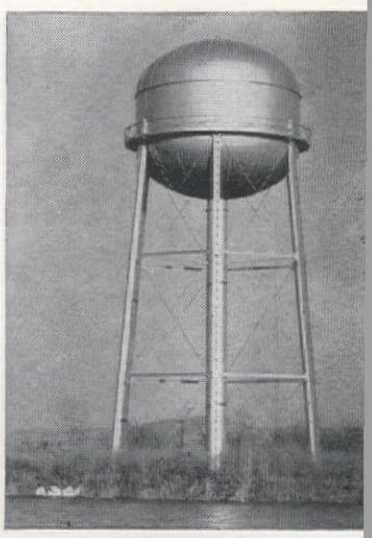

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CONSTRUCTION DESIGN CHART

CXXXVI . . . Net areas for riveted connections

By
JAMES R. GRIFFITH
Seattle, Wash.

THEN COMPUTING the net effective area of a riveted tension member, the effect of a diagonal or zigzag line through a chain of holes must be given careful consideration. The Uniform Building Code,[1] and most modern building codes, follow the method specified by the American Institute of Steel Construction. On page 101 of the 1948 edition of the AISC booklet *Steel Construction*, a chart is given for the determination of values of $\left(\frac{S^2}{4g}\right)$, and two illustrative problems.

The chart herein presented has been designed to give the same information in nomographic form as the chart given in *Steel Construction*. One of the same illustrative problems will be used herein. The problem is to determine the net width across section ABCEF, as illustrated on the accompanying chart. Rivets, ¾-in., are to be used. It is necessary to use a solution line for each pair of holes, and a solution line has been drawn on the chart for the pair of holes (BC). The reader may draw a solution line for the pair of holes (CE), although this line has been omitted to avoid confusion. Thus for ¾-in. rivets we have

Deduct for 3 holes (¾ + ⅛)
= — 2.625 in.

BC, $g = 4$ in., $S = 2$ in., add $\frac{S^2}{4g}$
= + 0.25 (solution line shown)

CE, $g = 10$ in., $S = 2\frac{1}{2}$ in., add $\frac{S^2}{4g}$
= + 0.155

Total deduction = 2.220 in.

Net width for 18-in. plate = 18.0 — 2.22
= 15.78 in.

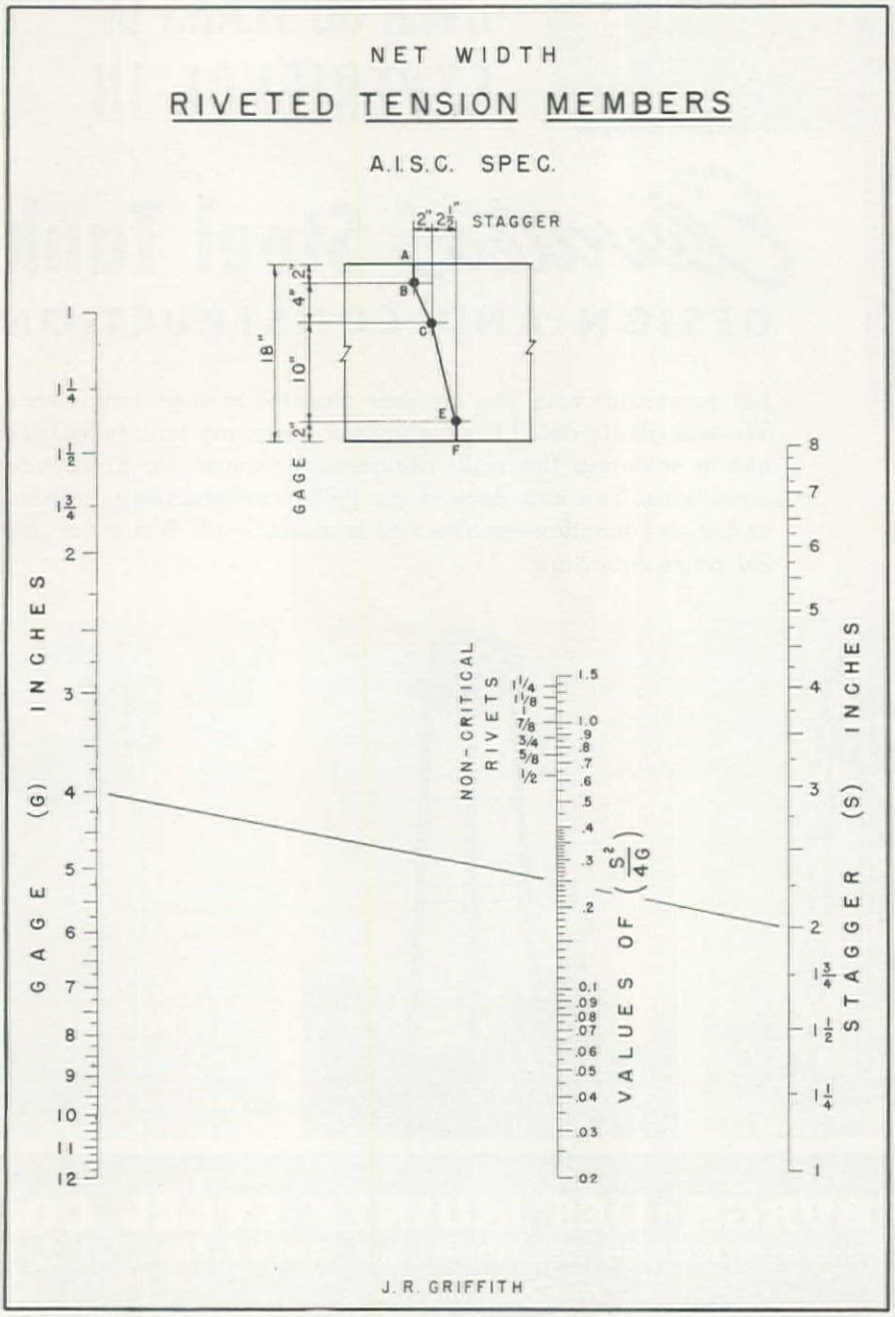
The amount to be added for the pair of holes (BC), as obtained from the accompanying chart $\frac{S^2}{4g} = 0.25$, is identical to that given in *Steel Construction*. The amount to be added for the pair of holes (CE) as obtained from my chart is $\frac{S^2}{4g} = 0.155$, wherein *Steel Construction* gives a value of 0.16. By formula we have

$$\frac{S^2}{4g} = \frac{2.5^2}{2 \times 10} = 0.156$$

Thus in this instance the value obtained from the accompanying chart is more nearly correct.

On the left side of the central scale of the accompanying chart, will be found the non-critical positions for rivets of various sizes. Thus, when the value of $\frac{S^2}{4g}$ is equivalent to the rivet diameter plus ⅛ in. for punching, the hole is far enough away from the critical line that it can be completely ignored in determining the net section. As an example, if a solution line is drawn between values of $g = 4$ and $S = 4$, the line will pass through the non-critical position for a ⅞-in. rivet. Thus all rivet sizes of ⅞ in. or less would be ignored in computing the net width for this value of $\frac{S^2}{4g}$.

[1] Pacific Coast Building Officials Conference.



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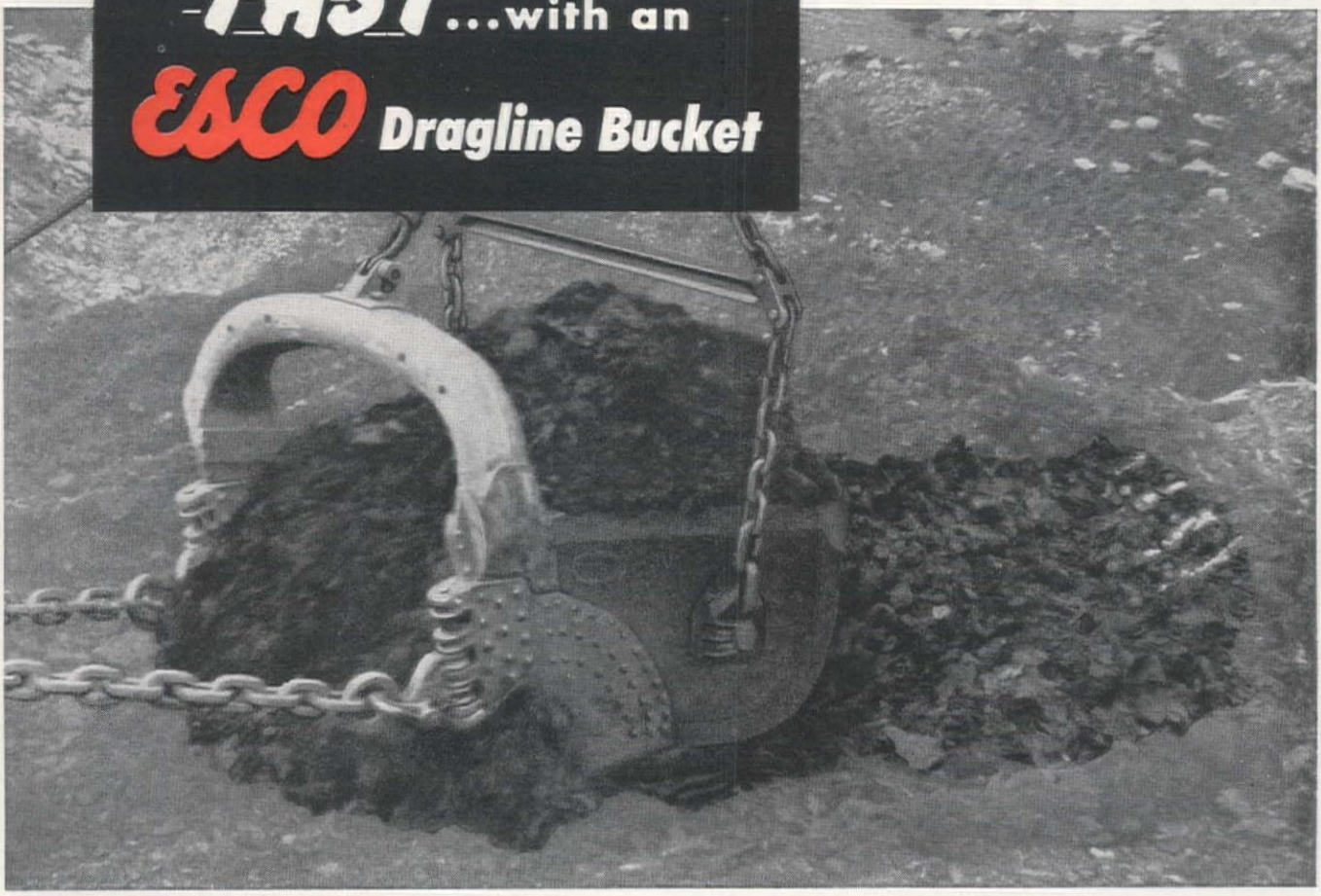
ESCO 4-yard standard stripping dragline bucket working in Pennsylvania strip mine. Machine is P&H 1055LC with 80-foot boom.



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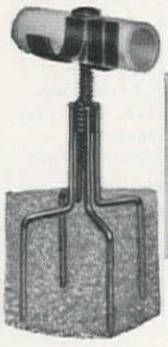

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NEWS OF WESTERN CONSTRUCTION OCTOBER 1951

Charles H. Purcell, one of the West's great engineers, is dead

CHARLES H. PURCELL, 68, California's Director of Public Works until July 31 of this year, died September 7 at his Sacramento home. Noted for his achievements as chief engineer of the San Francisco-Oakland Bay Bridge, as well as for the Public Works directorship he had held since 1943, Purcell retired because of ill health.

Governor Warren, paying tribute to Purcell, stated: "He devoted his entire life to public service and eventually gave his life to his State. But the great public works that he planned will be a lasting monument to his memory."

Purcell's engineering career commenced during his college days at the University of Nebraska, when he worked for the Burlington System during vacations. Following his graduation in 1906, he held various positions as a structural engineer, coming to the West in 1911 for the Yuba Construction Co. of Marysville, Calif. Later that year he moved to Washington as chief engineer for the Washington Northern Railroad Co., and in 1912 was appointed first bridge engineer for the new Oregon State Highway Department.

His work in Oregon, both for the State and for Multnomah County in construction of the Columbia River Highway bridges, established his position in the West, and in 1917 he became bridge engineer for the Bureau of Public Roads, remaining until 1928.

At that time he joined the State of California as State Highway Engineer, and in 1929 he became secretary of the Hoover-Young bridge commission, established to locate the San Francisco-Oakland bridge site. Following his conduct of surveys for the bridge, he was named its chief engineer, realizing a boyhood dream of achievement in bridge engineering. After the Bay Bridge was completed in 1936, Purcell was recognized for his part in its construction by election to the presidency of the American Association of State Highway Officials in 1938.

A national authority on public highways, Purcell became California's Director of Public Works in January 1943. In 1944 he received the George S. Bartlett Award bestowed by the American Association of State Highway Officials, the American Road Builders Association, and the Highway Research Board of the National Research Council. He was an honorary member of the American Society of Civil Engineers.

IN ONE of his last public appearances, Purcell (left) was handed safety merit award won by California. Governor Warren of California made the presentation at the annual conference of the Western Association of State Highway Officials at San Francisco in June, 1951.

In California he held ex-officio positions with the Governor's Council, the California Toll Bridge Authority, and the State Public Works Board. He was chairman both of the California Highway Commission and of the California Water Project Authority.

At the annual meeting of the Western Association of State Highway Officials held in San Francisco last June (*Western Construction*—August 1951, pp. 78-79), Purcell witnessed the presentation to California of the National Safety Council's annual award for outstanding engineering performance in traffic safety activities.

Interim Director of Public Works since Purcell's retirement has been the former deputy director, Frank B. Durkee.

Lightning touches off dam blast: nine men killed

NINE MEN were killed August 24 when a bolt of lightning touched off dynamite prematurely at the site of Reservoir No. 22 Dam, 25 mi. northwest of Denver. Seven men, most of whom were high scalers, were killed instantly, and two died later in a Denver hospital.

The accidental blast occurred at 1:50 p. m., Friday, August 24. Dynamite had been placed in drill holes along both walls of the 340-ft. deep canyon. At an inquest later, the foreman testified that he intended to shoot the loaded holes when they were ready, the same day.

When the lightning struck it detonated the two groups of holes which were on opposite sides of the canyon and about 300 ft. distant from each other. Men as far away as 800 ft. received electric shock from a surveyor's chain and a 6-in. iron pipe.

Located on South Boulder Creek between Pinecliff and Eldorado Springs, the dam is in the first stage of construction. The initial construction contract, approximately $7,000,000, was awarded in mid-May to a joint-venture of Macco Corp., Paramount, Calif., and Puget Sound Bridge & Dredging Co., Seattle. The project will provide additional water storage for the City of Denver and water supply for the new Atomic Energy Commission plant at Rocky Flats by regulating use of water from Moffat Tunnel. Completion is scheduled for 1954. A picture of high scalers on a canyon wall at the dam site, with a short description of the project, was presented in *Western Construction*—July 1951, page 76.

Eighteenth Coulee generator completes power plant

THE LAST of eighteen 108,000-kw. generators at Coulee Dam is expected to be in operation this month, completing the 1,974,000-kw. installation that has been in progress since 1941. Ceremonies will mark the occasion, with representation at the power plant by personnel of Westinghouse Electric Corp., which built these world's-largest hydraulic generators.

Razing of sunken vessel attracts wide range of bids

CONTRACT for removal and/or demolition of the wreck *USS Benevolence*, lying off the entrance to San Francisco harbor, has been awarded to the low bidder, a joint venture composed of Charles K. Johnston and J. Rodney King of Lewis, Delaware. Bid price was $297,973.

The *Benevolence* foundered in 12 fathoms of water following collision with the *SS Mary Luckenbach* on August 25, 1950, about 2½ mi. WSW of Mile Rock and immediately adjacent to the main ship channel for traffic entering and leaving the Golden Gate. Abandoned by the Navy Department, the former hospital ship has become a menace to navigation in waters under jurisdiction of the Corps of Engineers.

Col. K. M. Moore, District Engineer at San Francisco, presided at the bid

opening August 23, when five firms bid the job, their prices ranging to $3,975,000. Only one included a statement of the method to be used—pontoons to raise the hulk. Engineers-estimate, based on demolition, was $1,190,000.

The *Benevolence* was a C-4 type cargo vessel converted for Naval service in 1945. The 520-ft. craft, pierced in three places in the collision, has since begun to break in two parts at a new rupture amidships. Lying on her port side in a shallow, open roadstead, she presents a problem of access to the contractor. Her presence and position make for turbulence and confused seas on the surface, and for poor visibility below due to the sand and silt in suspension. Time for completion of the contract is set at December 31, 1952.

AGC president warns against snags in new "Controlled Materials Plan"

CAREFUL administration of the new federal Controlled Materials Plan was urged by Glen W. Maxon, president of Maxon Construction Co. and The Associated General Contractors of America.

Maxon predicted many bottlenecks, failures to complete contracts on schedule and other dire consequences if the new National Production Authority scheme is not thoroughly successful. The Plan states that all controlled materials required in construction, above certain specified small amounts, must be secured through the Controlled Materials Plan. Allotments of the controlled materials are made to the various construction programs, and government claimant agencies then make allotments to individual construction projects.

Maxon told the mid-year meeting of the governing and advisory boards of the AGC that every effort must be made to keep partially completed projects from coming to a standstill. Government construction will continue to get 100% of its demands, but fringe projects might well be delayed and extra expense incurred if snags occur in the administration of the policy.

Folsom Dam contract is $29,444,000; thirty-five contractors enter bids

THIRTY-FIVE heavy construction contractors, composing seven joint ventures, entered bids in the competition for award of a Corps of Engineers contract to build Folsom Dam on the American River, in California. Winning low bidder at the opening held August 31 was Merritt-Chapman & Scott Corp. of New York City and The Savin Construction Corp. of East Hartford, Conn., submitting an offer of $29,444,000. A complete summary of unit bid prices, including the Corps of Engineers estimate, appears beginning on page 128 in this issue of *Western Construction*.

As the hour for bid opening approached, an overflow crowd of bidders' representatives and the press jammed the conference room and adjacent offices at Corps of Engineers district headquarters in Sacramento. Rumors had the big multiple-purpose project priced all the way from $24,000,000 to $60,000,000. As it turned out, the spread between high and low bidders ranged from about 94% to 132% of the Corps' estimate which, not including allowance for profit, totaled $31,434,425.30.

Merritt-Chapman & Scott was represented at the opening by William Denny, vice president, accompanied by Jim Tripp, well known for his past participation in major engineering construction projects of the West. Presiding at the opening, Col. C. C. Haug of the Sacramento District, has since seen the contractor commence work at the dam site.

Problems posed at the dam site include measures to control the American River, which only last fall went on the rampage to register a record flow of over 200,000 cfs. Topographic features of the reservoir area and upstream hydraulic mining a century ago have resulted in deep channel deposits of unconsolidated gravels, necessary excavation of which comprises a 2,300,000-cu. yd. item in project specifications.

In addition, construction operations must be planned in a manner that will not endanger security of Folsom State Prison, located on the river's left bank just below the dam site.

Although the present contract will achieve the major objectives of damming the river channel with a rolled earthfill embankment and providing a concrete spillway of 606,000-cfs. capacity, previously awarded contracts cover other essential work, including construction of auxiliary dikes on the rim of the 11,500-acre reservoir. Tailrace channel and powerhouse excavation are currently in progress under a $1,463,720 contract awarded Guy F. Atkinson Co. by the Bureau of Reclamation, which is engineering project power features.

FOR THE RECORD bidders' representatives and press personnel tabulate Folsom Dam bid prices (left) as read by O. H. Hart, deputy chief of the Sacramento district operations division. At right, handshake by Col. C. C. Haug acknowledges apparent low bid of Merritt-Chapman & Scott representative, Vice President William Denny.

NEWS IN BRIEF

Single blast makes a cofferdam

A SINGLE SHOT dropped 50,000 cu. yd. of rock into the Clark Fork River at Cabinet Gorge, Idaho, on August 21, forming the upstream cofferdam for Morrison-Knudsen operations in constructing Cabinet Gorge Dam for Washington Water Power Co. Weeks of drilling preceded the event, as powder crews placed 32 tons of dynamite in the canyon wall.

Additional earth will top the new cofferdam to prevent overtopping by unexpected flood flows. Normal flows prior to next spring will be accommodated by the two 29-ft. diameter diversion tunnels, carrying 60,000 cfs. of water 1,100 ft. across a point of land around which the river formerly flowed in a sheer channel 140 ft. deep at the dam site between 300-ft. canyon walls.

Upon completion next year, the new 200,000-kw. hydroelectric project will be the biggest in Idaho and also the largest of 11 units of Washington Water Power Co.

New USBR offices at Carson, Nevada

NEW OFFICES of the Bureau of Reclamation are being opened this month in Carson, Nevada, to serve all the state except the region of Las Vegas and Boulder City. About 25 Bureau personnel will staff the new quarters, under the direction of H. A. Hunt.

Investigations to be conducted from the Carson office will include, successively, surveys of the Truckee and Carson rivers. The Truckee, its channel passing through the center of Reno, flooded several blocks of business and residential development following heavy rains in the Sierra Nevada last November.

Colorado airport runway is jet-proof

COMPLETION is expected this month of runway extensions at Buckley Field, Denver Naval Air Station. The new 2,000 ft. added to the north-south runway will give a total length of 10,000 ft., adequate for the latest jet aircraft.

Major portion of the extensions is of concrete, since it has been found that jet exhaust heat occurring on take-offs disintegrates bituminous surfacing over a period of time.

An all-concrete hangar 310 ft. long is included in the $2,800,000 program for construction of station facilities.

Montana's largest bridge job done

MONTANA'S LARGEST bridge construction contract, $1,640,474.35 for the O. S. Warden Memorial structure at Great Falls, was completed last month and the occasion observed with dedication ceremonies on September 14. Nearly

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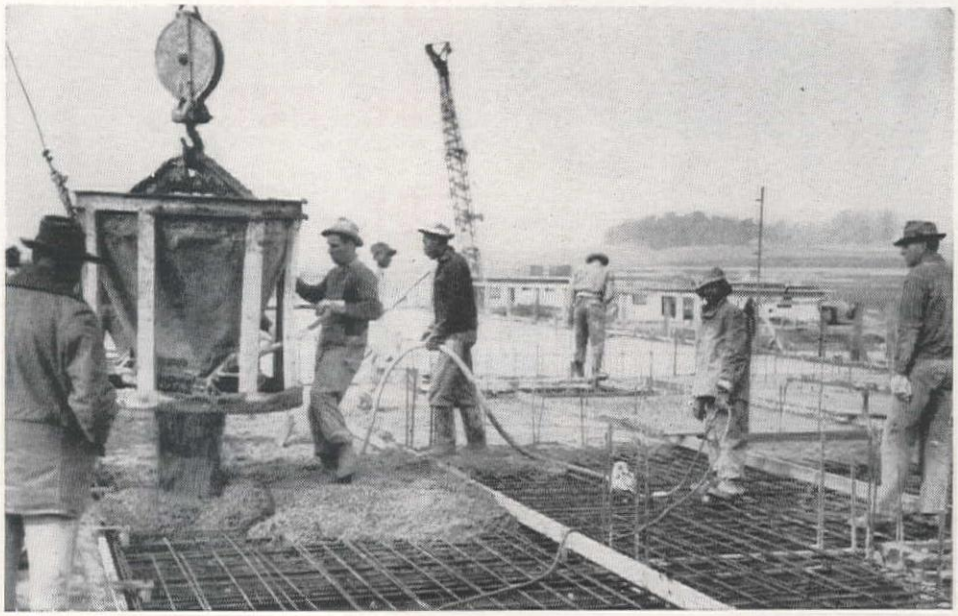

Placing cement floor slabs for barracks at one of the great Western Air Bases. (U. S. Army Engrs. photo.)

PERMANENTE CEMENT COMPANY, as the West's largest cement plant, has naturally been called upon to furnish a major portion of the millions of barrels of cement required for the Pacific Area Defense effort. Only the Company's tremendous production facilities and widespread distribution system, expanded by more than 180 per cent in ten years, has made it possible for Permanente to carry on its dual role of providing huge quantities of cement for defense and still supplying, as nearly as possible, the needs of its civilian customers.

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2,100 ft. long, including approach viaducts, the bridge is the longest in the state and took two years to build. Work by the Anderson Construction Co. was covered in *Western Construction* for April 1951, pp. 84-86.

The bridge design is notable for incorporation in its design of T-shaped piers 45 to 58 ft. high. In the flow cross-section of the channel these take the form of cylinders 10 ft. in diameter; above it they are of 6 x 7-ft. rectangular section. Cross beams supporting girders for the 34-ft. deck are 4½ ft. thick and range in depth from 9 ft. at the column to 6½ ft. at the ends.

Students win welding awards

SIX WESTERN engineering students made the grade in the 1950-51 competition for undergraduate awards and scholarships sponsored by the James F. Lincoln Arc Welding Foundation. Third place was taken by Paul E. Potter, civil engineering student of Oregon State College, with his paper "An All Welded Steel Bridge." Among the runners-up were Robert S. Kemper, Jr., and Robert L. Forbes, also of Oregon State; Dov Hasanovitsh of UCLA, Bradley O. Reese of Stanford, and Douglas M. Jardine of the University of Colorado.

"Holed through" at Yale Dam

THE LEWIS RIVER diversion tunnel at Yale Dam site in southwestern Washington was holed through on August 25, ending a 1,500-ft. tunneling operation that clears the way for construction of a rockfill dam 270 ft. high. A horseshoe section 32 ft. in diameter, the concrete-lined tunnel bypasses the scene of earth-moving operations that will include placement of 4,200,000 cu. yd. of material in both the main channel and a tributary valley.

Yale Dam, 1,600 ft. across its crest, will be completed in 1952, its power plant providing 100,000 kw. for Pacific Power and Light Co. An impervious clay core will be buried by a crushed rock fill, with quarried rock slope protection completing construction. Source of the material is a quarry above the dam's left abutment.

Precast course at San Francisco

AN 8-WEEK class of instruction and seminar in precast reinforced concrete tilt-up construction is being presented in San Francisco, beginning October 2. Sessions are scheduled for each Tuesday evening at the University of San Francisco. Cost of the course, sponsored by F. Thomas Collins, consulting engineer of San Gabriel, Calif., is $75.00, which permits an engineering or construction firm to send three men to the sessions.

A similar class has already been presented in Southern California, with 108 contractors from that area attending. The eight sessions cover consecutively the following general subjects: history, present practice, patent situation, equipment required, erection, joinery, estimating, methods of construction, building department requirements and future

New York's City Hall, completed in 1811, as it looked 100 years ago

The City of New York has several cast iron water mains in service that were laid more than a century ago. They are part of approximately 5,000 miles of cast iron mains representing about 98% of all the pipe in New York's distribution system. The contrast in traffic and construction, above and underground, today and 100 years ago, is fantastic. Yet the shock-strength, crushing-strength and beam-strength of cast iron mains have enabled them to withstand the unforeseen stresses imposed by vast changes. Because of these strength factors and effective resistance to corrosion, cast iron water and gas mains laid over 100 years ago, are still serving in the streets of 38 cities in the United States and Canada.

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precast techniques. More information may be obtained from the University of San Francisco or from F. Thomas Collins, 921 West Las Tunas Drive, San Gabriel, Calif.

Bids called for Wyoming power plant

BID CALL is expected late this month for construction of Alcova power plant, a unit of the Bureau of Reclamation Kendrick Project near Casper, Wyo. Main item of the two-unit, 37,900-kva. installation is the plant building, 82 x 119 ft., having a concrete substructure and steel superstructure. Other work includes construction of 18-ft. diameter steel penstocks from the outlet works to the power plant, and installation of two 26,500-hp. turbines to be furnished on a separate contract by Newport News Shipbuilding and Drydock Co.

Excavation quantities amount to 40,000 cu. yd. common and 13,000 cu. yd. rock. Concrete placement amounts to 14,500 cu. yd., plus 2,150,000 lb. reinforcing steel. Time for completion of the work will be 930 days.

First bucket at "Chief Joe"

WITH THE POURING of the first bucket of concrete for the Corps of Engineers' Chief Joseph Dam, near Bridgeport, Wash., another link in the Columbia River development program was actively under way. After many months of three-shift schedules by Chief Joseph Builders, the big pour began.

When completed, Chief Joseph Dam will have the second largest hydroelectric power plant in the world. The largest is at Grand Coulee Dam, upstream from Chief Joseph. Eventually 27 generating units of 64,000 kw. each will offer 1,728,000 kw. of installed capacity. The equipment will be housed in the more than 2,000 ft. long structure on the south side of the river.

The dam itself will rise 220 ft. when completed in 1956, and its backwater will extend 51 mi. upstream to the tailrace of Grand Coulee Dam. (See *Western Construction*--March and November 1950, August and September 1951.)

Forced to force account in Arizona

CONSTRUCTION of an $800,000 municipal water supply project for Safford, Arizona, will be carried out by that city's own force. Additional equipment has been purchased to aid in the work, which involves placement of 12- and 16-in. steel pipe from Bonita Canyon to Safford.

Although bids were taken for the job, the City felt that the $70,000 descrepancy between its estimate and the low bid was excessive, and therefore determined to do the work on force account.

Geological second story in Denver

EXPANSION of U. S. Geological Survey facilities in Denver, Colo., is included in an appropriations bill that reached President Truman late in August. Plans for the $2,000,000 work accompany the Department of the Interior bill.

The construction schedule marks $900,000 for 1951-52 expenditure and a like amount the following year to build a second story to present Geological Survey quarters in the Federal Center. An additional $500,000 is provided for laboratory equipment under the scheme, which would achieve centralization of over 1,000 employees of 16 Survey branches, four major divisions, and two national headquarters.

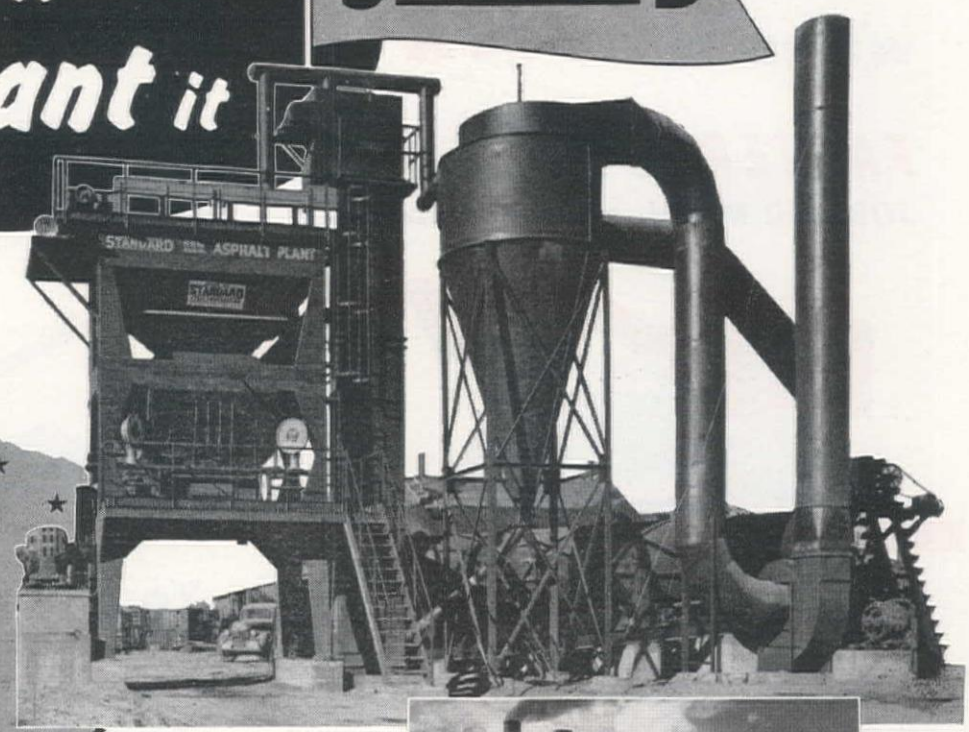
Weldless chain products list

PROPOSED by the Chain Institute, Inc., a simplified list of kinds and sizes of weldless chain and chain products has been approved by the Commodities Standards Division, U. S. Department of Commerce. Known as Simplified Practice Recommendation R245-51, the recommendation takes effect this month.

Criteria governing coverage of the Chain Institute proposal were uses and demands for weldless chain products. The new recommendation, affording an adequate selection for ordinary use and for stock, extends to finishes for the 26 items as well as to their size classification. Copies of the recommendation may be obtained from the Commodity Standards Division, Office of Industry and Commerce, Washington 25, D. C.

To see it is to want it

STANDARD



Stars indicate locations of new Standard plants

...that's why

9 operators in a single Texas-New Mexico area all chose STANDARD within 6 months

The first of the Texas-New Mexico installations of the new STANDARD SM SERIES ASPHALT PLANT was in February, 1951, at Albuquerque, New Mexico. News travels fast in the great Southwest. Operators from the surrounding territory came, saw, and were convinced. In less than 6 months eight more STANDARD PLANTS had been purchased in the same area.

The reason is performance. To see the new STANDARD PLANT in action is to immediately appreciate what a big factor it is in reducing paving costs. It is the contractor's plant — less down-time, greater capacity, and smoother operation. Again STANDARD proves why STANDARD PLANTS have been preferred all over America for more than 30 years.

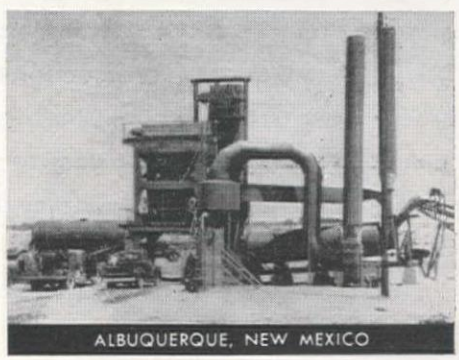
AMERICA'S MOST MODERN ASPHALT PLANT

Look at those advanced features

• Roller bearing equipped, twin-shaft mixer with patented sectionalized lining for easier, more economical replacement • Vertical hot elevator to cut friction and vibration • Fully dust sealed throughout • New easy motion control levers at operator's station to reduce fatigue factor • Individual electric motor drives • Manual or fully automatic weighing • Pressurized oil heating system • All parts easily accessible • Clean, straight line design for elimination of vibration • Completely synchronized flow • Unit built for easy erection, dismantling and transportation.

8 SIZES — 500 TO 6000 POUND BATCH CAPACITIES

TUCUMCARI, NEW MEXICO



ALBUQUERQUE, NEW MEXICO

STANDARD

SM SERIES

ASPHALT PLANT

Manufactured by

STANDARD STEEL CORPORATION

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THINGS MOVE FASTER when a "QUICK-WAY" is on the Job!

Reg. U. S. Pat. Off.

FASTER TO and FROM the JOB • 50 M.P.H. on the Highway

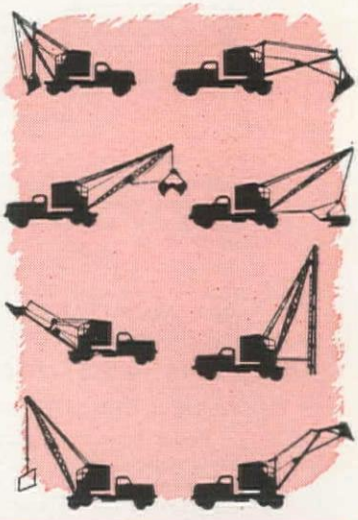
MORE WORK FINISHED ON THE JOB FASTER

You Make PROFITS FASTER

Job Tickets tell the story... *more hours of work each day... more work per hour... lower operating costs... lower maintenance costs*... it all adds up to *bigger profits for you.*

Yes, *QUICK-WAYS make faster profits*—give you fast truck speed between jobs—eight money making attachments—fast working speeds—4 models from 3 to 10 ton crane capacity.

—and quality construction too—all steel for strength and lightness—accurate balance—high capacity to weight ratio. More parts are interchangeable and easy to get at, which simplifies maintenance and repairs. All parts deliver their capacity rating and more. This fine construction means longer life—more profits on a small investment. They're economical to buy. Ask your distributor for a free demonstration.



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"QUICK-WAY" TRUCK SHOVEL CO.

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"QUICK-WAY" TRUCK SHOVEL CO.
Dept. 21—2400 East 40th Ave.,
Denver, Colorado

Please send me complete details on "QUICK-WAY" truck shovels—four different models for large jobs and small.

NAME_____

ADDRESS_____

CITY_____ STATE_____

ENGINEERS ON THE MOVE

Parker, Hill & Ingman, well-known Seattle, Wash., engineering firm, now occupies new offices at 1728 E. Madison St. **I. Curtiss Parker, Allen E. Hill** and **Gordon G. Ingman** felt the move was necessary to acquire additional office space and expanded parking facilities.

* * *

C. B. Cox, Bureau of Reclamation engineer at Coulee Dam, retires to assume new duties as office engineer for Aluminum Company of America, constructing the new Malage reduction plant near Wenatchee. Cox has worked on early surveys for the Columbia Basin Project, as assistant engineer on the Yakima Project and as structural and design engineer for the City of Portland, Ore.

* * *

Alfred Merritt Smith retires as state engineer for Nevada. His interest in the field of reclamation and water resources law will still receive some of his time. He will remain a director of the National Reclamation Association, a member of the Nevada Interstate Compact Commission and chairman of the State Board of Registered Professional Engineers.

* * *

Four officers in the North Pacific Division of the Corps of Engineers are promoted to the temporary rank of Lieutenant Colonel. The four officers are: Majors **Sam F. Warren, Dean W. Barnes, Harrington Cochran** and **John C. Mattina.** Colonel Warren is executive assistant to **Colonel T. H. Lipscomb,** Portland District Engineer. Colonel Barnes is stationed at Lookout Point Dam for training and observation of construction activities. Colonel Cochran is on duty in the Walla Walla District, and Colonel Mattina is in Anchorage with the Alaska District.

* * *

Canadian Chemical Co., Ltd., is starting construction of a new plant at Edmonton, Alberta, Canada, which will cost approximately $50,000,000. Brown & Root, Ltd., is the contractor, and **Gordon Mitchell,** chief engineer for the company is in Edmonton supervising the project. The 250-acre site, located about 7 mi. east of Edmonton, is now being cleared and work will start immediately on grading and excavations for foundations, putting in roads and construction shops.

* * *

Arthur V. Williamson, Bureau of Public Roads district engineer in Colorado, leaves soon to assume new duties as division highway engineer for the United States in Turkey. The planning work for which Williamson is going to Turkey is expected to keep him overseas for two years. Turkey is receiving the professional help of the Bureau of Public Roads in accordance with the Point Four program.

* * *

J. Clarke Williams, Bureau of Public Roads engineer, Colorado District, is en route to Monrovia, Liberia, to act as a technical consultant on highway development for the U. S. Embassy.

* * *

Fisher

Reed

W. H. Fisher retired recently as bridge engineer for the Wyoming State Highway Department. **E. R. Reed** is his successor. **W. B. Schilling,** construction engineer, Central District, since 1945 retired August 1, and his position was filled by **A. G. Gardner,** who was formerly project engineer at Casper.

* * *

J. O. Martin and **E. G. Shaver,** job chief of operations and manager of job operations, respectively, for Del E. Webb Construction Co., are engaged in construction of the Hughes Aircraft electronics plant at Tucson, Ariz.

* * *

J. N. Landis of the Bechtel Corp., San Francisco, Calif., is a member of the National Production Authority's construction advisory committee.

* * *

George M. Kephart is the new office engineer for County Surveyor Roscoe Boden in Salt Lake County, Utah.

* * *

Sheridan Everett, Corps of Engineers, goes to Meridian, Ore. to be in charge of railroad construction connected with Lookout Point Dam.

* * *

William J. McDonnal, formerly of the Planning and Reports Branch, Walla Walla District Corps of Engineers, takes over a new assignment on Okinawa. Another man leaving the district is **Raymond R. Garnett,** chief of the Supervision and Inspection Branch for the Western area. Garnett goes to the Office of the Chief of Engineers in Washington, D. C. **James Reeves,** chief of the Engineering Division, transferred recently to the North Pacific Division of the Corps with headquarters in Portland, Ore. He was succeeded by **Edwin C. Franzen,** former chief of the Design Branch. **Otto R. Lunn** replaces Franzen. **Leo R. Buhr,** chief of the Operations Division in the district, leaves his post to join the North Pacific Division. **William B. Watson** replaces Buhr.

* * *

S. P. McCasland, who for several years has been in charge of the United Western Study for the Bureau of Reclamation with headquarters in Salt Lake City, Utah, is now executive engineer, in charge of the hydroelectric division of Sanderson & Porter, consulting engineers, New York, N. Y. McCasland is well-known throughout the West, having served in several capacities with the Bureau of Reclamation.

* * *

Frank H. Davis, who has been general superintendent for Raymond Concrete Pile Co. in the Los Angeles, Calif. area, takes over new duties as Los Angeles assistant district manager. His headquarters are in the Los Angeles office of the firm with Pacific Coast District Manager **O. C. Struthers.**

* * *

Maynard N. Franklin is now vice president of H. C. Smith Co., which has changed its corporate name to Smith-Franklin Co., Inc., 718 E. 16th St., Los Angeles, Calif. The firm will continue to specialize in engineering, industrial and commercial construction.

* * *

Roy R. Friedrichs is now transitman 'A' for Pacific Gas & Electric Co. on the Bear River Hydro-Electric Project out of Jackson, Calif. Friedrichs was formerly with Donovan-James-Wismer & Becker, joint venturers at Davis Dam, Ariz.

* * *

Truman Price takes over the newly created post of senior engineer with the Public Utility District in Raymond, Wash. He has been active superintendent since **O. B. Edwards** resigned several months ago.

* * *

Ralph E. Ribal leaves the post as assistant city engineer of Oakland, Calif., to assume new duties as general manager of the Orange County Sanitation District. The East Bay Engineers Club honored him at a meeting August 10 and thanked him for his important contribution to the club.

* * *

D. M. Forester, construction engineer at Shadehill Dam, Missouri River Basin Project, and later the construction engineer at the transmission division in South Dakota, goes to Billings, Mont., as district engineer for the Bureau of Reclamation.

* * *

John Duff, former Wenatchee, Wash., city commissioner, is now associate Grant County Engineer. He will head the Quincy office of the county engineer

and handle the farm road construction for the Columbia Basin area. **Frank Englehorn** will head the branch office to be established at Moses Lake.

* * *

Webb Hoover, secretary of the Toll Bridge Authority in the State of Washington, takes on additional duties as engineer in charge of toll bridges and ferries. He relinquishes his duties as office engineer to **Herbert C. Higgins,** traffic engineer. **Rex Sill** becomes acting traffic engineer.

* * *

Reuben Eldredge is now field engineer with the Nevada Highway Department. He was formerly assistant division engineer. In his new post, Eldredge will prepare final details on new contracts and check construction work throughout the State. He will headquarter at Carson.

* * *

H. L. Senger, Boise, Ida., will act as a consulting engineer to the Sierra Pacific Power Co., Reno, Nev., on the design of dams to replace those existing in the Truckee channel, Wingfield Park.

* * *

Lawrence H. Hansen is now in Billings, Mont. in a new position as hydraulic engineer, Bureau of Reclamation, Region 6. He was formerly chief of the hydrology unit for the Missouri Oahe District, Huron, S. D. Hansen will direct topographical and geological surveys relating to water supply and control, stream flows, runoffs, etc. The results of this research work will be used by the Bureau as reference for future dam and reservoir construction. Hansen replaces **Leonard H. Dicke,** who took a military leave of absence from the Bureau.

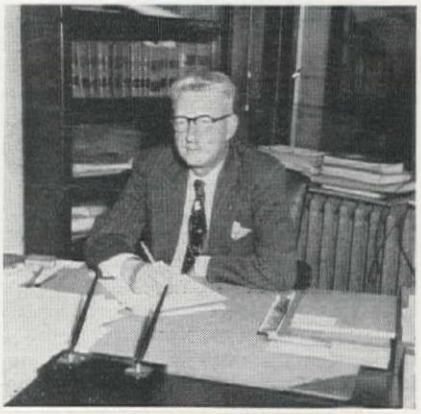
* * *

Swan Erickson, former Phoenix, Arizona, engineer, is now associated with Engineering Affiliates, consulting engineers, 74 New Montgomery St., San Francisco, Calif.

* * *

New Dean of Engineering at the University of Arizona is **John C. Park,** former professor of highway engineering.

* * *



***Earle V. Miller*, new highway engineer for Idaho and former deputy highway engineer for Arizona. (See *Western Construction*, August, pg. 106.)**

* * *

A. D. Engle, district engineer at Chicago, Ill. for The Austin Company, receives a new appointment as assistant vice president for research. He will be responsible for special engineering assignments and certain foreign assignments. Engle will headquarter in Cleveland, Ohio. **George Miller** replaces Engle at Chicago. He is a native of Coeur d'Alene, Idaho, and a civil engineering graduate of the University of Idaho. He worked on the planning of naval facilities in the Pacific Northwest, as office engineer for the Portland Cement Assoc. at Spokane, Wash., as structural engineer for the City of Tacoma, Wash. and as chief engineer of the Public Works Administration for Boise, Idaho.

* * *

V. H. Todd, Sr., is now a detailer on concrete forms for the McNary Dam Contractors. He was formerly with Messer, Toye & Associates, Portland, Ore.

* * *

Morton Macartney, city engineer of Spokane, Wash. from 1910 to 1917, recently retired from the Reconstruction Finance Corp. after 20 years of service. Macartney visited Spokane upon his retirement to examine the projects he had supervised as city engineer. Bridges were Macartney's specialty both as city engineer and later in connection with his RFC work.

CALENDAR OF MEETINGS

October 10-13 — Associated Equipment Distributors, joint regional meeting of active, associate and allied members from the eleven Western States, at Sun Valley, Idaho (see more details on page 126, this issue).

October 11-12—Structural Engineers Association of California, annual meeting, at Yosemite National Park, Calif.

October 14-17—League of California Cities, annual convention, at San Francisco.

October 15-17—League of Oregon Cities, annual convention, at Multnomah Hotel, Portland.

October 21-24 — American Bridge, Tunnel and Turnpike Association, annual convention, at St. Francis Hotel, San Francisco.

October 22-26—American Society of Civil Engineers, annual convention, at Statler Hotel, New York City.

October 23-26—American Association of State Highway Officials, fall meeting, at Fontinelle Hotel, Omaha, Nebraska.

October 23-26 — California Section, American Water Works Association, annual meeting, at Fairmont Hotel, San Francisco.

November 23-24—Arizona Society of Professional Engineers, joint meeting and dinner dance to which all Arizona engineers are invited, at Phoenix.

November 24—Arizona Section, ASCE, fall meeting, at Adams Hotel (tentative), Phoenix.

November 30-Dec. 1—Northern California Chapter of AGC, annual business meeting and banquet, at Palace Hotel, San Francisco.

December 3—Denver General Contractors Association, annual meeting, at Denver.

December 18—San Francisco Section ASCE, annual meeting, at Engineers Club of San Francisco.

January 10—San Diego Chapter of AGC, annual meeting, at San Diego (address of chapter 455-6 Spreckels Bldg., San Diego).

January 11-12 — Intermountain Branch of AGC, annual convention, at Salt Lake City (address of branch, 430 South Main St., Salt Lake City).

January 11-12 — Montana Contractors' Association, annual meeting, at Florence Hotel, Missoula, Mont.

January 21-23 — American Road Builders' Association, 50th anniversary convention, at Houston, Texas.

February 6-8—California Conference on Street and Highway Problems, fourth annual conference sponsored by the Institute of Transportation and Traffic Engineering, University of California. To be held on the Los Angeles campus of the University of California.

DEATHS

William L. Young, 74, died suddenly in Wolf Point, N. Dak. Young, an active civic leader all his life, campaigned for the Missouri-Souris irrigation project and one of the first bridges ever put across the Missouri River.

* * *

William H. Harrelson, 79, banker and builder, died August 23 in his San Francisco, Calif. home. Harrelson and his brother, Derrett, started a contracting firm in 1895. The firm later become Duncanson & Harrelson, contractor for the Carquinez and Antioch bridges and many other projects throughout the State. From 1937 to 1942, Harrelson was manager of the Golden Gate Bridge.

* * *

Alfred Wessel, 60, contractor, died in Denver, Colo. after a brief illness.

* * *

Andrew Weiss, consulting engineer and former professor at Colorado School of Mines, died September 2 in Mexico City. Weiss' career included service with the Bureau of Reclamation as assistant engineer on canal and reservoir projects in Nebraska and Wyoming. In 1924, Weiss became director of reclamation economics, a position he held for two years, before returning to the field as resident engineer on Mexican reclamation projects.

* * *

Maurice D. Plummer, 44, died in an accident July 23 in Jackson, Calif. He was an engineer and superintendent for Frank Pinkerton, Corona, Calif., and Haas and Rothschild, San Francisco. Plummer was well known in construction circles in the San Francisco Bay Area. He formerly served with the State Highway Department of Tennessee.

* * *

Selwyn Allen, 54, retired city structural engineer, died August 10 in Los Angeles, Calif.

* * *

Allen I. Biggs, 84, highway contracting engineer, died August 13, in Los Angeles, Calif.

* * *

Leland S. Rathbone, 60, field engineer, died August 24 in Tracy, Calif. after a brief illness. He was employed by Johnson, Drake and Piper, builders. Rathbone was a key man on construction of the California Vocational Institute near Tracy.

* * *

Michael J. Burke, 63, contractor, died August 26, while visiting in Seattle, Wash. Burke lived in Spokane, Wash., where he built many highways and streets.

* * *

Ivan C. Anderson, 72, retired civil engineer, died August 30 in a Portland, Ore. hospital. Anderson at one time was district surveyor in the city engineer's office in Portland.

* * *

Justin T. Kingdon, 78, retired civil engineer, died August 31 in his Denver, Colo. home after an illness of several years. Kingdon had been city engineer in Casper, Wyo. and assistant state engineer in Wyoming before coming to Denver.

* * *

Allen Reid Greene, 36, civil engineer, took his own life in a Phoenix, Ariz. hotel August 30.

* * *

Edward Peterson, 80, railroad and heavy construction contractor, died August 15 in his Omaha, Neb. home. Peterson was senior member of the Edward Peterson Company of Omaha.

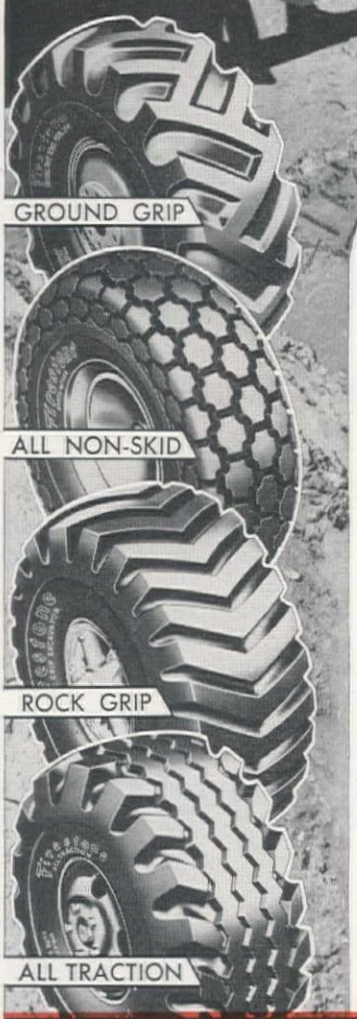
* * *

George Lyle Snow, 67, civil engineer, died August 6 in Huntington Memorial Hospital, Pasadena, Calif., of a heart ailment. Snow was a native of Salt Lake City, Utah, where he served with the Corps of Engineers during World War II.

* * *

John D. MacLean, 91, builder, died August 11 in Los Angeles, Calif. MacLean was a pioneer developer of Catalina Island. He aided the construction of many of the hotels and residences on the Southern California resort island.

LESS DOWNTIME *for Tire Changes*
LESS UPKEEP *for Tire Repairs*
LESS OUTLAY *for Tire Replacements*



It's a Fact... It Costs You Less to Run

Firestone
OFF-THE-HIGHWAY TIRES

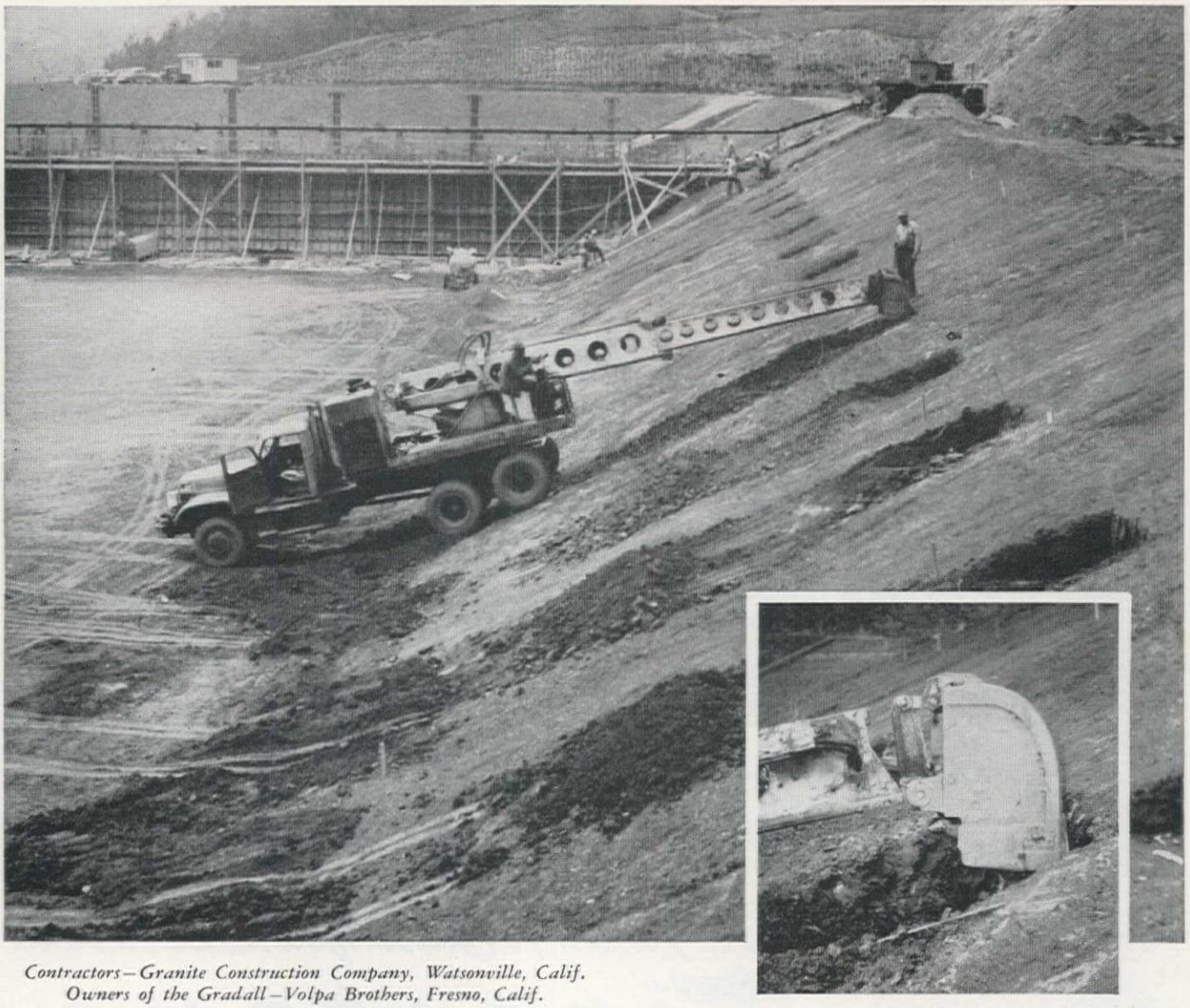
IT COSTS you less to run Firestone Tires because their treads are extra tough to withstand cutting and abrasion, extra thick to deliver more miles of service. And, whether your work is in sharp rock, loose earth or slippery clay, Firestone Tires have treads especially designed to meet your particular requirements.

It costs you less to run Firestone Tires because their extra-strong Gum-Dipped rayon cord bodies are the next thing to trouble-free. Protected against impact by four special tread plies and guarded against cuts and snags by double-thick sidewalls, they run longer without interruption, remain in better condition for additional retreading.

Firestone Tires cost you no more to buy than other popular makes, cost a considerable amount less to run. Make a note now to buy your next tires from your nearby Firestone Headquarters.

WHEN YOU BUY NEW EQUIPMENT OR REPLACEMENT TIRES, SPECIFY FIRESTONE

Enjoy the Voice of Firestone on radio or television every Monday evening over NBC



Contractors—Granite Construction Company, Watsonville, Calif.
Owners of the Gradall—Volpa Brothers, Fresno, Calif.

Gradall solves tough excavation problem on San Francisco Reservoir project

THE San Francisco Water Department recently completed a difficult excavation job according to schedule, thanks to the Gradall. In building a 30,200,000 gallon reservoir, it was necessary to excavate for the foundations of over 500 columns which will support a concrete "roof" over the reservoir. This meant that clean, vertical cuts were needed—and more than 100 of the footings were on a 2 to 1 slope of the reservoir's banks.

Yet the Gradall completed the job simply and speedily—while virtually eliminating slow, costly hand labor!

This story is just one more example of the Gradall's extreme versatility. But it's no exception. Hundreds of owners all over the country are discovering that the Gradall handles more types of construction work—more simply—than any other machine. For instance, in pipe line work, it digs the trench, lays the pipe and backfills to complete the job. You can use it to cut grades for curbs and gutters, to dig up trees, to remove pavement. It works in "tight" places inaccessible to other machines. And it's always "ready to go"—ready immediately to be driven to the next job at truck speed.

Your Gradall Distributor is also "ready to go" with a field demonstration. We'd suggest calling him—soon.

SALES & SERVICE:

COLUMBIA EQUIPMENT CO. • *Portland, Ore.* • *Boise, Idaho* • *Seattle, Wash.*
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Gradall®
DIVISION OF WARNER & SWASEY *Cleveland*

GRADALL—THE MULTI-PURPOSE CONSTRUCTION MACHINE

SUPERVISING THE JOBS

George Peterson is superintendent for Claude Fisher Co., Ltd. on the Weldon Canyon job on the Ridge Route to Bakersfield, Calif., a distance of 5-1/10 mi. **Lawrence Davis** is master mechanic on the $1,075,000 job. **Ace Mason, Floyd Johnson** and **Claude E. Lee** are grade foremen. **Jim French** is the office manager.

* * *

Calvin Clyde **(right), superintendent for W. W. Clyde Co., Springville, Utah, was struck by a speeding truck while flagging traffic over a detour during highway construction near Salt Lake City. Clyde is now taking a post-graduate course at the University of California and *Lorus Palfreyman* has succeeded him at the superintendent's post. With Clyde above is *Ed Kennelly*, resident engineer for the Utah highway department.**

* * *

J. R. Ricker is area superintendent for Morrison-Knudsen Co., Inc., on a project for the Southern Pacific Company in Roseville, Calif. **I. D. Robbins** is superintendent, **Bud Snowball** and **Bob Overman** are excavation foremen and **J. O. McGinnis** is concrete foreman. **Dallis Matthews** is master mechanic on the $500,000 job. **W. F. Turner, D. K. McNeer** and **G. L. Dutton** are engineers on the project. Morrison-Knudsen Co., Inc., recently completed two contracts for the Corps of Engineers on the Folsom Dam Project. **A. F. Kull** was project engineer.

* * *

Preliminary excavation at Folsom Dam is being supervised by **Ed Bell. G. C. McFadden** and **Al Posen** are shovel foremen for contractor H. Earl Parker. The Corps of Engineers project began last January and is scheduled for completion early next year.

* * *

Joe Canto and **Jim Alexander** are general superintendents for Guy F. Atkinson Co. on the excavation for power facilities at Folsom Dam. **Chris Nielson** is drill superintendent and **Cal Conaday** is electrical superintendent. The Bureau of Reclamation project will cost $1,463,721, and is scheduled for completion in December.

* * *

George Blehm is superintendent and **Peter Parker** is assistant superintendent for T. E. Connolly on construction of the $650,000 diversion tunnel at Folsom Dam, Calif. The Corps of Engineers' job will probably end in April 1952.

* * *

Construction of a terminal reservoir with a capacity of 20,000,000 gal. in Salt Lake City, Utah, is being supervised by **W. G. Waigand. Tiny Madison** is general foreman, and **Orville Saalfeld** is carpenter foreman. **Ed Bilsborough** is job engineer, **L. R. Dunkley** is project engineer for the Bureau of Reclamation and **W. F. Gentry** is resident engineer on the $1,259,940 project. **Kenneth Hansen, Thomas G. Hansen, Zenas R. Lefler** and **Carl Pulsipher** are carpenter foremen. **A. S. Wallace** and **D. F. Williams** are also carpenter foremen. Peter Kiewit Sons' Co. is the contractor.

* * *

Jack Beach**, assistant superintendent on the A. D. Drumm, Jr., highway job between Wendover and McGill in eastern Nevada. *Earl Ryan* is general superintendent on the job.**

* * *

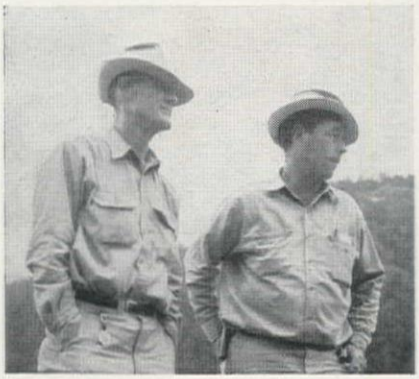
J. M. Sawyer is general superintendent and **C. L. McDonald** is job superintendent for Macco-Puget Sound, joint venturers on construction of a concrete dam across So. Boulder Creek for the City and County of Denver, Colo. **Owen J. Lloyd** is general foreman and **Fred**

Down-time Dopes . . . . . by Anderson

BOB ORR, assistant resident engineer on highway work in Alaska, suggested this month's "down-time dopes".

If you have a pet "down-time dope", write Editor, *Western Construction*, 609 Mission St., San Francisco 5, Calif., and we'll be glad to immortalize him in a cartoon in one of the next issues. You'll receive credit for the idea.

Cherry is tunnel superintendent. Huso Festich is excavation superintendent, O. V. Ross is master mechanic, and Parley Elmer is carpenter superintendent. The job got under way June 5, 1951 and is scheduled for completion March 30, 1954.

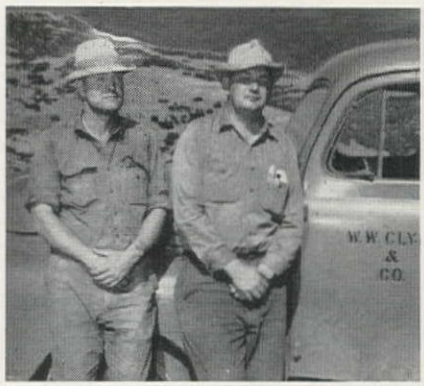


Wayne Wooten (left), project manager for Guy F. Atkinson Company, talks with foreman *Joe Baker* during earth-moving operations on the firm's 5½-mi. highway and railroad relocation project at Lookout Point Dam, near Eugene, Oregon.

In Beverly Hills, Calif., where William Simpson Construction Co. is building a new $7,000,000 department store to house J. W. Robinson Co., Oscar Erickson is general superintendent. Eric A. Erickson is general carpenter foreman, Richard H. Murphy is carpenter foreman along with Fred Bittner and Paul Veeder. George Mahan, Herbert Wright and Nels Thylander are labor foremen.

M. M. Moorehead, master mechanic for Utah Construction Co., at Bear River Dam near Jackson in Northern California. He's leaning against one of four big Euclid rear-dumps on the job, which are powered by the new NVH-1200 Cummins diesel engines (12 cylinder, rated at 400 hp.). Dam is being built for Pacific Gas and Electric Co.

Construction of the Olmstead pipe line and related structures in Provo Canyon, Utah, is being supervised by A. R. Bone, with Vernon Whiting as his assistant. United Concrete Pipe Corp. and Ross Construction Co., joint venturers, have Tom Induich as pipe-laying foreman, Theron Collings as carpenter foreman, and Chris Chrisman as welding foreman. Wesley Jolley and George Jakeman are labor foremen and E. V. Jolley is master mechanic.

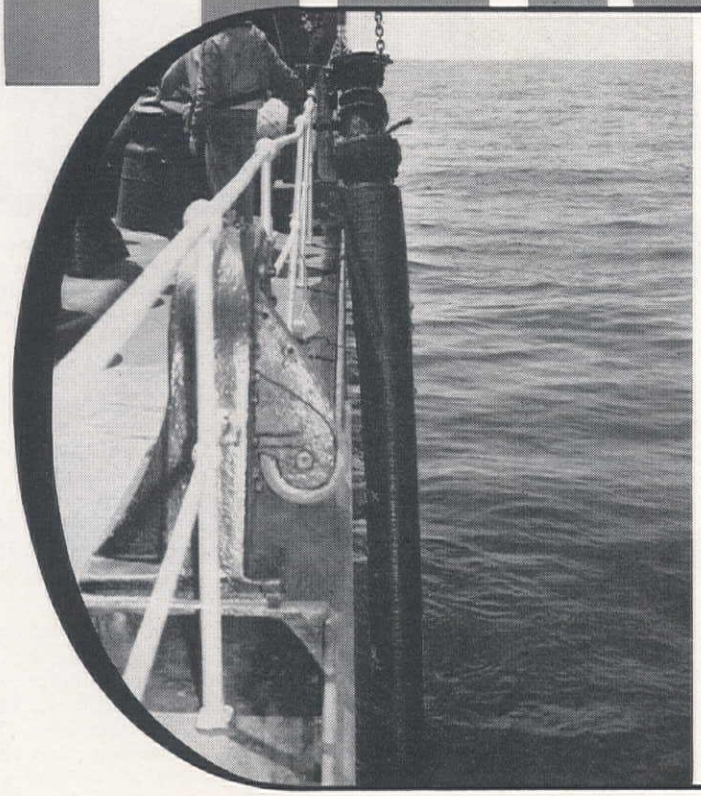


Lorus Palfreyman (left) took over as superintendent for W. W. Clyde on highway relocation job near Salt Lake City after Calvin Clyde was injured (see picture on page 115). With Palfreyman is *William Clyde*, who acted as interim superintendent until Palfreyman completed his previous job.

Moore & Roberts, Inc., and B & R Construction Co. are constructing 11 new buildings in "E" area, Dugway Proving Grounds, Utah. Gerry Haskell is general superintendent, L. Singleton

Industrial rubber products especially built for LONG SERVICE

PIONEER



Proving Ground for Pioneer Quality

This Pioneer hose spends most of its life on the bottom of the Pacific Ocean. It is part of a system used to convey fuel oil from tankers to the new Pacific Gas and Electric Company generating plant at Moss Landing, California. When a tanker arrives, the end of the hose is brought up from the bottom, and oil is pumped ashore at the rate of 5,600 gallons per minute.

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is assistant superintendent, and **Paul Haney** and **L. C. Bean** are job superintendents on the Corps of Engineers' project.

* * *

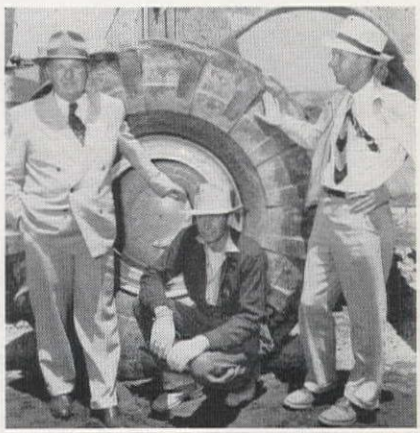
Thirteen buildings, railroad track and water and sewer lines are being constructed in Lark, Utah, for the U. S. Smelting, Refining and Mining Co. by Utah Construction Co. **O. D. Hofman** is project engineer. **J. C. McCausland** is carpenter superintendent, **J. W. Angus** is labor superintendent, and **J. T. Hoele** is steel superintendent. **A. W. Whaedon** is concrete superintendent and **Charles Worthlen** is brick superintendent. **Al Youngberg** is office engineer on the $3,500,000 job. Construction of the Bingham Tunnel in Lark, Utah, by the Utah Construction Co. for U. S. Smelting, Refining & Mining Co. is being supervised by **J. D. Kimsey. Charles Eaton** is assistant superintendent, along with **C. M. Alexander** and **Fred Arp. Don Roberts** is master mechanic and **John Gately** is chief electrician. **H. C. Miller** is project manager on the job.

* * *

Thirty-eight miles of grading and surfacing from Timpe to Dugway, Utah, is being supervised by **F. F. McKinnon** with **Aaron Smith** as his assistant. **Jack Ashbery** is grade foreman and **Fred Ryvers** is master mechanic. Olaf Nelson Co. holds the $560,000 contract on the Bureau of Public Roads project.

George Renauld is general superintendent for M. H. Hasler Construction Co. and D. & H. Construction Co. on the building of Mormon Island Auxiliary Dam, Folsom Project, Calif. **Tom Kelley** and **G. Keller** assist Renauld on the $2,194,000 contract for the Corps of Engineers.

* * *



***O. Fredrickson*, co-owner of Fredrickson & Watson Co., *Gordon Johnson*, foreman, and *K. Poss*, superintendent, on Eastshore Freeway job in Oakland.**

* * *

A. F. Carlson is general superintendent for Cahill-Mooney Construction Co. on construction of 11 buildings in "E" Area, Dugway, Utah. **Frank Despins** is assistant superintendent on the Corps of Engineers' project. Carpenter foremen are: **Karl Schmidt, Jesse Brown, Max Gammon, A. L. Stoker,** and **W. P. Petersen.**

* * *

H. W. Russell is assistant superintendent for MacDonald, Young & Nelson on construction of a housing project at Fairfield Air Base in California. **John Boykin** is framing superintendent, **Dan Fairless** is mill superintendent, and **John Murphy** is labor foreman on the job. **John A. Crowl** is project engineer and **R. M. (Red) Cameron** is project manager.

* * *

Grading and paving at Fairfield Air Force Base is being supervised by **D. G. (Bud) Hall** for Morrison-Knudsen Co., Inc. **Jim Wright** is structural superintendent, **R. A. McGovern** is asphalt superintendent, and **Jack Rutherford** is grading superintendent. **Rube Anderson** is master mechanic on the $10,000,000 project.

* * *

O. A. Cooper is general superintendent on grading and paving roads, parking areas, etc., on Columbia Steel Co.'s expansion program. J. H. Pomeroy Construction Co. has the general contract on the Pittsburg, Calif., job.

* * *

G. H. Prosise is general superintendent for R. J. Daum Construction Co. and M. J. Brock & Sons, Inc., joint venturers, on construction of seven buildings and utilities at Dugway, Utah. **Roi W. Searles** is assistant superintendent and **R. C. Riding** is project manager. **Sterling White** is resident engineer.

Dam and tunnel construction in Granby, Colo., for the Bureau of Reclamation is being supervised by **C. M. Allen, Jr.**, for Peter Kiewit and Sons' Co. **Harold Short** is assistant superintendent on the $1,294,706 project. About 300 ft. of 700-ft. long tunnel have already been bored, and about 75% of the dam excavation is complete.

* * *

On construction of electrical transmission and distribution lines at Dugway Project, Utah, **Ken McKay** is general foreman and **John Barber** is line foreman. **Harry Dewey** is project manager for C. L. Electric Co., Pocatello, Idaho.

* * *

Construction of combined operations buildings at Dugway, Utah, by Christiansen Bros. is being supervised by **Wally Christiansen** with **Arthur Trissell** as carpenter foreman and **John DeJong** as cement foreman. **Simon Christiansen** is job engineer on the project.

* * *

Don H. Bentzen, contractor, is building a $60,000 super market in Bozeman, Mont.

* * *

Grading on the Humptulips River Bridge approaches in Grays Harbor County, Wash., is being supervised by **Howard Becker** for Strong & Macdonald, Inc. **H. K. Allen** and **J. A. MacDonald** are other key men on the job.

* * *

Construction of Hoquiam Bridge in Washington by Kennard & Burnham is being supervised by **Mr. Burnham. E. L. Kennard** is the foreman.

* * *

Art (Swede) Ingwetsen is general superintendent for United Concrete Pipe Corp. on grading and paving a highway in Turlock, Calif., for the State. Rockplant superintendent is **Keith Little**, and **Leonard Vaughn** is plant foreman. **Ed Walker** is master mechanic, and **Pat Patterson** is general foreman. **Kenney Cornell** is superintendent for the firm on its project at Crowes Landing Air Base.

* * *

In Washington, where Bennett Campbell, Inc., Seattle, is engaged in highway construction along Grays Harbor County Road and Vesta School bridges and approaches, **Glen Riemer** is job superintendent and **Clark H. Eldridge** is in general charge of bridge work. Cost of the project is $173,283.

* * *

Construction of a 300,000-gal. water tank at Manhattan Beach, Calif., is being supervised by **J. R. Smith.** Pittsburgh-Des Moines Steel Co., Santa Clara, Calif., is the contractor on the $100,000 project.

* * *

Dell D. Martin is job superintendent for J. E. Haddock, Ltd., on the completion of cement silos at Oro Grande, Calif. **Frank Saver** is gunite foreman, **Roy Price** is carpenter foreman and

Continued on page 125

CONTRACTS

A Summary of Bids and Awards For Major Projects in the West

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Alaska

$4,118,252—**Haddock Engineers Ltd. and Assoc.,** Santa Fe, N. Mex.—Contract awarded for construction of the central power and heating plant at Whittier; by Corps of Engineers.

$2,505,500—**Morrison-Knudsen Co., Inc.,** 603 Hoge Bldg., Seattle, Wash.—Contract awarded for construction of bulk petroleum storage and handling facilities at Eielson Air Force Base; by Corps of Engineers.

$17,348,865—**Palmer Constructors (Peter Kiewit Sons' Co., Morrison-Knudsen Co., Inc., Coker Construction Co.)** joint venturers, Omaha, Neb.—Low bid for construction of schedule 1 of the Eklutna tunnel; by Bureau of Reclamation.

$675,410—**Stock & Grove, Inc.,** Box 2051, Anchorage—Low bid for construction of a bridge and related work on a 3.3-mi. section of the Sitka Highway; by Bureau of Public Roads.

Arizona

$960,730—**Arizona Sand & Rock Co.,** P. O. Box 596, Phoenix—Low bid for heavy grading and draining work over a new alignment, approximately 8 to 11 mi. west of Camp Verde; by State Highway Department.

$2,731,882—**Grafe-Callahan Construction Co.,** 1603 First National Bank Bldg., Dallas, Tex.—Low bid for completion of the Davis Dam spillway stilling basin; by Bureau of Reclamation.

$189,304—**Martin Construction Co.,** P. O. Box 934, Tucson—Low bid for construction of the Safford-Clifton highway, beginning at a point on U. S. Route 70, about 10.5 mi. southeast of Safford, and extending northeasterly for a distance of approximately 6⅓ mi.; consists of grading, draining, select material, aggregate base and bituminous surface treatment; by State Department of Highways.

$204,115—**Pioneer Constructors,** P. O. Box 2768, Tucson—Low bid for construction on the Gadsden-Yuma highway for a distance of about 3 mi. to the town of Somerton, including grading, draining, select material and bituminous plant-mix; by State Department of Highways.

$284,747—**Lyle Price,** P. O. Box 548, Flagstaff—Low bid for construction of the Holbrook-Lupton highway; work begins about 45 mi. northeast of Holbrook and extends northeasterly over a new alignment for a distance of approximately 7.5 mi.; consists of grading and draining a new roadway; by State Highway Department.

$358,387—**H. L. Royden,** P. O. Box 3707, Phoenix—Low bid for construction of the Winslow-Holbrook highway, for a distance of about 4 mi., including grading, draining, select material, aggregate base and bituminous plant-mix; by State Department of Highways.

$243,615—**Young and Smith Construction Co.,** 203 Beason Bldg., Salt Lake City, Utah—Low bid for construction of the Nevada state line-Utah state line highway 1 mi. north of Littlefield, Ariz.; consists of the construction of a steel girder bridge and 1¼ mi. of approach roadway; by State Highway Department.

California

$1,925,000—**James I. Barnes Construction Co.,** 299 Kansas St., San Francisco—Low bid for construction of hospital; administration building; employees' housing and garage; Institution for Epiletics; by State Division of Architecture.

$6,490,000—**Bressi and Bevanda Constructors** and **A. Teichert and Son,** P. O. Box 439, North Hollywood—Contract awarded for construction of extension and improvement of runways at Marine Corps Air Station, El Toro (Santa Ana); by U. S. Navy.

$855,472—**A. J. Cheff Construction Co.,** 2426 Ninth West, Seattle, Wash.—Low bid for construction of the Sheffield Tunnel, South Coast conduit, Carpenteria section, Cachuma Project; by Bureau of Reclamation.

$5,955,166—**F. L. B. Curtis & Assoc.,** 3459 Long Beach Blvd., Long Beach—Low bid for construction, management and finance of an 895-unit housing project at Kearney Mesa, San Diego; by Eleventh Naval District.

$2,007,473—**Fredericksen & Kasler,** 212 Thirteenth St., Sacramento—Contract awarded for grading and surfacing 9.3 mi. of U. S. 66 between 0.6 mi. north of Devore and 0.2 mi. south of Gish Underpass and constructing 4 reinforced concrete bridges and 2 culverts, to provide a freeway with a 4-lane divided roadbed; by State Division of Highways.

$879,444—**Fredrickson Bros.,** 1259 65th St., Emeryville—Low bid for construction of a state highway in Humboldt County, between 1 mi. south of Scotia Post Office and North Scotia Bridge, about 1.4 mi. in length to be graded and surfaced with plant-mixed surfacing on cement treated base and a reinforced concrete undercrossing structure to be constructed; by State Division of Highways.

$529,169—**Granite Construction Co.,** Box 900, Watsonville—Low bid for construction of a state highway in San Luis Obispo County, in the City of San Luis Obispo, at Santa Rosa St., at Ida St., and at the Southern Pacific R.R., 2 reinforced concrete bridges and an underpass to be constructed and streets to be graded and one street to be surfaced with plant-mixed surfacing on cement treated imported base material; by State Division of Highways.

$2,381,815—**Griffith Co.,** 1060 S. Broadway, Los Angeles—Low bid for construction of a state highway in Los Angeles County, on Ramona Freeway, between 8th St. and .1 mi. east of Jackson Ave., about 1.7 mi. in length to be graded and paved with portland cement concrete and 4 bridges and a pedestrian undercrossing to be constructed to provide a 6-lane divided highway with frontage roads; by State Division of Highways.

$257,203—**Harms Bros.,** 5261 Stockton Blvd., Sacramento—Contract awarded for grading and surfacing and a bridge structure on State Route 89 between 1.3 mi. and 2.6 mi. east of Picketts; by State Division of Highways.

$1,307,000—**R. R. Hensler,** 7550 Wheatland Ave., Sun Valley—Contract awarded for extending and strengthening runway 12-30 and taxiway, Mojave; by Eleventh Naval District.

$177,903—**M. A. Jenkins & R. E. Hertel,** 4521 Fifteenth Ave., Sacramento—Low bid for construction of a county highway in Plumas County at Indian Creek Bridge, about 0.8 mi. south of Crescent Mills, about 0.6 mi. in length to be graded and surfaced with R. M. S. on C. R. B. and reinforced concrete bridge to be constructed; by State Division of Highways.

$212,842—**Charles MacClosky,** 112 Market St., San Francisco—Contract awarded for construction of a reinforced concrete girder bridge across San Gabriel River on Imperial Highway, Los Angeles County; by State Division of Highways.

$1,096,023—**Means & Ulrich,** 111 E. 6th St., Santa Ana—Low bid for construction of a 75-bed, 1-story reinforced concrete hospital building, Newport Beach; by Hoag Memorial Hospital—Presbyterian.

$832,527—**M. Miller Co.,** 877 N. Bunkerhill St., Los Angeles—Low bid for construction of section 1 trunk line sewers, Sonoma; by Sonoma Valley County Sanitary District.

$225,119—**Munn & Perkins,** P. O. Box 1092, Modesto—Low bid for surfacing with plant-mixed surfacing on untreated rock base, 7.2 mi. of Sign Route 29 between the Lake County line and 1.5 mi. north of Calistoga; by State Division of Highways.

$1,137,000—**Pacific Rock & Gravel Co.,** Box 30, Monrovia—Contract awarded for extending runways, taxiways and parking areas at Brown Field, San Diego; by Eleventh Naval District.

$1,618,800—**J. A. Payton** and **Bent Construction Co.,** 5359 Valley Blvd., Los Angeles—Low bid for construction of a state highway in San Diego County, between Buena Vista Lagoon and ¼ mi. south of Mission Ave. in Oceanside, about 21 mi. in length to be graded and paved with portland cement concrete and a reinforced concrete bridge and grade separation structures to be constructed; by State Division of Highways.

$270,478—**E. G. Perham,** 1128 Stearns Drive, Los Angeles—Contract awarded for construction of a reinforced concrete structural steel bridge across Rio Hondo on Florence Ave. in Los Angeles County; by State Division of Highways.

$397,890—**O. B. Pierson,** 9521 E. Flower Ave., Bellflower—Low bid for construction of a county highway in Ventura County across Santa Clara River at Santa Paula, a structural steel and reinforced concrete bridge to be constructed, about ¼ mi. of approaches to be graded and surfaced with plant-mixed surfacing on untreated rock base; by State Division of Highways.

$1,056,885—**A. G. Raisch & Lew Jones Construction Co.,** P. O.

Box 458, San Rafael—Low bid for construction of highway ramps, a frontage road and roadbeds, placing plant-mixed surfacing, widening an existing concrete bridge, constructing a reinforced concrete bridge and installing highway lighting facilities on U. S. 101 between Myrtle Ave. in San Rafael and California Park Overhead; by State Division of Highways.

$411,268—**Roland T. Reynolds**, Rt. 4, 8751 Sunkist, Anaheim—Low bid for construction of a state highway in Orange County on Stanton Ave., between Garden Grove Ave. and Lincoln Ave., about 4 mi. in length, a new 2-lane roadway to be graded and surfaced with plant-mixed surfacing on untreated rock base over imported subbase material; the existing roadbed to be widened and surfaced with plant-mixed surfacing on existing pavement and on untreated rock base, and seal coats to be applied to provide a 4-lane divided highway; by State Division of Highways.

$189,151—**Stolte, Inc.**, 8415 San Leandro St., Oakland—Contract awarded for construction of sewers in Del Monte Grove, Monterey; by City of Monterey.

$259,694—**Sully-Miller Construction Co.**, 1500 W. 7th St., Long Beach—Contract awarded for widening and surfacing 8.9 mi. of the County Route 747 on Wright-Brookhurst St., between Wintersburg Ave. and Santa Ana Freeway; by State Division of Highways.

$385,000—**Trewhitt-Shields & Fisher**, 926 Parallel Ave., Fresno—Contract awarded for sewage and water project work, California Vocational Institution near Tracy; by State Division of Architecture.

$2,537,790—**United Concrete Pipe Corp.**, Box 425, Baldwin Park—Contract awarded for grading and surfacing 2 mi. on Santa Ana Freeway between Todd Ave. and 0.2 mi. southeasterly of Lakewood Blvd., surfacing interchange roadways, acceleration and deceleration lanes, and construction of 4 grade separation structures and bridge over the Rio Hondo, to provide a 6-lane divided freeway; by State Division of Highways.

Colorado

$165,333—**Alger Construction Co.**, Lakewood—Low bid for state highway construction between Placerville and Telluride on State Highway No. 145, in San Miguel County; grading, surfacing, structures and oil protection treatment along 8.2 mi.; by State Highway Department.

$132,528—**Broderick & Gibbons,** Pueblo—Low bid for construction of a state highway between Lamar and Granada on State Highway No. 6 in Prowers County, including stabilizing and plant-mix oil; by State Department of Highways.

$316,834—**Colorado Constructors, Inc.,** 725 W. 39th Ave., Denver—Low bid for construction of the Willow Creek Pass route through Arapaho National Forest in Grand County, to be 26 ft. wide and 7.4 mi. in length; by Bureau of Public Roads.

$466,536—**Lowdermilk Bros.,** 1950 W. Dartmouth, Denver—Low bid for construction of a state highway between Northend Valley Highway and North Washington St. and Federal Blvd., State Highways Nos. 185 and 382; by State Highway Department.

$261,962—**Schmidt Construction Co.,** P. O. Box 66, Grand Junction—Low bid for construction of a state highway between a point 4.2 mi. south of the El Paso-Pueblo County line, south to Gragdon Underpass in Pueblo County, including structures, grading, stabilizing and oil processing; by State Highway Department.

$148,731—**Schmidt Construction Co.,** P. O. Box 66, Grand Junction—Low bid for construction of a state highway between Climax and Kokomo on State Highway 91 in Summit and Lake counties, stabilization, surfacing and plant-mixed O. P. S., 4.7 mi. in length; by State Highway Department.

$143,439—**Schmidt Construction Co.,** P. O. Box 66, Grand Junction—Low bid for construction of a state highway between Kremmling and Summit county line in Grand County, including grade stabilization and structures, to be 4.3 mi. in length; by State Highway Department.

Montana

$149,781—**Kiely Construction Co.,** P. O. Box 65, Butte—Contract awarded for construction of the Dodson-Malta highway in Phillips County, including steel and concrete bridge construction and treated timber bridge construction; by State Highway Commission.

$155,391—**Norgaard & Hilling,** Williston, N. Dak.—Contract awarded for construction of the Poplar-Flaxville highway in Roosevelt and Daniels counties, to be 11.2 mi. of grading, gravel surfacing and small drainage structures; by State Highway Commission.

$788,304—**Northwestern Engineering Co.,** Rapid City, S. Dak.—Contract awarded for construction of the Glendive-Wibaux and Glendive-East Highway in Dawson County, to be 13.4 mi. of grading, gravel surfacing, plant-mixed bituminous surfacing and small drainage structures; by State Highway Commission.

$135,606—**Hilde Construction Co.,** 3810 7th Ave., Great Falls—Contract awarded for construction of the Belgrade-West highway in Gallatin County to be 6.0 mi. long, with grading, gravel surfacing, road-mixed oil and small drainage structures; by State Highway Commission.

$202,543—**Thomas Staunton,** 806 First National Bank Bldg., Great Falls—Contract awarded for construction of the Arrow Creek-Brooks highway in Fergus County, to be 13.0 mi. long, including grading, surfacing, and small drainage structures; by State Highway Commission.

$158,906—**Thomas Staunton,** 806 First National Bank Bldg., Great Falls—Contract awarded for construction on the Clearwater-Seeley Lake section of the Clearwater-Big Fork highway in Missoula County, to be 14.7 mi. long; grading, surfacing, road-mixed oil and small drainage structures; by State Highway Commission.

Nevada

$215,670—**Isbell Construction Co.,** P. O. Box 2351, Reno—Contract awarded for construction of a portion of the State Highway system in Elko County, from a point approximately 8 mi. west of Elko to Elko; by State Department of Highways.

$125,319—**George E. Miller,** P. O. Box 1728, Reno—Low bid for construction of a portion of the State Highway system in Mineral County, from the U. S. Naval Ammunition Depot boundary to a junction with U. S. 95 in Hawthorne; by State Department of Highways.

$147,306—**Silver State Construction Co.,** Fallon — Contract awarded for construction of a state highway from a point at the intersection of State Routes No. 3 and 28 to a point approximately 1 mi. east of Spooners Summit; by State Department of Highways.

$489,849—**Silver State Construction Co.,** Fallon — Contract awarded for construction of a portion of the state highway sys-

tem in Lyon and Churchill counties, from ¼ mi. east of the Fernley Overpass to a point approximately 9 mi. northeast of the Lyons-Churchill county line; by State Department of Highways.

New Mexico

$224,442—**Jack Adams,** P. O. Box 610, Los Alamos—Contract awarded for construction on State Highway 84 in Rio Arriba County, the Colorado-New Mexico state line-Chama, to be 8.14 mi. in length; by State Highway Department.

$290,890—**Allison & Haney,** P. O. Box 1507, Albuquerque—Low bid for construction of the Datil-Reserve-Dry Creek route through Apache National Forest in Catron County, to be 28 ft. wide and 7.9 mi. in length; by Bureau of Public Roads.

$168,666—**W. T. Bookout Construction Co.,** P. O. Box 298, Las Vegas—Contract awarded for construction on State Highway No. 3 in San Miguel-Mora counties along the Mora-Las Vegas Rd., to be 21.6 mi. in length; by State Highway Department.

$509,509—**W. T. Bookout Construction Co.,** P. O. Box 298, Las Vegas—Contract awarded for construction on State Highway No. 180 in Grant and Hidalgo counties on the Silver City-Lordsburg Rd., to be 12.0 mi. in length; by State Highway Department.

$249,273—**Floyd Haake,** 1111 Lovato Lane, Santa Fe—Contract awarded for construction of the Mosquero-Logan Rd. in Harding County, to be 4.3 mi. in length; by State Highway Department.

$897,960—**Morrison-Knudsen Co., Inc.,** 411 W. 5th St., Los Angeles—Low bid for channelization of the Rio Grande, San Marcial to the Narrows of Elephant Butte reservoir, Middle Rio Grande Project; by Bureau of Reclamation.

$167,466—**Pioneer Construction Co.,** Albuquerque—Low bid for construction of the Alpine-Reserve route through Apache National Forest in Catron County, to be 28 ft. wide and 3.5 mi. in length; by Bureau of Public Roads.

$235,820—**Wheeler & Trotz,** 2129 E. Lead Ave., Albuquerque—Contract awarded for construction on State Highway No. 18 in Union County along the Clayton-Nara Vista to be 22.0 mi. long; by State Highway Department.

Oregon

$338,690—**Babler and Rogers,** 4617 S.E. Milwaukie Ave., Portland—Contract awarded for construction of the Forest Boundary-Mill Creek section of the Warm Springs Highway; by Oregon State Highway Commission.

$551,616—**Cosmo Gilo,** Mehama—Low bid for construction of 10 mi. of County Road No. 360 in Lane County; by Corps of Engineers.

$192,878—**C. J. Eldon,** 3045 N.E. 45th, Portland—Contract awarded for construction of the Little North Santiam River Bridge about 1 mi. from Mehama on the North Santiam Highway in Marion County; by State Highway Commission.

$417,656—**C. H. Grimstad** and **T. Vanderveldt** and **Heavy Hauling Co.,** joint venturers, Astoria—Contract awarded for 2.38 mi. of grading, constructing 100-ft. concrete structure, and 2.47 mi. of bituminous macadam and oil mat surface; by State Highway Commission.

$495,810—**Leonard & Slate Oregon, Ltd.,** 7805 S.W. 40th Ave., Portland—Low bid for construction of the Rocky Creek-Wocus Marsh section of the Klamath Lake Secondary Highway in

Klamath County, including a bridge, grading and surfacing; by State Highway Commission.

$694,441—**P. S. Lord,** 4507 S.E. Milwaukie Ave., Portland—Contract awarded for construction of the Grand Ave. lateral sewerage system in Portland; by City of Portland.

$156,259—**Warren Northwest Inc.,** P. O. Box 5072, Portland—Contract awarded for construction of the Forest Grove section of the Wilson River (temporary route) and Tualatin Valley highways; by State Highway Commission.

Utah

$1,399,400—**Ellis W. Barker Co.,** Ness Bldg., Salt Lake City—Low bid for construction of a high school in Ogden; by Board of Education.

$235,000—**W. W. Clyde & Co.,** Springville—Low bid for construction of the Sevier Summit Highway, Kane County; State Road Commission.

$1,058,950—**Olson Construction Co.,** 1549 S. 2nd W., Salt Lake City—Contract awarded for construction of the Granite School District senior high school in Salt Lake; by Granite School District.

Washington

$1,017,515—**Bay Constuction Co.,** 1762 Airport Way, Seattle—Low bid for construction of an 86.8-mi. transmission line from Grand Coulee Dam to Spokane; by Bonneville Power Administration.

$204,542—**Paul Bocek & Sons,** 3126 Simpson Ave., Hoquiam—Contract awarded for construction on Primary State Highway No. 13, Joe Creek to Pacific County line, Grays Harbor County, to be 3.5 mi. in length; by State Department of Highways.

$795,397—**Collins Concrete & Steel Pipe Co.,** 3841 N. Columbia Blvd., Portland—Low bid for construction of a pumping plant and lateral system located about 3 mi. southwest of Quincy, Columbia Basin Project; by Bureau of Reclamation.

$193,830—**N. Fiorito Co.,** 844 W. 48th St., Seattle—Low bid for construction on Primary State Highway No. 15, Monroe to Sultan, Snohomish County, to be 7.5 mi. in length; by State Department of Highways.

$20,000,000—**L. H. Hoffman Co.,** 715 S.W. Columbia Blvd., Portland—Contract awarded for construction of reinforced concrete buildings for kraft pulp mill, Everett; by Weyerhaeuser Timber Co.

$1,358,040—**Peter Kiewit Sons' Co.,** 1024 Omaha National Bank Bldg., Omaha—Low bid for construction on an 18-mi. unlined section of the Potholes East Canal, 4 mi. of unlined wasteway, bridges, radial gates, fencing, protective screens and other related structures in north Franklin County; by Bureau of Reclamation.

$1,467,865—**Peter Kiewit Sons' Co.,** 1300 Aloha St., Seattle—Low bid for construction of Pasco levees; by Corps of Engineers.

$1,253,188—**Macdonald Bldg. Co.,** 1517 S. Tacoma Way, Tacoma—Low bid for general construction on four 2-story, reinforced concrete ward buildings at Rainier State School, Buckley; by State Department of Public Institutions.

$1,425,488—**Zoss Construction Co.,** Portland—Contract awarded for construction of a warehouse building, Mount Rainier Ordnance Depot; by Corps of Engineers.

Wyoming

$147,754—**Boatright-Smith,** P. O. Box 703, Rawlings—Contract awarded for grading, draining, base course surfacing, oil treatment by the road-mix method and miscellaneous work on 3.7 mi. of the Basin-Burlington road from Burlington north to U. S. 20 and 0.6 mi. of the Greybull-Cody road on the Emblem Bench section of Big Horn County; by State Highway Department.

$143,978—**Boatright-Smith,** P. O. Box 703, Rawlings—Contract awarded for construction of grading, draining, base course surfacing, oil treatment by the road-mix method and miscellaneous work on 3.0 mi. of the Basin-Greybull road in Big Horn County; by State Highway Department.

$141,114—**Lichty Construction Co.,** P. O. Box 1068, Riverton—Contract awarded for grading, draining, 4 reinforced concrete culverts, base course surfacing, and miscellaneous work on 10.1 mi. of the Green River-Linwood road in Sweetwater County; by State Highway Department.

$136,948—**Strong Company,** Springville, Utah—Low bid for construction of the Hoback Canyon route through Bridger National Forest in Sublette County, to be 22 ft. wide and 11.1 mi. in length; by Bureau of Public Roads.

SUPERVISING THE JOBS

. . . Continued from page 119

Glen Olson is structural steel foreman. **Welton Porter** is millwright foreman, **J. C. Baker** is labor foreman and **J. P. Asbury** is prestressed foreman. **T. T. Brooks** is resident engineer and architect's representative.

* * *

Construction of a steam electric power plant in Salt Lake City, Utah, for Utah Power & Light Co. is under the general supervision of **Harry P. Benner. William B. Anderson** is assistant superintendent for Bechtel Construction Co. **E. A. Ruth** is electrical superintendent. **Stanford Sayles** is heavy rigging foreman, **Thomas Spencer** is millwright foreman, and **Eldon Webb** is carpenter foreman. **Al Magnus** is labor foreman, and **Paul Keppler** is start-up engineer.

* * *

A hot mix bituminous surfacing job in Corsica, S. Dak., is being supervised by **H. M. Kaiser** for the C. H. Lien Construction Co. **Tom Finder** is assistant superintendent on the $62,000 State projetc.

* * *

J. W. Lowe, Jr. is general superintendent for Peter Kiewit Sons' Co. on construction of the Angostura Canal in Hot Springs, S. Dak. **I. J. Garver** is excavation superintendent and **C. B. Smith** is structural superintendent. **Walt Powers** is master mechanic, and **Red Fyler** is lining superintendent. **H. C. Culbertson** is job engineer on the $2,112,000 project.

* * *

In Weaver, S. Dak., where M. A. Garland Construction Co. is building a $399,981 grade school at Rapid City Air Force Base, **Merrill Skog** is general superintendent and **Ben Noroin** is his assistant.

* * *

Nick Evans is job superintendent for Peter Kiewit Sons' Co. on construction of the Monicka-Kalispell highway in Lincoln and Flathead counties, Mont. **Gail Loop** is assistant superintendent on the $546,300 job. **Louis Tippetts** and **Bill Fraser** are grading foremen, **Don Armstrong** is master mechanic and **Leonard Lane** is office manager.

* * *

A. E. Mallow was general superintendent for M. P. Butler Construction Co. on construction of a railroad bridge in Broad Pass, Alaska. The Alaska Railroad Commission complimented the construction firm and the crew for completing the job on schedule in spite of adverse weather conditions.

* * *

Clearing on the 325 acres of the Detroit Dam Reservoir in Oregon is being supervised by **C. W. Penrod** for Penrod Construction Co. About 70% of the project is now complete in spite of adverse weather conditions. **Van Ottinger** is general foreman and **C. W. Beck** is the Corps of Engineers project inspector on the $218,998 job.

NEWS of DISTRIBUTORS AND FACTORY BRANCHES

New offices and warehouse facilities for *Leschen & Sons Rope Co.* are now completed in Seattle, Wash. More than 14,000 sq. ft. of space is contained in the new building, located at 2904 6th Ave. So. The specially-constructed building is over 300 ft. long and designed to suit the particular needs of the industry. The building was completed under the supervision of C. P. KOFRON, Northwest manager. Former address of the firm was 3410 1st Ave. So., Seattle.

☆ ☆ ☆

C. R. (BOB) JOHNSON, well known *Caterpillar Tractor Co.* district representative in the West since early 1935, died suddenly in Sacramento, Calif., June 13 after an illness of several days.

☆ ☆ ☆

A. C. COPE, 954 Howard St., San Francisco, Calif., is now regional representative in Northern California and Nevada for *David Round & Son,* Cleveland, Ohio, manufacturer of hand and electric-operated hoists.

☆ ☆ ☆

Opening of new sales offices is announced in Salt Lake City, Utah, and Phoenix, Ariz., for *United States Steel Supply Company,* warehousing subsidiary of *U. S. Steel Corp.* DONNELL NEWMAN, formerly salesman for the company in Los Angeles, becomes resident salesman in Salt Lake. ALBERT M. LOOMIS, also from Los Angeles area, becomes resident salesman in Phoenix.

☆ ☆ ☆

A new branch store has been opened by *Modern Machinery Co., Inc.,* at 2963 First Ave. South, Seattle, Wash. E. C. STEPHENSON is sales manager, ROBERT SCHULZ is store and service manager and R. J. ANDERSON is parts manager at the new branch. Accounts represented by the new store include: *R. G. Le Tourneau, Inc., Lima* shovels, *Michigan* shovels, *Gardner-Denver* compressors, etc., *Universal* crushing equipment and *Pettibone-Mulliken* equipment. Main headquarters for *Modern Machinery Co., Inc.,* are located at E. 4412 Trent Ave., Spokane, Wash.

☆ ☆ ☆

W. J. BRETT, district manager for *Macwhyte Co.,* with offices in Portland and Seattle, announces additional Washington distribution through the new branch of *Modern Machinery Co.,* recently opened at 2963 1st Ave. So., Seattle. The firm is distributor for *R. G. Le Tourneau, Inc.* in the State of Washington. R. S. SCHULTZ will supervise the Seattle branch with E. C. STEPHENSON as sales manager, BOB ANDERSON as parts manager and BOB ROSS and BILL SHIRD as salesmen.

☆ ☆ ☆

McCaffrey

JOHN JORGENSEN, president of *Western Traction Co.,* San Francisco, announces the appointment of JACK MCCAFFREY to the firm's sales staff. McCaffrey was formerly with *Chicago Pneumatic Tool Co., Inc.,* for six years. He will cover the East Bay Area on all lines handled by the company.

☆ ☆ ☆

The *Cleco Division* of the *Reed Roller Bit Co.,* Houston, Tex., announces the appointment of the following distributors: *The Bidley Co.,* San Francisco, Calif., as distributor for its line of pneumatic tools for construction, manufacturing and industrial maintenance; *Martin Mfg. Co.,* Los Angeles, Calif.; *Elect Air Tool Co.,* Burbank, Calif., and *W. E. Mushet Co.,* San Francisco, Calif. In Seattle, Wash., *Dawsen Tool & Abrasive, Inc.,* becomes distributor for Cleco products.

☆ ☆ ☆

Cummins & Moran, Phoenix, Ariz., *Cummins Engine Company, Inc.,* distributor in Arizona, New Mexico and two southeastern counties of Nevada, is now in new headquarters. The modern 12,500-sq. ft. air-conditioned building at 1350 No. 22nd Ave. offers expanded facilities and room for future expansion.

☆ ☆ ☆

FRANK MCNAMARA is the new district representative for *Caterpillar Tractor Co.'s* Western Sales Division. He will work with Caterpillar dealers in Napa, Eureka, Rio Vista, Marysville, Chico, Colusa, Petaluma and Sacramento, California. His offices will be in Sacramento. McNamara succeeds the late C. R. JOHNSTON.

☆ ☆ ☆

New Pacific Coast District sales manager for Tar Products Division of *Koppers Company, Inc.,* is S. J. KATZ. He will headquarter at the new district headquarters, 727 East Gage Ave., Los Angeles, Calif.

☆ ☆ ☆

Western Machinery Co., Phoenix, Ariz., announces the addition of the following new lines: *Meili Blumberg Corp.*—graders, line markers, tilt-bed trailers; *Walter Motor Truck Co.; Minneapolis-Moline*—industrial tractors; *N. P. Nelson Iron*

Western region AED meet in Sun Valley, Oct. 12-13

A JOINT Western regional meeting, the first of its kind, will be held by the Associated Equipment Distributors at Sun Valley, Idaho, October 12 and 13. Members and their wives from the eleven Western States will take advantage of Sun Valley's world-famous pleasure facilities and engage in several meetings to discuss the problems facing Western construction machinery distributors in a war-time economy.

The program includes authoritative speakers from within the industry. Among them are **Charles Weinberg** of Brown-Bevis Equipment Co., Los Angeles, who will speak on "The Survival of Distributors in the Equipment Business"; **R. L. Arnold,** national president of AED, who will bring the conference the latest information on AED activities, and **James I. Ballard,** editorial director of *Western Construction,* who will speak on "A Long Range View of Construction in the West."

A. F. Sersanous, of Loggers and Contractors Machinery Co., Portland, is program chairman, and **Phil Bufford,** of Intermountain Equipment Co., Boise, is chairman of the arrangements committee. **L. E. Jones,** director of AED Region 12, will act as general chairman of the meeting.

The Executive Committee of AED will hold a two-day session at the famed Idaho resort preceding the regional meeting.

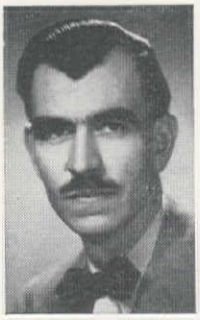
***John Raicy*, left, Clackamas County, Ore., road superintendent, and *Ernest Harding*, right, shop foreman, accept delivery of three new "Cat" 112 diesel motor graders from *Bob Ebersole* of Interstate Tractor and Equipment Co. The machines will be used in road improvement work on the county's 2,500-mi. highway system.**

Works, Inc.—all-purpose truck loaders and *Douglas Mfg. Co.*—Grouser Strip for all size tractors.

☆ ☆ ☆

Caterpillar Tractor Co.'s Western Distributors' traveling sales conference this year included 150 members of distributor organizations and covered 600 mi. in the State of California. Purpose of the trip was to observe new Caterpillar and allied manufacturers' products in the field.

☆ ☆ ☆



Griebeler

W. L. GRIEBELER, former assistant professor of agricultural engineering at Oregon State College, joins the staff of *Douglas Fir Plywood Assoc.* Griebeler will take over as California field representative. He will offer market-level advice and assistance on plywood uses to distributors, retailers, architects, builders, etc.

☆ ☆ ☆

McCoy Company, Caterpillar distributor for the State of Colorado, adds eight men to its sales staff. Included are: FLOYD STEWART, who becomes office manager of the Monte Vista branch, and EARL BONHAM, who will represent the firm in northeastern Colorado.

☆ ☆ ☆

Cate Equipment Co., 40 E. Ninth South, Salt Lake City, Utah, is a new distributor for the State of Utah for *The Mall Tool Co., The Elgin Corp.,* and district agent for *The Chain Belt Co.*

☆ ☆ ☆

The Heil Co., 805 Stuart Bldg., Seattle, Wash., announces the granting of a franchise to the *Treasure State Equipment Co.* of Kalispell, Mont., to handle the complete line of Heil Body and Hoist equipment. The new distributor will have a stock of equipment to service Lincoln and Flathead counties in Montana.

☆ ☆ ☆

Timber Structures of Canada, Ltd., Peterborough, Ontario, is opening Western Division sales offices at Vancouver, B. C., at 817 W. Hastings St. W. K. ZIMMERMAN is in charge of the Western Division, which encompasses British Columbia, Alberta, Saskatchewan and Manitoba.

☆ ☆ ☆

The *De Laval Steam Turbine Co.* of Trenton, N. J., announces completion of a new building at 160 Folsom St., San Francisco, Calif. Sales and service activities in the area will be centered at the new office and warehouse structure. C. F. REEVES will head the expanded activities. He is in charge of De Laval's West Coast sales.

☆ ☆ ☆

HOWARD L. STILLEY, 45, sales manager of *Bay Cities Equipment Co., Inc.,* was killed instantly when a United Air Lines DC6B airliner on which he was a passenger crashed into a mountain in Decoto, Calif., near Oakland Municipal Airport. LEE JORGENSON, West Coast representative for *R. G. Le Tourneau, Inc.* escaped death when he canceled his reservation on the ill-fated plane. This is Jorgenson's third such escape from fatal air crashes. He failed to catch two planes in Mexico and both of these crashed.

☆ ☆ ☆

R. B. JEPHSON has a new assignment as tractor equipment service engineer for *Bucyrus-Erie Company.* His territory will cover the northwestern part of the United States and western Canada. Jephson will headquarter in Spokane, Wash.

☆ ☆ ☆

Blue Diamond Corp., Los Angeles, Calif., is appointed exclusive distributor of *Crownite Lightweight Aggregate* in the Los Angeles area.

☆ ☆ ☆

Mar-Rail Conveyor Co. appoints *Wallace R. Bohall Co.,* Seattle, Wash., and *Hughdon Equipment Co.,* San Francisco, Calif., as distributors for the new Brik-Toter.

☆ ☆ ☆

Merrill-Brose Co., San Francisco, Calif., is now a Northern California distributor of *White Manufacturing Co.* concrete vibrators, asphalt heating kettles, asphalt plants, kerosene torches, and tractor front end loaders.

☆ ☆ ☆

R. M. Wade & Co. has awarded a contract for construction of new general office and warehouse facilities to be constructed on one and one-third acres in northwest Portland, Ore. The building will be of reinforced concrete construction and includes basement space for heating and utility mechanical equipment. Office and display units will be a story and a half with measurements of 80 by 58 ft. Service, parts and shipping departments are

Continued on page 132

UNIT BID PRICES

Selected Bid Abstracts for Typical Western Projects

Main portion of Folsom Dam, 8,439,000 cu. yd. of embankment and 1,030,000 cu. yd. of mass concrete

California—Folsom Project—Corps of Engineers. Merritt-Chapman & Scott Corp., 17 Battery Place, New York City, N. Y. and The Savin Construction Corp., 10 Village St., East Hartford, Conn., joint venturers, with a bid of $29,444,000, were low before the Corps of Engineers for construction of the main structure of Folsom Dam across the American River. Work includes 8,439,000 cu. yd. of embankment and approximately 1,030,000 cu. yd. of mass concrete. (For a further description, see Western Construction for August 1951, page 62.) Unit prices were as follows:

(1) Merritt-Chapman & Scott Corp. and The Savin Construction Corp. $29,444,000
(2) Winston Bros. Co., Foley Bros., Inc., Al Johnson Construction Co. and C. F. Lytle Co. 32,321,409
(3) J. A. Jones Construction Co., Charles H. Thompkins Co. and Western Contracting Corp. 33,067,766
(4) Eldorado Constructors (Morrison-Knudsen Co., Inc., Peter Kiewit Sons' Co., Macco Corp., General Construction Co., Brown & Root, Inc., MacDonald, Young & Nelson, Inc.) 34,240,274
(5) American River Constructors (Walsh Construction Co., B. Perini & Sons, Inc., Henry J. Kaiser Co., Utah Construction Co., The Shea Co., The Arthur A. Johnson Corp., C. J. Langenfelder & Son, Inc., Pacific Bridge Co.) 36,683,000
(6) Guy F. Atkinson Co., Bressi & Bevanda Constructors, Inc., Charles L. Harney, Inc., W. E. Kier Construction Co., Ostrander Construction Co., A. Teichert & Son, Inc. 36,842,306
(7) The Arundel Corp., L. E. Dixon Co., Hunkin-Conkey Construction Co., American Pipe & Construction Co., Rhoades-Shofner Construction Co., Allied Dam Contractors, Inc. 41,467,550
(8) Engineer's estimate (without profit) 31,434,425

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lump sum	diversion and care of water	$864,000	$800,000	$609,618	$1,000,000	$1,385,400	$1,465,000	$899,250	$957,468
900	acre clearing firebreak and borrow area No. 2	100.00	200.00	226.00	110.00	190.00	225.00	225.00	132.00
26,000	cu. yd. excav. above elev. 215—concrete dam	3.70	7.50	6.00	5.00	6.70	9.60	9.65	8.23
78,000	excav. above elev. 215—stilling basin	3.65	1.00	1.99	5.00	2.00	1.90	3.20	1.82
2,300,000	cu. yd. excav., American River channel	.65	.95	.89	.75	.60	1.20	1.25	.75
170,000	cu. yd. excav. below elev. 215—conc. dam and stilling basin	4.20	3.50	2.50	5.00	2.54	6.00	4.05	3.89
410,000	cu. yd. excav., tailrace channel and pilot channel	3.00	3.50	2.84	2.40	2.40	2.10	3.60	2.04
42,000	cu. yd. excav., Pacific Gas and Electric Company dam	3.50	3.50	3.57	2.40	4.70	3.00	4.20	2.30
22,000	cu. yd. excav., miscel.	5.00	3.50	2.20	4.75	2.14	3.00	16.40	1.76
380,000	cu. yd. excav., foundation, wing dams, and dikes No. 5, 7 and 8	.60	.70	.50	1.00	.46	.50	1.05	.27
7,000	cu. yd. excavation, dental, 0-10 ft.	7.00	27.50	12.00	24.00	27.00	8.00	19.50	20.30
2,000	cu. yd. excavation, dental, 10-25 ft.	14.00	40.00	18.00	30.00	35.00	15.00	88.50	35.90
1,000	cu. yd. excavation, dental, over 25 ft.	21.00	50.00	23.00	34.00	73.00	30.00	99.00	46.85
50,000	cu. yd. waste excavation, borrow area No. 5	.24	.60	.02	.26	.58	.35	.55	.318
1,200,000	cu. yd. excavation, borrow area No. 1	.40	.45	.49	.35	.38	.50	.45	.329
4,600,000	cu. yd. excavation, borrow area No. 2	.40	.45	.61	.34	.50	.33	.33	.344
300,000	cu. yd. excavation, borrow area No. 7	.60	.75	.56	.65	.83	.50	.97	1.08
750,000	cu. yd. stockpile, rock	.60	1.00	.69	.85	1.23	.80	1.15	.704
1,470,000	cu. yd. embankment, Zone A	.20	.15	.11	.12	.05	.11	.26	.056
2,080,000	cu. yd. embankment, Bone B	.10	.07	.11	.08	.04	.05	.20	.057
2,100,000	cu. yd. embankment, Zone C	.15	.15	.17	.11	.15	.11	.235	.114
620,000	cu. yd. embankment, Zone D	.12	.15	.17	.073	.12	.11	.235	.147
1,100,000	cu. yd. embankment, Zone E	.70	.75	1.06	.58	1.00	.50	.87	.70
241,000	cu. yd. embankment, Zone F	1.00	1.20	1.06	1.15	1.83	.90	1.97	1.09
900,000	cu. yd. embankment, Zone G	.15	.15	.17	.11	.10	.16	.235	.19
63,000	cu. yd. embankment, Zone H	.12	.15	.17	.11	.10	.12	.425	.154
10,000	cu. yd. backfill canal, ditches and depressions	.75	.50	.49	.60	.66	.40	1.92	.62
183,000	thous. gal. water	1.35	1.15	2.00	1.10	1.32	1.25	4.15	1.22
1,000	hr. addtl. compaction rolling	5.00	15.00	10.70	11.00	14.50	18.00	15.20	14.20
7,000	hr. pneumatic tamping	3.60	3.50	5.30	5.45	6.30	10.00	9.75	7.23
50,000	sq. yd. foundation cleanup	6.00	1.50	8.18	6.80	3.65	1.00	9.00	.95
55,000	sq. ft. line drilling	2.50	1.30	1.89	1.65	2.60	2.20	1.62	2.75
100	lin. ft. overburden drilling	3.50	10.00	8.00	15.00	10.00	10.00	9.65	7.14
4,000	lin. ft. NX core drilling	4.50	7.50	6.00	7.50	14.00	6.50	7.35	8.72
160	lin. ft. reaming	6.00	6.00	6.00	4.20	8.00	6.00	5.75	4.71
160	lin. ft. cementing and drilling out cement	10.00	4.00	5.00	7.50	8.00	4.00	4.00	4.74
30	hr. pressure testing	40.00	14.00	15.00	36.00	13.00	15.00	13.80	11.10
40	ea. drill set-up	50.00	70.00	100.00	52.00	65.00	75.00	69.00	74.40
3,600	lin. ft. percussion drilling	.60	.90	1.00	1.80	2.40	1.25	.55	.957
69,000	lin. ft. drilling grout holes	3.00	3.40	2.00	2.80	5.20	3.00	3.40	5.75
87,000	cu. ft. pressure grouting	1.00	2.75	2.00	3.00	2.50	2.75	2.75	2.01
2,000	cu. ft. slushing	.50	.50	2.50	6.80	8.00	8.50	1.70	.73
67,000	ton minus 2-in. sand and gravel	1.00	1.30	1.26	3.00	.88	1.45	1.65	.84
15,000	ton minus 2-in. dredge tailings	1.50	1.40	1.00	3.00	1.00	1.15	1.10	.84
64,000	ton minus 3-in. dredge tailings	1.50	1.00	1.00	2.30	.45	1.15	1.00	1.06
13,000	ton 2 to 6-in. dredge tailings	1.50	1.40	1.00	3.00	1.50	1.10	1.10	1.26
11,000	ton sand and gravel filters	2.00	1.90	1.90	3.10	1.50	1.80	6.00	1.95
166,000	ton rock riprap	1.50	1.80	1.00	2.00	2.10	2.00	1.75	1.71
10,000	ton roadway surfacing aggregate	1.60	2.10	1.50	3.00	3.00	2.50	3.95	2.60
220	ton liquid asphalt, Type SC-3 or SC-4	27.00	29.00	20.00	30.00	35.00	25.00	29.00	27.20
23,000	sq. yd. mixing, spreading and finishing road mix surfacing	.50	.10	.15	.24	.30	.15	.40	.21
1,030,000	cu. yd. mass concrete for dam	8.40	10.00	9.95	12.00	12.40	13.55	14.30	10.54
10,000	cu. yd. concrete for backfilling dental excav.	9.00	20.00	11.33	14.00	14.00	15.00	14.30	13.19
17,000	cu. yd. conc. in power and pipe line intakes, spray walls, spillway bridge and piers	22.00	25.00	31.47	40.00	43.00	45.00	50.40	49.25
450	cu. yd. conc. in parapet walls and outside stairs	88.00	73.00	71.00	150.00	149.00	80.00	170.00	95.30
36,000	cu. yd. conc. in stilling basin floor and walls, and construction bridge abutments and piers	14.00	13.50	15.00	17.00	19.00	27.00	22.50	12.52
11,000	cu. yd. concrete in retaining walls	14.00	14.00	16.58	19.00	18.00	22.50	29.00	22.95
3,200	cu. yd. concrete, miscellaneous	46.00	45.00	63.00	52.00	72.00	60.00	86.50	72.25
800	cu. yd. concrete, tunnel plug	50.00	15.00	25.00	17.00	25.00	50.00	64.00	50.00
1,000	cu. yd. sand-cement grout	21.00	9.00	25.00	14.00	32.00	40.00	30.00	17.00
700	ton mineral filler	27.00	30.00	29.00	35.00	40.00	30.00	21.75	40.85
25,000	lb. fluidifier	.25	.30	.28	.28	.35	.22	.20	.19
900,000	bbl. portland cement	3.60	3.80	4.00	4.00	4.00	3.35	3.50	3.83
4,400,000	lb. steel reinforcement	.10	.12	.12	.13	.16	.14	.158	.137
90,000	lin. ft. drilling and grouting anchor bars	1.85	1.70	1.90	1.80	2.60	2.50	.575	1.41
1,030,000	lb. structural steel	.17	.23	.214	.19	.40	.22	.26	.204
60,000	lb. miscellaneous iron and steel	.65	.65	.50	.39	.55	.95	.46	.347
32,000	lb. expansion rockers and fixed pedestals for spillway bridge	1.25	.80	.69	.45	1.40	.55	1.40	.548
22,000	lb. copper water stops	1.75	1.10	1.51	1.40	2.60	3.00	1.44	2.82
40	M.B.M. timber	325.00	420.00	296.00	240.00	500.00	325.00	345.00	350.00
1,330	lin. ft. 8-in. perf. corru. metal pipe	3.60	2.00	3.10	3.00	2.60	3.00	2.65	2.73
1,830	lin. ft. 10-in. perf. corru. metal pipe	3.90	2.30	3.80	3.50	3.20	3.50	3.22	3.22
2,320	lin. ft. 12-in. perf. corru. metal pipe	4.25	2.70	4.00	4.00	3.30	3.75	3.57	3.66

(Continued on next page)

33% MORE GROUND CONTACT

Single Drive . . .
MORE TRACTION MORE ACTION

And much more satisfaction with the M-B 501 grader. Built into the 501 are the largest grader tires in the business—huge 18:00 x 24 earthmover tires that spread out over 612 square inches to give you flotation for soft going and tremendous traction on *any* surface. Traction unequaled by any other grader in its class—one of the main reasons the 501 will *work* where other graders can not even *travel.*

These large tires provide additional advantages. They roll over irregularities without affecting the blade; they do not sink in and spin as readily as the smaller, narrow tandem drive tires; they roll easier on any surface; all advantages no other grader provides. Get all the facts, and you too will get an M-B 501.

Huge 18:00 x 24 earthmover on the M-B 501 spread out to provide 612 square inches of ground contact for traction.

COMPARE WITH TANDEM DRIVE

The *largest* tandem drive tires in the 50 H.P. class are 12:00 x 24, each tire providing only 116 square inches of ground contact, or a total of 464 square inches. Compare with the 612 square inches above.

MEILI-BLUMBERG CORPORATION

1633 WISCONSIN STREET • NEW HOLSTEIN, WISCONSIN

EDWARD R. BACON CO.	San Francisco, Sacramento, Fresno, Oakland, Stockton, California
HOWARD-COOPER CORP.	Portland, Roseburg, Central Point, Eugene, Albany, Oregon
HOWARD-COOPER CORP.	Seattle, Washington
CASEY METCALF MACHINERY CO.	Los Angeles, California
LIBERTY TRUCKS & PARTS CO.	Denver, Colorado
SAWTOOTH CO.	Boise, Twin Falls, Idaho
CLARK COUNTY MERCANTILE CO.	Las Vegas, Nevada

UNIT BID PRICES . . . CONTINUED

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2,170 lin. ft. 21-in. perf. corru. metal pipe	7.00	4.00	6.30	7.00	6.00	6.50	5.20	5.71
190 lin. ft. 10-in. corru. metal pipe	3.40	2.50	3.81	3.50	2.70	3.00	2.90	3.14
1,200 lin. ft. 21-in. corru. metal pipe	6.50	4.00	5.00	6.00	5.00	6.00	4.25	5.37
4,000 lin. ft. 8-in. perf. vitrified clay pipe	2.50	2.10	3.10	4.20	2.40	2.50	2.30	1.80
1,000 lin. ft. 8-in. vitrified clay pipe	2.00	1.40	1.60	4.00	2.00	2 25	1.95	1.66
5,100 lin. ft. 15-in. semi-circular vitrified clay pipe	5.00	2.30	3.80	7.00	3.30	4.00	2.94	1.85
4,000 lin. ft. 84-in. steel pipe	85.00	67.00	100.00	87.00	108.00	85.00	88.50	87.41
180 lin. ft. 60-in. steel pipe	84.75	66.00	88.00	63.00	94.00	90.00	55.00	89.14
3,500 lin. ft. 42-in. steel pipe	41.75	30.00	38.00	35.00	40.50	40.00	33.40	36.06
440 lin. ft. 18-in. steel pipe	15.50	7.50	14.00	12.00	14.80	12.00	11.50	10.75
4,000 lin. ft. 3½-in. black steel pipe, Sched. 40	3.35	1.50	3.15	3.20	6.00	3.50	3.10	4.03
9,300 lin. ft. 2½-in. black steel pipe, Sched. 40	2.50	1.00	2.50	2.00	4.00	2.50	2.65	2.58
4,000 miscl. pipe and fittings	2.00	.60	.60	.60	1.30	.75	.86	1.09
3 ea. 60-in. gate valve, 120#	$30,000	$26,000	$25,000	$19,000	$21,000	$17,000	$27,600	$30,303
2 ea. 42-in. gate valve, 35#	$7,500	$3,400	$5,000	$4,200	$6,300	$5,000	$6,175	$5,920
2 ea. 42-in. gate valve, 120#	$10,000	$8,900	$12,600	$7,800	$10,500	$8,500	$9,090	$5,920
1 ea. 18-in. gate valve, 120#	$2,500	$2,250	$2,500	$2,500	$3,050	$1,000	$2,630	$3,595
1 ea. 12-in. gate valve, 120#	$1,600	$1,450	$1,800	$1,500	$2,000	500.00	$1,430	$2,056
3 ea. 8-in. gate valve	300.00	190.00	380.00	180.00	275.00	250.00	225.00	530.00
2 ea. 6-in. gate valve	200.00	140.00	250.00	110.00	190.00	160.00	160.00	287.00
2 ea. 4-in. gate valve	150.00	90.00	130.00	80.00	120.00	125.00	105.00	192.00
6 ea. 84-in. expansion coupling	$3,540	$4,000	$5,400	$3,700	$6,700	$6,000	$4,270	$4,774
13 ea. 42-in. expansion coupling	$1,000	$1,300	$2,000	$2,200	$1,800	$1,800	$1,522	$1,680
1 ea. 18-in. expansion coupling	500.00	500.00	600.00	480.00	700.00	750.00	595.00	672.00
2 ea. 84-in. flexible coupling	500.00	340.00	540.00	350.00	800.00	600.00	546.00	657.00
3 ea. 60-in. flexible coupling	400 00	280.00	430.00	300.00	550.00	450.00	405.00	522.00
5 ea. 42-in. flexible coupling	300.00	200.00	300.00	230.00	420.00	350.00	425.00	461.00
1 ea. 18-in. flexible coupling	100.00	60.00	50.00	60.00	130.00	60.00	95.00	289.00
Lump sum, air release and vacuum valve	$3,000	$2,930	$2,600	$2,160	$3,100	$5,000	$2,860	$2,752
Lump sum, flow measuring equip. North Fork-Natoma Water System	$35,000	$39,000	$40,000	$43,000	$51,000	$40,000	$43,150	$7,044
Lump sum, diversion tunnel bulkhead gate, guides and frame	$80,000	$97,000	$80,000	$82,000	$136,000	$50,000	$101,200	$26,039
20,000 lb. diversion tunnel gate hoist struct. and accessories	.50	.72	.70	.56	1.10	.60	.65	.325
414,000 lb. install embedded penstocks	.25	.08	.09	.09	.15	.085	.047	.099
Lump sum, penstock stop log guides, seats and anchors	$100,000	$90,000	$92,000	$80,000	$65,000	$85,000	$126,500	$63,414
687,000 lb. install penstock fixed-wheel gates and hoists	.10	.07	.05	.08	.10	.06	.038	.044
141,000 lb. install penstock fixed-wheel gate guides, frames and anchors	.15	.11	.13	.10	.22	.11	.052	.076
3,000 lb. penstock gate erections struct. metalwork	.80	.36	.75	.74	.45	.75	.46	.416
Lump sum, penstock gate hoist and transfer struct. metalwork	$17,000	$10,000	$12,500	$12,000	$29,000	$12,000	$14,150	$6,318
Lump sum, penstock gate bypass piping	$22,000	$12,300	$12,000	$32,000	$21,000	$20,000	$52,000	$46,612
Lump sum, penstock gate hoist oil supply system	$30,000	$1,500	$5,000	$1,900	$3,400	$3,000	$42,900	$5,440
542,000 lb. trashrack metalwork	.25	.24	.20	.24	.26	.20	.31	.192
1,900,000 lb. install conduit slide gates and accessories	.10	.065	.038	.04	.06	.03	.032	.057
Lump sum, conduit slide gates operating equipment	$60,000	$39,000	$50,000	$42,000	$57,000	$60,000	$42,000	$44,736
Lump sum, conduit bulkhead gate and lifting beam	$32,000	$31,000	$25,000	$21,800	$46,000	$40,000	$28,600	$9,992
Lump sum, conduit bulkhead gate frames, guides and accessories	$84,000	$131,000	$100,000	$73,000	$38,000	$70,000	$106.000	$22,014
Lump sum, conduit gate bypass piping	$20,000	$6,000	$5,000	$6,550	$10,000	$10,000	$76,500	$8,567
2,544,000 lb. install Tainter gates, machinery and accessories	.10	.09	.075	.09	.12	.07	.066	.102
Lump sum, tower	$150,000	$74,000	$100,000	$120,000	$149,160	$120,000	$94,500	$85,516
11,000 lb. tower drainage system	.30	.46	.50	.46	.58	.55	.58	.775
15,000 lb. gallery drainage system	.15	.50	.33	.46	.47	.42	69	.472
Lump sum, elevator, hoist and appurtenances	$75,000	$87,000	$70,000	$74,150	$114,800	$85,000	$87,000	$81,449
Lump sum, domestic water supply	$3,500	$3,700	$4,300	$2,400	$5,800	$4,500	$4,000	$5,281
Lump sum, sewerage system	$17,000	$9,500	$7,000	$9,000	$12,300	$5,000	$11,000	$8,865
Lump sum, sump pumping system	$13,000	$3,800	$7,000	$3,300	$6,600	$4,000	$7,700	$14,333
Lump sum, ventilating system	$2,000	$5,700	$1,900	360.00	800.00	$1,000	805.00	$7,405
Lump sum, compressed air system	$7,000	$7,200	$8,000	$7,000	$7,570	$5,000	$6,450	$6,730
Lump sum, heating system	$1,000	$2,000	$1,000	700.00	$1,100	$1,500	$1,330	$1,570
Lump sum, power, lighting and telephone systems	$221,187	$268,000	$180,000	$160,000	$251,000	$250,000	$281,000	$128,970
Lump sum, erect gantry crane	$25,000	$33,000	$10,000	$21,000	$32,500	$35,000	$18,700	$36,363
160,000 lb. gantry crane rail	.12	.09	.20	.17	.15	.13	.175	.20
1 ea. hoist and appurtenances	$3,000	$3,000	$3,000	$2,800	$5,045	$2,500	$5,860	$1,180
1,900 lin. ft. safety treads	3.00	2.70	2.00	2.60	3.23	2.00	2.18	2.20
Lump sum, floatwell and appurtenances	$5,000	$4,200	$5,000	$6,000	$6,600	$12,000	$4,600	$7,069
2,800 lin. ft. parapet handrail	6.00	7.00	2.50	6.70	3.10	4.60	3.62	5.45
18,000 lb. pipe handrail	.50	.76	.40	.60	.80	.50	.63	.472
Lump sum, drains for roadway and spillway bridge	$2,000	$2,250	$2,200	$2,000	$1,700	$1,200	$1,840	$1,633
Lump sum, piezometer tubes	$4,000	850.00	$3,300	$1,400	$2,100	$1,000	$3,220	$2,335
Lump sum, portable fire extinguishers	500.00	350.00	600.00	820.00	300.00	$1.000	605.00	679.00
7,530 lin. ft. guard railing	2.00	2.00	2.00	2.20	4.00	4.00	2.85	2.03
45,000 lin. ft. fence	.25	.42	.40	.52	.55	.35	.42	.33
Lump sum, relocate telephone line	$2,000	$1,700	$3,000	$5,800	$3,100	$7,000	$3,540	$2,249
Lump sum, temporary water supply for Folsom Prison	$150,000	$63,000	$100,000	$115,000	$31,800	$50,000	$31,600	$162,648
Lump sum, flood lighting	$7,000	$7,000	$8,800	$6.700	$8,900	$25,000	$50,600	$8,977
Lump sum, guard personnel	$132,400	$80,000	$100,000	$125,000	$42,000	$110,000	$66,400	$66,341
Lump sum, pumping plant	$165,000	$150,000	$124,000	$196,000	$241,000	$175,000	$200,800	$272,921
ROSE SPRING DITCH RELOCATION—VOLUME II								
21,000 cu. yd. excavation	2.00	.90	1.10	1.80	1.00	1.10	1.75	1.285
800 cu. yd. compacted dike	3.50	.75	.50	1.20	.16	1.10	3.45	.74
750 hr. pneumatic tamping	3.00	5.00	6.00	6.00	6.00	5.00	6.90	7.23
80,000 gal. watering	5.00	3.50	2.00	3.60	1.30	5.00	6.35	3.60
220 cu. yd. concrete	100.00	100.00	75.00	120.00	70.00	75.00	92.00	49.50
10,000 lb. steel reinforcement	.20	.17	.13	.14	.20	.15	.23	.142
500 lin. ft. concrete ditch lining	8.00	7.00	7.50	5.00	3.70	9.00	11.50	2.55
60 ton cobbles	7.00	7.00	3.00	5.00	2.20	6.00	5.75	5.40
1,100 lb. miscellaneous metal	2.50	1.10	.40	.50	.50	.45	.46	.784
7.5 M.F.B.M. lumber	400.00	320.00	300.00	360.00	280.00	400.00	385.00	345.00
285 lin. ft. metal flume	10.00	9.00	7.40	6.40	6.00	5.50	5.75	5.20
60 lin. ft. 50-in. x 31-in. corru. metal arch pipe, No. 12 gauge	20.00	16.00	14.00	15.00	16.00	15.00	16.10	11.60
40 lin. ft. 12-in. corru. metal pipe, No. 16 gauge	6.00	3.60	3.50	3.00	3.25	4.00	4.05	3.35
3,690 lin. ft. 24-in. welded steel pipe dipped and wrapped, No. 10 ga.	18.00	13.00	10.00	9.50	12.00	9.00	9.75	7.56
56 lin. ft. 20-in. welded steel pipe dipped and wrapped, No. 10 ga.	25.00	11.00	11.00	9.00	9.00	8.00	9.20	14.95
224 lin. ft. 24-in. non-reinf. conc. pipe	8.00	4.00	7.00	7.00	5.00	5.25	6.90	6.75
1 ea. 12-in. slide headgate	100.00	80.00	100.00	80.00	100.00	80.00	175.00	91.00
8 ea. 24-in. expansion coupling	600.00	500.00	500.00	500.00	650.00	500.00	742.00	126.00
1 ea. 24-in. flexible coupling	120.00	100.00	60.00	70.00	100.00	80.00	115.00	98.00
1 ea. 20-in. flexible coupling	120.00	80.00	50.00	50.00	75.00	55.00	95.00	87.00
1 ea. 4-in. gate valve	100.00	70.00	100.00	120.00	85.00	80.00	105.00	93.00
2 ea. 6-in. gate valve with elbow	150.00	110.00	160.00	140.00	150.00	160.00	230.00	184.00
1 ea. 20-in. gate valve	$1,000	$1,100	850.00	700.00	$1,400	800.00	$1,265	$1,021
1 ea. 24-in. gate valve	$1,500	$1,600	$1,200	850.00	$2,000	$1,250	$1,895	$1,623
Lump sum, pump installation	$6,100	$9,600	$5,000	$4,500	$4,000	$5,000	$9,780	$4.667
Lump sum, flow meter	$5,000	$4,400	$4,500	$4,000	$4,800	$5,000	$7,485	$3,696
10,600 lin. ft. barbed wire fence	.50	.44	.40	.40	.55	.40	.52	.38
5,900 lin. ft. stock-proof fence	1.50	.52	.75	.55	.70	.47	.58	.52
4 ea. gate in barbed wire fence	100.00	65.00	175.00	55.00	80.00	60 00	58.00	90.00
2 ea. gate in stock-proof fence	150.00	75.00	200.00	60.00	90.00	70.00	69.00	97.50
700 lin. ft. remove fence	.50	.14	.30	.16	.20	.16	.35	.22

A Marathon Runner . . . like Cast Iron Pipe . . . has STAMINA*!

To run 26 miles over hill and dale in 2½ hours requires strength and endurance,—in a word, *stamina!* To carry on for 100 years or more, as cast iron water and gas mains are still doing in 38 American cities, also requires stamina. These rugged mains, installed in the days of horse-drawn vehicles, are now withstanding the traffic-shock of multi-ton trucks and buses and the soil disturbances caused over the years by underground construction of sewers, power lines, telephone conduits and subways. Yet cast iron pipe has survived these changes because of its crushing-strength, shock-strength and beam-strength. No pipe deficient in these strength-factors of long life should ever be laid in paved streets of cities, towns and villages.

CAST IRON PIPE

SERVES FOR CENTURIES

* The Marathon race, blue-ribbon event of the modern Olympic Games (first held in Athens, Greece in 1896) was won in the record time of 2 hours 29 minutes 19.2 seconds in 1936.

Cast Iron Pipe Research Association, Thos. F. Wolfe, Managing Director, 122 So. Michigan Ave., Chicago 3.

NEWS of DISTRIBUTORS AND FACTORY BRANCHES

Continued from page 127

grouped in the warehouse floor space, with dimensions of 190 by 138 ft. In all, the building encompasses 30,860 sq. ft. *Henry M. Mason Co., Inc.*, is general contractor on the $250,000 improvement plan.

☆ ☆ ☆

Stein

REG STEIN is the new Los Angeles, Calif., district manager for *A. C. Horn Co., Inc.* He replaces the late SIDNEY BLUM. Stein's new position consists of supervising operations for Southern California, New Mexico and Arizona. He has been Los Angeles sales engineer for the Horn Co. for over seven years.

☆ ☆ ☆

CLINTON D. PRICE, 58, vice president and secretary-treasurer of the *Peterson Tractor & Equipment Co.*, San Leandro, Calif., died in Alameda, Calif. Price was well known in the construction equipment field, having worked with *R. G. Le Tourneau, Inc.*, and *Caterpillar Tractor Co.* before joining Peterson.

☆ ☆ ☆

Galbreath

JACK GALBREATH is now Northern Division sales manager for *The Republic Supply Co. of California*. His territory includes company branches in Oakland, San Jose, Stockton, Fresno and Sacramento. Galbreath joined Republic in 1932 and has been manager of the Oakland office since it was opened. Construction is in progress on $700,000 headquarters and warehouse facilities for the Northern Division in San Leandro.

☆ ☆ ☆

RICHARD W. SABINE becomes manager of distributor sales, Mechanical Goods Division, *Goodyear Tire & Rubber Co.* He succeeds the late W. T. BELL. Sabine will handle the company's contacts with distributors of mechanical rubber goods products.

☆ ☆ ☆

American Steel & Wire Co. announces two changes in the personnel of its sales department. THURMAN HASKELL takes over special duties as area manager of sales in the Western District with offices at Chicago, Ill. H. C. HOY is now manager of sales in the Denver, Colo., District, replacing Haskell.

UNIT BID PRICES . . . CONTINUED

Bridge and Grade Separation . . .

Substructure for Columbia River Bridge at Pasco

Washington—Benton and Franklin Counties—State. Paul Jarvis, Inc., Cascade Contractors, Inc., and Robert W. Austin, joint venturers, Seattle, with a bid of $1,917,000, were low before the Department of Highways for construction on Primary State Highway No. 3, Columbia River Bridge at Pasco—substructure, to be 0.4 mi. in length. Unit prices were as follows:

(1) Paul Jarvis, Inc. and Cascade Contractors, Inc. and Robert W. Austin..$1,917,000
(2) Ben C. Gerwick, Inc..... 1,917,400
(3) Manson Construction & Engineering Co. $1,946,100
(4) General Construction Company..... 2,830,400
(5) Peter Kiewit Sons' Co. 2,973,408

	(1)	(2)	(3)	(4)	(5)
48,000 cu. yd. struct. excav.	5.00	3.50	7.00	8.00	6.00
Lump sum, shoring and cribs	$414,500	$550,000	$385,000	$800,000	$1,060,000
40 days mechanical tamper	75.00	75.00	65.00	30.00	40.00
630 cu. yd. concrete Class A in place	70.00	40.00	80.00	65.00	80.00
18,000 cu. yd. concrete Class F in place	30.00	28.00	30.00	40.00	36.00
22,300 cu. yd. concrete Class H in place	20.00	20.00	19.00	29.50	24.00
610,000 lb. steel reinforcing bars in place	.12	.11	.11	.12	.14
10,000 lb. structural carbon steel in place	.60	.40	.60	.30	.46
2 only bridge drains complete in place	100.00	50.00	150.00	100.00	100.00
30,000 cu. yd. riprap Class B in place	5.00	5.00	4.50	5.00	10.00

Small reinforced concrete bridge

Utah—Morgan County—State. F. R. Knowlton & Son, Layton, with a bid of $26,867, was low before the Road Commission for construction on a highway at Morgan City and the junction of the Milton Richville Rd., of a concrete bridge over a 20-ft. span. Unit prices were as follows:

(1) F. R. Knowlton & Son $26,867
(2) The Contracting Corp. 29.187
(3) LeGrand Johnson 35,105
(4) Young & Smith Contracting Co.....$36,382
(5) Engineer's estimate 28,910

	(1)	(2)	(3)	(4)	(5)
500 cu. yd. excav. for structs.	7.00	11.00	13.50	15.00	3.00
315 cu. yd. concrete, Class "A"	54.00	54.00	68.00	70.00	65.00
38,500 lb. reinforcing steel	.125	.14	.14	.14	.14
103 lin. ft. steel handrail	15.00	12.50	15.00	14.00	15.00

Concrete and structural steel bridge

California—Los Angeles County—State. E. G. Perham, Los Angeles, with a bid of $270,478, was low before the Division of Highways for construction of a county highway across Rio Hondo on Florence Ave., a reinforced concrete and structural steel bridge. Unit prices were as follows:

(1) E. G. Perham $270,478
(2) O. B. Pierson 271,022
(3) Charles MacClosky Co. $292,660
(4) K. B. Nicholas 296,286

	(1)	(2)	(3)	(4)
1,275 cu. yd. structure excavation	4.00	6.00	5.00	5.50
178 M.F.B.M. treated Douglas fir timber	300.00	280.00	320.00	317.00
292 cu. yd. Class "A" P.C.C. (footing block)	25.00	30.00	20.00	50.00
1,050 cu. yd. Class "A" P.C.C. (structure)	55.00	56.25	65.00	50.00
480 lin. ft. precast P.C.C. curbs	3.00	3.85	4.00	4.00
343,000 lb. structural steel	.185	.175	.18	.20
9,200 lb. miscl. steel	.45	.39	.50	.48
4,810 lin. ft. furn. tr. Douglas fir piling	1.60	1.50	1.85	2.15
5,290 lin. ft. furn. cast-in-place conc. piling	3.00	3.55	3.00	3.50
242 each driving piles	70.00	100.00	102.00	105.00
220,000 lb. bar reinf. steel	.11	.0883	.12	.11
Lump sum, chain link fence	$1,000	$1,000	$1,000	750.00
815 lin. ft. steel railing	12.50	11.20	11.50	13.00
Lump sum, office facilities	$2,000	500.00	750.00	$1,000

PCC paving and cement-treated subgrade and four grade separation structures for 6-lane freeway

California—Los Angeles County—State. United Concrete Pipe Corp., Baldwin Park, with a bid of $2,537,790, was low before the Division of Highways for construction of a State highway between Todd Ave. and 0.2 mi. southwesterly of Lakewood Blvd., about 2 mi. in net length to be graded and paved with portland cement concrete pavement on cement-treated subgrade, interchange roadways, acceleration and deceleration lanes to be surfaced with plant-mixed surfacing on untreated rock base; four grade separation structures and a bridge over Rio Hondo to be constructed, to provide a freeway with a 6-lane divided roadway. Unit prices were as follows:

(1) United Concrete Pipe Corp.....$2,537,790
(2) Griffith Co. 2,660,855
(3) J. E. Haddock $2,713,870
(4) Guy F. Atkinson 2,764,951

	(1)	(2)	(3)	(4)
350 cu. yd. removing conc.	4.00	4.60	6.50	2.50
Lump sum, clearing and grubbing	$75,000	$20,000	$40,000	$25,000
66,650 cu. yd. roadway excavation	.30	.50	.56	.35
9,960 cu. yd. structure excavation (bridges)	1.20	1.85	2.95	1.80
4,970 cu. yd. structure backfill (bridges)	1.75	1.15	2.95	1.60
6,800 cu. yd. structure excavation	1.75	2.00	2.20	1.25
60 cu. yd. ditch and channel excavation	2.00	2.00	3.00	2.50
21,000 sta. yd. overhaul	.02	.01	.03	.01
15,000 sq. yd. compacting original ground	.04	.07	.08	.05
445,200 ton imported borrow	.49	.64	.58	.70
106,150 ton I. B. M.	1.20	1.25	1.33	1.70
3,400 ton imported pervious material	2.00	1.95	1.80	1.80
3,100 sq. yd. preparing slopes (erosion control)	.12	.14	.10	.15
53,500 sq. yd. cultivating (preparatory landscap.)	.05	.06	.07	.10
Lump sum, dev. wat. sup. and furn. wat. equip.	$22,000	$4,000	$15,000	$5,000

Continued on page 134

NEWS of MANUFACTURERS

WILLIAM C. JOHNSON, executive vice president of *Allis-Chalmers Manufacturing Co.*, died July 26 as the result of a heart attack. Johnson, who also served as chairman of the board of directors for the firm, started his association with Allis-Chalmers in 1924 as a machinist helper. In 1929 he became a representative of the crushing and cement division and six years later, general sales representative at Chattanooga, Tenn. In 1937, Johnson opened the firm's district office in Knoxville, Tenn. Just prior to his appointment as executive vice president for the entire company in February of this year, Johnson was vice-president in charge of the General Machinery Division. He was a member of many prominent industrial associations and professional societies.

☆ ☆ ☆

A. J. BELANGER holds a new post as assistant sales manager of *Pioneer Engineering Works*, Minneapolis, Minn. Belanger is a specialist in the needs of the road construction industry. Since 1948 he has been bituminous sales engineer for Pioneer.

☆ ☆ ☆

New sales manager of *The United Manufacturing Co.*, Bedford, Ohio, is JOSEPH N. RYDER. Ryder, who served in many sales positions throughout the industry, will supervise the sale and distribution of all of the firm's products.

☆ ☆ ☆

RUSSELL J. LOVE resigned as vice president and chief engineer of *Standard Steel Corporation.*

☆ ☆ ☆

CECIL M. SPEKKER is now purchasing agent for *Mixermobile Manufacturers*, Portland, Ore.

☆ ☆ ☆

HOWARD W. GOODALL, founder and president of *Dixon Valve & Coupling Co.*, Philadelphia, Pa., died at the age of 78 after years of active participation in the development, manufacture and sales of mechanical rubber goods and hose couplings for the construction field. Goodall was also one of the founders of the *Goodall Rubber Company.*

☆ ☆ ☆

W. CORDES SNYDER, JR. is the new president and chief executive officer of *Blaw-Knox Company.* He was previously a vice president of the firm in charge of its *Lewis Foundry & Machine Division*, and more recently the vice president of the *Koppers Company* and manager of its Metallurgical Department.

☆ ☆ ☆

A nationwide company for the manufacture and sale of various types of paving asphalts is now formed under the name of *American Bitumuls & Asphalt Co.* The new firm was created when *American Bitumuls Co.*, operating only in the East, acquired all the assets of *Stancal Asphalt*

Continued on page 136

UNIT BID PRICES . . . CONTINUED

	(1)	(2)	(3)	(4)
17,000 M. gal. applying water	1.35	1.70	1.50	2.00
Lump sum, finishing roadway	$2,000	$4,000	$2,500	$2,800
75,000 sq. yd. mix. and compact. (cem. tr. subgrade)	.20	.24	.20	.30
4,200 bbl. P.C. (cem. tr. subgrade)	4.00	3.90	3.04	3.20
105 ton asph. emul. (cur. sl., pt. bdr. and sl. ct.)	35.00	43.00	33.00	35.00
15,000 ton untreated rock base	1.80	1.88	1.85	1.80
65 ton liq. asph., SC-2 (pr. ct.)	24.00	25.00	23.50	35.00
11,233 ton mineral aggregate (P.M.S.)	3.50	4.20	4.25	3.40
608 ton paving asph. (P.M.S.)	20.00	4.20	4.25	20.00
150 ton sand (sl. ct.)	6.00	3.50	4.00	5.00
2,300 lin. ft. placing P.M.S. dikes	.25	.17	.18	1.00
625 sq. ft. placing P.M.S. drains	.25	.17	.25	.35
17,050 cu. yd. Class "B" P.C.C. (Pave.)	11.00	12.00	11.50	15.00
15,400 ea. pave. tiebolt assemblies	.60	.65	.60	.70
13,480 cu. yd. Class "A" P.C.C. (structures)	52.00	51.00	55.00	51.00
970 lin. ft. rubber waterstops	2.00	2.30	2.00	2.00
3,148 lin. ft. conc. railing	7.00	5.00	5.85	8.00
2,690,000 lb. structural steel	.145	.164	.147	.16
Lump sum, clean. and paint. structural steel	$27,000	$28,000	$26,900	$25,000
20,040 lin. ft. furn. concrete piling	3.00	3.20	2.80	3.00
616 ea. driving piles	60.00	60.00	87.50	55.00
2,697,600 lb. bar reinf. steel	.09	.10	.11	.10
85,370 lb. miscl. iron and steel	.30	.28	.30	.27
3,500 cu. yd. P.C.C. (curbs, gutters and sidewalks)	27.00	29.00	26.00	25.00
240 lin. ft. portable timber guard railing	3.50	4.00	3.50	4.00
36 ea. culv. markers and clear. markers	7.00	6.00	7.00	8.00
1,800 lin. ft. metal plate guard railing	3.00	3.30	2.75	3.00
1,300 lin. ft. 36-in. chain link fence	1.40	1.60	1.40	1.50
20,000 lin. ft. 72-in. chain link fence	1.80	2.00	1.95	1.80
130 lin. ft. 4-in. asbestos-cement water pipe	2.50	2.10	2.50	3.00
800 lin. ft. 15-in. R.C.P. culv.	3.50	3.40	4.50	4.00
300 lin. ft. 18-in. R.C.P. culv.	4.50	4.20	5.00	5.00
930 lin. ft. 24-in. R.C.P. culv.	6.00	5.60	6.25	6.00
45 cu. yd. Class "C" P.C.C. (pipe reinf.)	25.00	16.00	25.00	25.00
32 lin. ft. 6-in. vitrified clay pipe (std. str.)	1.25	5.20	3.60	8.00
80 lin. ft. 8-in. vitrified clay pipe (extra str.)	1.40	6.00	6.00	8.00
350 lin. ft. 8-in. vitrified clay pipe (std. str.)	1.30	3.50	5.10	8.00
730 lin. ft. 10-in. vitrified clay pipe (std. str.)	1.80	4.80	6.10	8.00
250 lin. ft. 10-in. vitrified clay pipe (extra str.)	1.90	7.00	7.80	9.00
6 ea. manholes (sanitary sewers)	350.00	260.00	325.00	300.00
Lump sum, drainage pumping equip.	$10,000	$9,000	$8,000	$10,000
Lump sum, pump house electrical equip.	$5,000	$5,000	$2,950	$5,000
Lump sum, lighting equip.	$14,000	$14,500	$14,600	$15,095
Lump sum, washing equip.	500.00	500.00	350.00	$1,000

Continuous reinforced concrete slab bridges

Wyoming—Hot Springs County—State. Charles M. Smith, Thermopolis, with a bid of $38,469, was low before the Highway Department for construction of three continuous reinforced concrete bridges over Owl Creek and approaches on 0.3 mi. of the Owl Creek Road. Unit prices were as follows:

(1) Charles M. Smith $38,469
(2) Etlin E. Peterson 39,316
(3) Engineer's estimate $38,199

	(1)	(2)	(3)
10,500 cu. yd. excavation	.60	.60	.60
900 cu. yd. excavation (sel. emb.)	.60	1.00	.75
2,000 cu. yd. sta. overhaul	.01	.01	.01
100 cu. yd. mi. haul	.40	.50	.30
120 M. gal. watering (emb.)	4.50	3 00	2.00
35 hr. sheep's foot roller operation	7.50	15.00	20.00
10 hr. pneumatic tired roller operation	12.00	10.00	15.00
12 hr. mechanical tamping	7.50	8.00	10.00
150 cu. yd. Class 1 riprap	14.00	14 00	10.00
75 cu. yd. structure excavation	2.50	2.00	3.00
100 cu. yd. special backfill	1.50	3.00	3.00
5 cu. yd. excavation for pipe culverts	3.00	5.00	2.50
45 lin. ft. 18-in. C.M.P.	3.75	4.00	5.50
14 lin. ft. 36-in. C.M.P.	12.50	11.00	9.00
1,800 cu. yd. removing and relaying gravel	1.50	1.25	1.20
900 lin. ft. standard r/w fence	.20	.30	.35
2 ea. end panels	15.00	15.00	20.00
3 ea. brace panels	14.00	15.00	18.00
10 ea. r/w markers	12.00	12.00	15.00
30 M. gal. watering (base)	4.50	3.00	2.00
15 hr. roller operation	14.00	10.00	15.00
217.9 cu. yd. Class A concrete	60.00	60.00	60.00
51,380 lb. reinforcing steel	.145	.15	.15
760 lb. structural steel	.40	.30	.20
220 cu. yd. wet excavation for bridges	10.00	12.00	10.00
40 cu. yd. dry excavation for bridges	2.50	5.00	5.00
272 lin. ft. metal plate guardrail	3.00	3.50	3.00
1 ea. prov. and maint. field test lab. bldg.	400.00	300.00	400.00

Building . . .

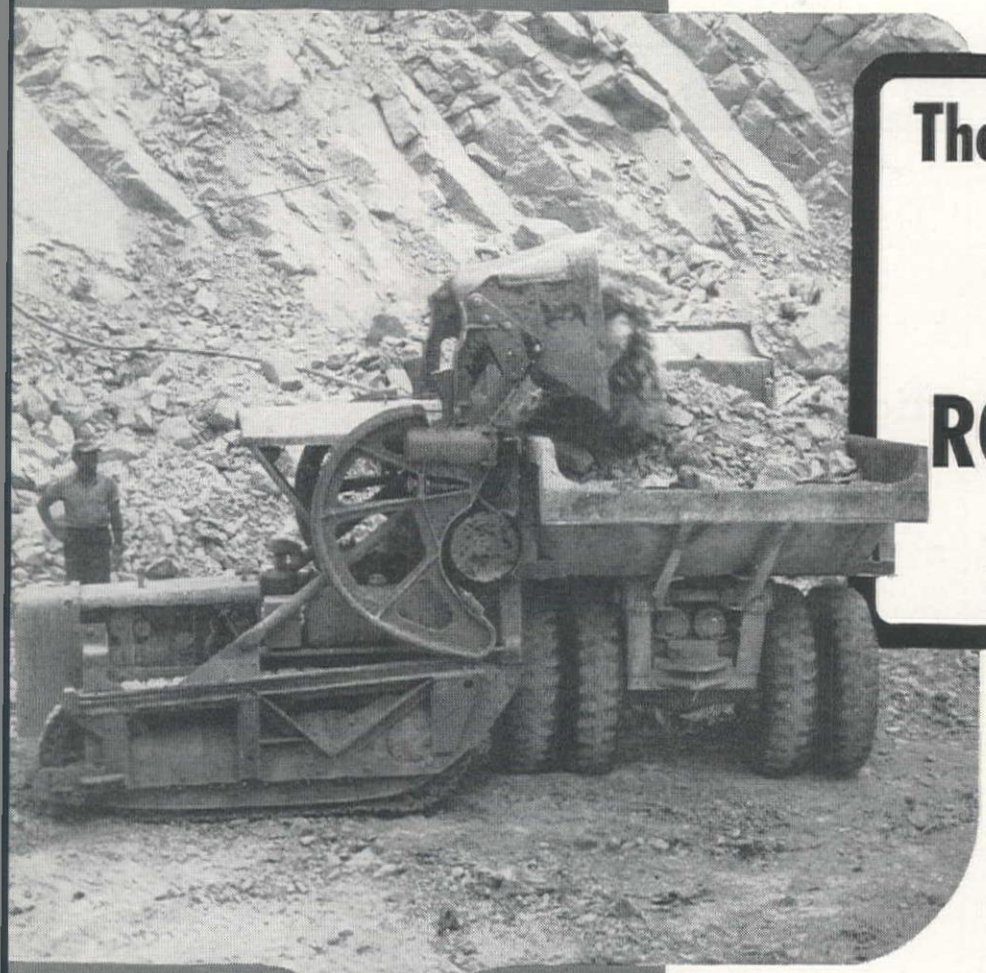
Headquarters building on Davis Dam Project

Arizona-Nevada—Davis Dam Project—Bureau of Reclamation. Daum-Donaldson Construction Co., Phoenix, with a bid of $448,371, was low before the Bureau of Reclamation for construction of the headquarters building for the system operations and maintenance area, Davis Dam Project. Unit prices were as follows:

(1) Daum-Donaldson Construction Co. $448,371
(2) Edwards Construction Corp. 463,681
(3) McGinty Construction Co. 474,584
(4) Harold Ashton Building Co. $478,568
(5) Engineer's estimate 408,020

	(1)	(2)	(3)	(4)	(5)
2,600 cu. yd. excavation	2.70	1.32	2.50	1.20	3.00
750 cu. yd. backfill	.90	.835	1.00	2.50	1.00
50 cu. yd. compacting backfill	3.00	4.06	4.00	5.00	4.00

Continued on page 136



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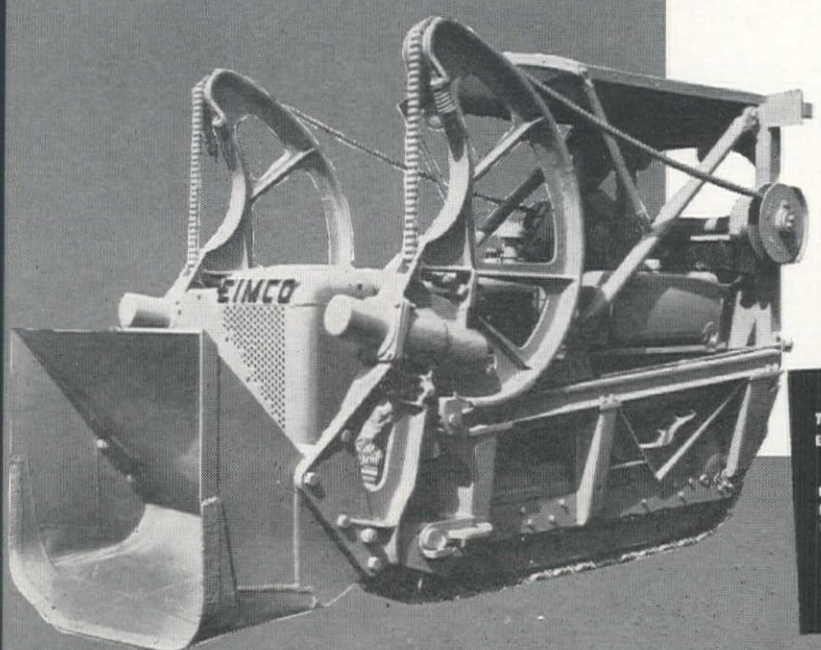

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AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD

NEWS of MANUFACTURERS

Continued from page 134

and Bitumuls Co., operating in the West. Both firms are subsidiaries of *Standard Oil Company of California*. Fourteen district offices will be set up to handle the new arrangement. Officers of the new firm include: CHARLES W. STEWART, president, and vice presidents L. P. STREET, L. G. THOMPSON, E. G. LOHMANN and N. H. ANGELL. Main offices for the new operations will be in San Francisco, Calif.

☆ ☆ ☆

G. E. GUNTHER becomes assistant sales manager of *Thew Shovel Co.*, Lorain, Ohio. Gunther has been in the construction equipment industry since 1936. J. T. CUSHING is sales manager.

☆ ☆ ☆

HENRY G. REENTS becomes superintendent of the plywood manufacturing department of *The Long-Bell Lumber Company*, Weed, Calif.

☆ ☆ ☆

L. F. SHOEMAKER is now vice president of *The Buda Company*, Harvey, Ill. In his 31 years with the firm, Shoemaker has served as regional representative and in distributor and branch retail sales. For the past 12 years he has served as manager of the Industrial Engine Sales Division and then as engine sales manager.

UNIT BID PRICES . . . CONTINUED

	(1)	(2)	(3)	(4)	(5)
700 cu. yd. puddling bacfifill	1.50	.823	.75	3.00	2.00
115 cu. yd. furnishing and placing gravel	3.00	15.82	10.00	3.00	6.00
1,930 bbl. furnishing and handling cement	5.10	5.86	5.25	8.00	6.00
20,000 lb. furn. and placing reinf. bars for headquarters bldg. below elevation 1045.66	.15	.147	.14	.14	.18
140 cu. yd. conc. in headquarters bldg. below elev. 1045.66	21.00	25.04	18.00	45.00	50.00
Lump sum, constructing headquarters building	$423,348	$439,269	$450,006	$446,338	$375,000

Highway and Street . . .

Grading, gravel base course and bituminous surfacing

Utah—Kane County—Bureau of Public Roads. Floyd S. Whiting, Salt Lake City, with a bid of $56,873, was low before the Bureau of Public Roads for construction of 0.7 mi. of highway in Dixie National Forest, Cedar-Long Valley route, to be 28 ft. wide. Unit prices were as follows:

(1) Floyd S. Whiting $56,873
(2) W. W. Clyde & Co. 60,455
(3) R. M. Jensen 75,436
(4) Whiting & Haymond $77,429
(5) Reynolds Construction Co. 98,844
(6) Engineer's estimate 87,900

	(1)	(2)	(3)	(4)	(5)	(6)
9 acre clearing and grubbing	200.00	200.00	400.00	500.00	$1,000	250.00
55,200 cu. yd. unclassified excavation	.50	.55	.72	.79	1.00	.95
160 cu. yd. unclass. excav. for structs.	2.00	2.00	3.00	3.00	3.00	2.50
40,000 sta. yds. overhaul (1000 ft. free haul)	.03	.03	.03	.06	.03	.03
3,200 lin. ft. furrow ditches	.10	.10	.11	.15	.10	.10
65 unit obliteration of old roadways	5.00	6.00	5.00	10.00	10.00	10.00
8 unit roadside cleanup	50.00	15.00	10.00	10.00	10.00	5.00
400 unit watering of embankment, Item 29	2.00	2.50	2.00	2.50	3.00	2.50
70 unit watering of base course, Item 52A(2)	2.00	2.50	2.00	2.50	3.00	2.50
All required, providing and maintaining water plant or plants	500.00	500.00	$2,000	$1,000	$1,000	600.00
350 hr. rolling embankments, Item 29	4.00	5.00	6.50	7.00	5.00	6.00
18 hr. rolling of base course, Item 52A(2)	5.00	10.00	12.00	7.00	5.00	6.00
4,800 ton selected matl. for subgrade	1.50	1.50	1.60	.97	1.90	.90
3,200 ton cr. gravel or cr. stone base course, Class 2, Grading D-1	1.50	1.50	1.75	1.12	1.95	1.50
196 ton Type 4 blotter matl. for bituminous preservative treatment	4.00	4.00	6.00	4.00	3.00	4.00
24 ton medium-curing cut-back asph., Gr. 1 or 2, for bituminous preserv. treatment	50.00	45.00	50.00	44.00	40.00	45.00
22 ton medium-curing cut-back asph., Grade 4 for bituminous preserv. treatment	50.00	45.00	52.50	45.60	40.00	45.00
10 cu. yd. conc., Class A (air-entrained conc., low alkali Type II cement)	70.00	100.00	.95	100.00	100.00	75.00
95 lb. reinforcing steel	.15	.20	.20	.20	.20	.20
1,225 lb. struct. steel—furn., fabricated and erected	.40	.30	.40	.50	.30	.30
626 lin. ft. 24-in. C.G.S.M. culvert pipe	5.00	5.40	5.00	6.00	6.40	5.00
7 ea. 24-in. metal pipe, end sections	50.00	50.00	48.50	55.00	47.70	45.00
45 ea. timber guide posts with warning reflectors (tr.)	8.00	10.00	7.50	10.00	10.00	7.00
900 cu. yd. furn. and placing loamy topsoil	1.00	1.50	1.70	3.00	2.00	1.50
95 unit Bromus Inermis seeding	10.00	6.00	6.50	5.00	20.00	5.00

Road-mix surfacing of 10½ mi. in Colorado

Colorado—San Miguel and Montrose Counties—State. Colorado Constructors, Inc., Denver, with a bid of $97,027, was low before the State Highway Department for construction of a State Highway between Norwood and Naturita on State Highway 145; road mixed oil process to be applied along 10.5 mi. Unit prices were as follows:

(1) Colorado Constructors, Inc. ..... $ 97,027
(2) Harrison & Atchison Co. 100,097
(3) J. H. & N. M. Monaghan & Assoc. Cos. 100,730
(4) Peter Kiewit Sons' Co. $101,583
(5) Engineer's estimate 85,976

	(1)	(2)	(3)	(4)	(5)
140 hr. rolling F.W. roller	8.00	10.00	8.00	11.00	8.00
120 hr. rolling R.T. roller	8.00	8.00	8.00	9.00	7.25
1 ea. furn. F.W. roller	300.00	500.00	300.00	400.00	200.00
1 ea. furn. R.T. roller	300.00	400.00	250.00	300.00	100.00
480 M. gal. wetting	1.50	3.00	2.00	1.50	1.50
40,400 ton mi. overhaul	.12	.10	.11	.10	.10
17,400 ton gravel, cr. rk. surf. course	1.30	1.25	1.45	1.25	1.05
135,800 gal. asph. road matl. MC-3	.17	.20	.19	.22	.18
63,100 gal. asph. road matl. MC-	.19	.20	.19	.22	.175
31,600 gal. asph. road matl. RC-	.19	.20	.20	.23	.175
123,870 sq. yd. road mix oil proc.	.12	.10	.11	.10	.08
1,390 ton stone screen. Tp. 2	7.35	8.00	7.00	6.00	7.00

Grading and asphaltic concrete paving

Washington—Spokane County—State. Charles A. Power, Spokane, with a bid of $194,654, was low before the Department of Highways for construction on Primary State Highway No. 11, Cheney to Four Lakes, to be 4.4 mi. in length. Unit prices were as follows:

(1) Charles A. Power $194,654
(2) Carbon Bros. $232,864

	(1)	(2)
Lump sum, clearing and grubbing	$4,500	$4,000
22,210 cu. yd. common excav., including haul of 600 ft.	.49	.43
26,480 cu. yd. solid rock excav., incl. haul of 600 ft.	.49	1.50
80 cu. yd. common trench excav., incl. haul of 600 ft.	2.00	2.00
10,000 cu. yd. common borrow, incl. haul of 600 ft.	.30	.35
103,370 cu. yd. stas. overhaul	.02	.02
692.05 M. cu. yd. stas. overhaul	5.00	6.00
2,000 cu. yd. stripping borrow and surf. pit incl. all haul	.20	.25
420 cu. yd. structure excav.	2.50	2.00
22 days tamping roller	50.00	50.00

Continued on page 138

ENGINEERED TYING DEVICES, ANCHORAGES and ACCESSORIES for CONCRETE CONSTRUCTION

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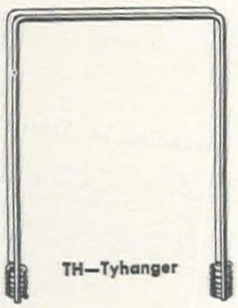
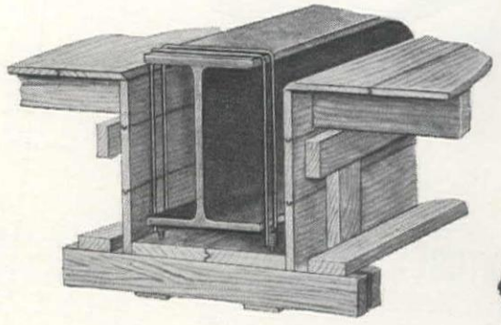


TH—Tyhanger

LAG—Tylag

FW—Flat Washer



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UNIT BID PRICES . . . CONTINUED

		(1)	(2)
104	days pneumatic tired roller	40.00	50.00
11	days mechanical tamper	32.00	45.00
12,200	lin. ft. slope treatment Class A	.10	.15
244.4	stas. (100 ft.) finishing roadway	10.00	12.00
900	M. gal. water in place	2.00	3.00
47,830	ton ballast in place	.75	.80
17,840	ton crushed stone surf. top course in place	1.25	1.30
	TYPE I-1 ASPHALTIC CONCRETE PAVEMENT		
5,282	ton Class C, wearing course in place	7.00	7.50
6,002	ton Class L leveling course in place	7.00	7.60
20	ton Class G leveling course, in place	11.00	11.40
	OTHER ITEMS		
310	lin. ft. removing and resetting existing cable guard rail	1.00	2.00
1,137	lin. ft. std. reinf. conc. culv. pipe 18-in. diam. in place	3.50	3.00
84	lin. ft. std. reinf. conc. culv. pipe 24-in. diam. in place	6.00	4.00
100	lin. ft. std. reinf. conc. culv. pipe 36-in. diam. in place	11.00	8.50
88	lin. ft. std. reinf. conc. culv. pipe 54-in. diam. in place	18.00	20.00
45	only reinf. concrete r/w markers in place	5.00	5.00

Grading and crushed stone surfacing in Arizona

Arizona—Navajo County—Bureau of Public Roads. Lyle Price, Contractor, Flagstaff, with a bid of $126,661, was low for construction of Route 12, Globe-Holbrook National Forest Highway, to be 8.0 mi. in length and 26-ft. in width; including grading and surface course. Unit prices were as follows:

(1) Lyle Price, Contractor $126,661
(2) Wallace & Wallace 134,394
(3) Arizona Sand & Rock Co. $154,514
(4) W. C. Smith, Contractor 194,773

		(1)	(2)	(3)	(4)
	Lump sum, extra and misc. force account work	$2,000	$2,000	$2,000	$2,000
91,200	cu. yd. unclassified excav.	.47	.60	.70	.60
1,370	cu. yd. unclass. excav. for structs.	2.00	2.00	2.00	3.50
10,000	sta. yd. overhaul (1000-ft. free haul)	.01	.02	.04	.04
21,700	lin. ft. furrow ditches	.10	.08	.12	.10
	Lump sum, obliteration of old roadways	100.00	100.00	100.00	100.00
34,400	ton cr. gravel or cr. stone surf. course, Class 1, Grading B	1.45	1.30	1.29	2.75
139	cu. yd. Class A concrete	55.00	60.00	70.00	85.00
14,400	lb. reinforcing steel	.13	.13	.17	.20
1,266	lin. ft. 18-in. CGSM culvert pipe	4.15	4.00	3.80	5.00
696	lin. ft. 24-in. CGSM culvert pipe	6.00	6.00	6.00	7.00
126	lin. ft. 36-in. CGSM culvert pipe	9.70	10.00	12.00	10.75
46	lin. ft. 48-in. CGSM culvert pipe	13.55	17.00	15.00	16.00
70	lin. ft. 60-in. CGSM culvert pipe	21.85	24.00	26.00	26.50
588	lin. ft. remove, clean and relay or stockpile salvaged culvert pipe	2.50	3.00	3.00	2.00
10	ea. right-of-way monuments, Type A	10.00	40.00	15.00	25.00
1	ea. cattle guard (4-units)	$1,720	$1,750	$1,900	$2,500
5,300	lin. ft. barbed wire fence	.22	.20	.22	.40
1	ea. gate (Type 2)	30.00	30.00	80.00	100.00

Grading and paving with asphaltic concrete

California—Los Angeles County—State. Boddum & Peterson, Long Beach, with a bid of $321,897, was low before the Division of Highways for construction of a State highway on Pomona Blvd. between Ferris Ave. and Potrero Grande Drive, about 2.3 mi. in length to be graded and paved with asphaltic concrete. Unit prices were as follows:

(1) Boddum & Peterson $321,897
(2) Vido Kovacevich Co. 324,681
(3) H. & H. Construction Co. 338,357
(4) Jesse S. Smith, Robert R. Hare and Service Construction Co. of So. Calif. $344,115
(5) Griffith Co. 364,979

		(1)	(2)	(3)	(4)	(5)
760	cu. yd. removing concrete	5.00	6.00	7.00	5.00	4.40
	Lump sum, clearing and grubbing	$2,500	$1,000	$1,000	$2,500	$4,300
39,000	cu. yd. roadway excavation	.80	.72	1.00	1.00	.85
2,500	cu. yd. structure excavation	2.00	2.60	2.50	3.00	2.90
2,450	cu. yd. ditch and channel excavation	1.00	1.50	1.75	.90	1.20
55,500	sq. yd. compacting original ground	.05	.05	.09	.04	.04
22,100	ton imported subbase material	1.00	1.00	1.06	1.10	1.25
	Lump sum, dev. wat. sup. and furn. wat. equip.	$2,000	$1,000	$1,500	$5,000	$1,972
2,100	M. gal. applying water	2.00	1.75	2.00	1.50	1.70
	Lump sum, finishing roadway	$1,000	200.00	$1,160	$1,000	900.00
42,600	ton untreated rock base	1.50	1.70	1.60	1.65	1.88
98	ton liquid asph., SC-2 (pr. ct.)	25.00	28.50	25.00	22.00	24.00
43	ton asphaltic emul. (pt. bdr. and sl. ct.)	45.00	36.00	40.00	29.00	32.00
22,400	ton asph. conc.	3.90	4.05	3.84	4.00	4.35
262	ton sand (seal coat)	5.00	3.50	6.00	3.00	4.70
165	cu. yd. Class "A" P.C.C. (structures)	60.00	63.50	75.00	75.00	67.00
1,285	cu. yd. Class "B" P.C.C. (curbs, gutters and sidewalks)	26.00	23.00	23.00	25.00	29.50
15,100	lb. bar reinf. steel	.15	.14	.20	.20	.14
28,400	lb. miscl. iron and steel	.30	.30	.35	.30	.32
278	lin. ft. 18-in. R.C.P. (std. strength)	7.00	5.00	4.55	4.50	5.00
858	lin. ft. 24-in. R.C.P. (std. strength)	7.00	6.00	5.80	6.00	6.00
103	lin. ft. 30-in. R.C.P. (std. strength)	10.00	8.00	9.15	7.50	8.50
610	lin. ft. 36-in. R.C.P. (std. strength)	10.00	10.00	10.70	10.00	10.00
100	lin. ft. raised traffic bars	3.00	1.50	1.50	1.00	1.25
22	ea. adjusting manholes to grade	20.00	20.00	20.00	20.00	19.00
	Lump sum, adjusting existing lighting systems	$6,000	$6,000	$5,930	$6,500	$7,000
	Lump sum, adjusting existing traffic control system	$12,000	$12,000	$12,180	$13,000	$14,000

9-in. portland cement concrete pavement

Washington—Cowlitz County—State. Fiorito Bros., 1100 Leary Way, Seattle, with a bid of $363,618 was low before the Department of Highways for construction of Primary State Highway No. 1—Kalama River to Paxton Rd. Unit prices were as follows:

(1) Fiorito Bros. $363,618
(2) N. Fiorito Co. 375,904
(3) Peter Kiewit Sons' Co. $408,476

		(1)	(2)	(3)
15,900	cu. yd. common excav. including haul of 600 ft.	.50	.60	.80

(Continued on next page)

This Diesel's built to go a million miles (and work thousands of "stand-by" hours!)

GMC

GASOLINE & DIESEL TRUCKS

½ TO 20 TONS

GM

GENERAL MOTORS

Your key to greater hauling profits

No place is GMC's new "Million-Miler" Diesel more at home than when working under the truck-killing conditions of heavy construction work.

For here is where the sustained "go" of GMC's 150- and 225-BHP power plants are really called upon to keep socking home the heft to the pay load.

But the big factor is the *patient power* that purrs under the hood of this "Jimmy" Diesel – thousands of hours of stand-by power, idling – ready to spring into driving motion the moment the foreman signals "take her away!"

With new automatic Fuel Modulation that takes the lugging and the sludging out of low-speed Diesel operation – new freer-breathing, carbon-free scavenging action, husky 80 c.c. unit injection of fuel and a new high governed speed of 2100 r.p.m. – *no wonder it's the ruggedest, workingest, longest-lasting engine ever yoked to a real truck!*

Why not let your GMC dealer give you all the facts on this fleet of new Diesel "Million-Milers." Figure out the power savings you'll get–both in terms of miles *and hours* of real, long-time, rough-and-tumble work!

GMC Truck & Coach Division of General Motors

UNIT BID PRICES . . . CONTINUED

		(1)	(2)	(3)
1,760	cu. yd. stas. overhaul	.05	.03	.05
787	M. cu. yd. stas. overhaul	8.00	6.00	8.00
50	days smooth-wheeled power roller	45.00	55.00	55.00
50	days pneumatic-tired roller	45.00	55.00	50.00
290.3	stas. (100 ft.) finishing roadway	10.00	10.00	11.00
300	M. gal. water in place	3.00	3.00	2.50
11,220	ton crushed stone surf. top course in place	3.00	2.50	3.35
	TYPE I-1 ASPHALTIC CONCRETE PAVEMENT			
823	ton Class C wearing course in place	10.00	10.00	13.00
1,463	ton Class L leveling course in place	10.00	10.00	13.00
11	ton asphalt cement MC-3 prime coat in place	50.00	50.00	70.00
	ONE COURSE CONCRETE PAVEMENT			
72,155	sq. yd. cement conc. pavement stand. 14 day mix, 9-in. section in place	3.73	3.95	4.15
680	only dowel bars with rubber caps in place	.40	.40	.40
2	only temp. br. across pavement, takedown type in place	150.00	150.00	40.00
4,434	sq. yd. removing asphaltic concrete pavement	.50	.35	.35
203	lin. ft. pavement headers in place	3.00	.75	1.00
	OTHER ITEMS			
152	lin. ft. Type A precast white reflect. curb in place	3.00	3.00	2.00
104	lin. ft. Type C precast white reflect. curb in place	3.50	3.50	3.00
46	only precast white reflect. traffic buttons, in place	3.00	4.00	3.60
200	lin. ft. asphaltic concrete traffic bars, in place	2.00	1.75	1.20
3,565	lin. ft. removing precast white reflect. curb, Type A	.50	.50	.50
434	lin. ft. removing precast white reflect. curb, Type C	.50	.50	.85
29	only removing precast white reflect. traffic buttons	1.00	.50	.85
149	lin. ft. removing asphaltic concrete traffic bars	.50	.50	.50
2,812	lin. ft. resetting precast white reflect. curb, Type A	1.00	1.75	.65
429	lin. ft. resetting precast white reflect. curb, Type C	1.00	1.75	1.00
24	only resetting precast white reflect. traffic buttons	2.00	1.75	1.00
500	lin. ft. temporary beam guard rail in place	2.00	2.50	3.15
86	only reinforced concrete spot posts in place	15.00	12.00	14.00
250	lin. ft. removing and resetting standard beam guard rail	3.00	2.00	1.65
12	only removing and resetting reinforced concrete spot posts	15.00	7.50	10.00
350	lin. ft. removing temporary beam guard rail	.60	.75	.70
350	lin. ft. resetting temporary beam guard rail	1.50	1.25	1.00
2	only removing illuminated terminal nosing Type No. 1	10.00	25.00	25.00
1	only resetting illuminated terminal nosing Type No. 1	15.00	50.00	85.00
1,121	sq. yd. removing traffic island	.50	.50	.70
Lump sum,	removing concrete floor slab	50.00	100.00	75.00
1	only adjusting catch basin to grade	25.00	50.00	100.00

Dam . . .

Glen Anne earthfill dam with asphaltic concrete protection layer on upstream face

California—Cachuma Project—Bureau of Reclamation. O. K. Mittry and N. M. Saliba Co., joint venturers, Los Angeles, with a bid of $752,680, were low for construction of Glen Anne Dam, a 102 ft. high and 250 ft. long earthfill dam on the west fork of the Glen Anne Creek, 4 mi. northwest of Goleta. Included in the project are: a 7 ft. diameter horseshoe-shaped tunnel outlet, reinforced concrete chute-type overflow, stilling pool and wasteway. The dam's upstream face will be protected by asphaltic concrete layer, a recent innovation of the Bureau. Unit prices were as follows:

(1) O. K. Mittry and N. M. Saliba Co.....$752,680
(2) L. A. & R. S. Crow 845,932
(3) Rhoades-Shofner Construction Co., Inc. 889,559
(4) Clyde W. Wood & Sons, Inc. $1,145,404
(5) Carl M. Halvorson, Inc. 1,267,971
(6) Engineer's estimate 707,560

		(1)	(2)	(3)	(4)	(5)	(6)
100,000	M. gal. diversion and care of stream flow from Tecolote Tunnel drainage, first 10,000 thousand gallons	*1.00	.40	3.00	.50	.90	2.50
190,000	M. gal. diversion and care of stream flow from Tecolote Tunnel drainage over 10,000 thousand gallons	* .05	.20	.20	.05	.60	.06
		**(0.50)					
Lump sum,	clearing reservoir and constr. areas	$31,250	$70,000	$20,000	$25,000	$25,000	$10,000
52,000	cu. yd. excav. for dam foundations	.75	1.20	.90	2.25	1.90	.65
2,800	cu. yd. excav. in open cut for outlet works	.75	1.16	2.00	2.00	2.00	1.00
8,000	cu. yd. excav. in area "C" and transportation to dam embankment	1.00	2.00	2.00	2.25	3.00	.75
860	cu. yd. excavation for wasteway	2.00	1.50	2.00	5.00	3.00	1.25
1,000	cu. yd. excav. in tunnel for outlet works	35.00	30.00	40.00	65.00	58.00	50.00
25,000	lb.furn. and placing perm. struct'l-steel tunnel supports, steel tunnel-liner plates, and steel lagging	.30	.40	.10	.50	.45	.22
48,000	cu. yd. excav., stripping borrow area "A"	.40	.46	.50	.72	.75	.40
104,000	cu. yd. excav. in borrow area "B" and transportation to dam embankment	.55	.90	.80	2.00	1.65	.55
1,850	cu. yd. backfill	.40	2.00	1.00	1.50	5.00	1.00
600	cu. yd. dumped fill in Tecolote Tunnel access road embankments	.40	1.00	1.00	.50	1.00	.30
310	cu. yd. furn. and placing gravel or cr. rk. blankets under dumped riprap and under riprap for wasteway slope protection	8.00	8.00	11.50	10.00	7.00	6.50
180	cu. yd. furn. and dumping riprap for spillway outlet channel and wasteway outlet	10.00	15.00	11.50	15.00	25.00	8.75
440	cu. yd. furn. and placing riprap for road and wasteway slope protection	15.00	18.00	13.50	15.00	27.00	8.75
58,000	cu. yd. Vasqueros formation fill in dam embankment, Zone 2, first 58,000 cu. yd.	.20	.30	.30	.35	1.20	.22
58,000	cu. yd. Vasqueros formation fill in dam embank., Zone 2, over 58,000 cu. yd.	.14	.30	.20	.25	.70	.20
3,500	cu. yd. furn. and placing sand and gravel fill in dam embankment, Zone 3	8.00	7.00	10.50	8.00	1.00	6.00
7,200	cu. yd. special compaction of earth fill	3.00	2.00	4.00	4.00	3.25	3.00
1,400	cu. yd. topsoil for seeding	1.00	2.50	2.50	5.00	3.00	.80
4,000	sq. yd. seeding	.30	.50	.50	.50	.50	.05

(Continued on next page)

UNIT BID PRICES . . . CONTINUED

		(1)	(2)	(3)	(4)	(5)	(6)
95	M. gal. water for seeded areas	30.00	10.00	8.00	8.00	10.00	8.00
300	lin. ft. furn. 8-in. diam. sewer pipe and constr. embank. toe drains with uncem. joints	4.00	7.00	8.00	6.00	3.00	3.00
640	lin. ft. furn. 4-in. diam. sewer pipe and constr. drains with uncem. joint	2.50	10.00	5.00	2.50	2.50	2.00
42	lin. ft. furn. and laying 4-in. diam. sewer pipe with cemented joints	2.50	10.00	2.00	3.50	2.00	2.00
1,000	lin. ft. drilling grout holes betw. depth of 0 ft. and 20 ft.	2.00	6.00	3.00	3.50	4.00	3.00
400	lb. furn. and placing pipe and fittings for tunnel grouting	1.50	4.00	1.00	2.00	2.00	1.00
600	cu. ft. pressure grouting	3.00	6.00	4.00	5.00	5.00	2.50
2,440	bbl. furn. and handling cement	5.00	4.50	4.50	5.25	6.00	5.00
310	cu. yd. conc. in spillway floor and side lining	60.00	70.00	60.00	85.00	108.00	40.00
330	cu. yd. conc. in spillway transition, stilling basin, and wing walls	80.00	75.00	100.00	85.00	108.00	70.00
50	cu. yd. conc. in outlet-works intake struct.	100.00	80.00	200.00	90.00	100.00	60.00
150	cu. yd. conc. in outlet-works conduit and cut-off collars	50.00	65.00	70.00	80.00	102.00	55.00
525	cu. yd. conc. in outlet-works tunnel lining, tunnel portal plug, and tunnel portal	40.00	90.00	60.00	85.00	78.00	50.00
3	cu. yd. second-stage conc. in outlet-works tunnel portal plug	100.00	125.00	100.00	100.00	150.00	80.00
75	cu. yd. concrete in wasteway	65.00	80.00	100.00	100.00	80.00	65.00
95,750	lb. furn. and placing reinf. bars	.14	.12	.15	.20	.15	.16
9,400	lb. furn. and placing reinf. fabric	.20	.20	.16	.25	.20	.14
270	sq. ft. furn. and placing bitum. joint filler	2.00	2.00	3.00	3.00	1.00	2.00
40	lin. ft. furn. and placing metal seals, Type N-1	2.00	5.00	3.00	5.00	3.00	1.50
35	lin. ft. furn. and placing metal seals, Type Z	3.00	5.00	4.00	5.00	3.00	3.00
145	lin. ft. placing rubber water stops	2.00	3.00	3.00	3.00	1.00	1.60
116	lin. ft. furn. and placing conc. irrigation pipe	5.00	5.00	6.00	3.00	2.00	2.00
35	posts furn. and setting pre-cast-conc. posts	15.00	20.00	6.00	10.00	12.00	10.00
5,700	lb. installing butterfly valve	.25	.50	.30	.50	.20	.15
2,000	lb. installing control equip. for butterfly valve	.50	.75	.30	.50	.20	.40
2,200	lb. installing trashracks	.25	.25	.10	.50	.20	.12
950	lb. installing miscl. metalwork	1.00	1.00	.30	1.00	.20	.30
290	lin. ft. furn. and placing 3-in. well-discharge pipe	2.00	4.00	10.00	2.00	2.00	5.50
6,000	cu. yd. excav. for roadway	.40	.60	1.00	.50	1.50	.80
8,000	cu. yd. roadway embankments for Hove access rd.	.10	.20	.30	.50	.50	.40
125	cu. yd. backfill for roadway	.40	5.00	3.60	3.00	3.00	1.00
66	lin. ft. furn. and laying 16-gage 18-in. diam. corru.-metal pipe	5.00	4.00	3.00	5.75	3.00	4.50
50	lin. ft. furn. and laying 14-gage 30-in. diam. corru.-metal pipe	12.00	6.00	10.00	10.00	6.00	8.00
90	lin. ft. furn. and laying 10-gage 72-in. diam. corru.-metal pipe	35.00	32.00	40.00	40.00	30.00	28.00
400	cu. yd. selected roadway surfacing	3.00	1.50	6.00	1.00	5.00	1.00

(Continued on next page)

UNIT BID PRICES . . . CONTINUED

SCHEDULE—PART B—ASPHALTIC-CONCRETE UPSTREAM SLOPE PROTECTION

	(1)	(2)	(3)	(4)	(5)	(6)
8,500 cu. yd. excav. for spillway	1.50	2.75	3.00	2.25	1.00	.90
191,000 cu. yd. excav. in borrow area "A" and transportation to dam embankment	.45	.34	.50	.65	.52	.50
83,000 cu. yd. earthfill in dam embank. Zone 1, first 83,000 cu. yd.	.20	.27	.30	.50	.54	.21
83,000 cu. yd. earthfill in dam embank., Zone 1, over 83,000 cu. yd.	.12	.27	.20	.30	.45	.19
1 cu. yd. concrete in curbs	100.00	100.00	100.00	50.00	100.00	60.00
1,200 ton furn. asph. for asphaltic conc.	26.00	18.00	26.00	18.00	51.00	35.00
19,500 sq. yd. preparing surf. for asphaltic-conc. slope protections	.20	.15	.60	.50	.20	.30
11,000 ton asphaltic conc. in slope protection	6.00	5.00	8.00	8.50	7.60	10.00

SCHEDULE—PART C—RIPRAP UPSTREAM SLOPE PROTECTION

9,000 cu. yd. excav. for spillway	1.50	3.00	2.25	1.00	.90
175,000 cu. yd. excav. in borrow area "A" and transportation to dam embank.	.45	.50	.65	.52	.50
77,000 cu. yd. earthfill in dam embank., Zone 1, first 77,000 cu. yd.	.20	.30	.50	.54	.21
77,000 cu. yd. earthfill in dam embank., Zone 1, over 77,000 cu. yd.	.12	.20	.30	.45	.19
7,000 cu. yd. furn. and placing gravel or cr. rk. blanket on upstream slope of dam embank.	6.00	10.00	8.00	7.00	6.50
13,000 cu. yd. furn. and placing riprap on upstream slope of dam embank.	10.00	12.00	14.00	17.00	8.00

*Corrected.
**Totals on basis of correcting bidder's alleged error in Item 2—acceptance subject to Comptroller General's decision.

Earthfill dam for City of Medford, Oregon

Oregon—Willow Creek Dam—City. Leonard & Slate Oregon, Ltd., Portland, with a bid of $840,481, was low before the City of Medford Board of Water Commissioners for construction of Willow Creek Dam. (The Commission rejected the earlier bid of $1,393,007 by Guy F. Atkinson Co. because the bid exceeded the available funds.) The job consists of 682,000 cu. yd. of fill; main dam and small side dam sections; center line of dam divided by rock knoll. Rock from knoll will be used in necessary concreting work and spillway will be laid over knoll. Unit prices were as follows:

(1) Leonard & Slate Oregon, Ltd. $840,481
(2) C. J. Montag & Sons 916,710
(3) G. D. Dennis & Son and Donald M. Drake 939,167
(4) Carl M. Halvorson $1,107,765
(5) L. A. & R. S. Crow 1,381,215
(6) Engineer's estimate 797,845

	(1)	(2)	(3)	(4)	(5)	(6)
Lump sum, diversion and care of stream during constr. and unwatering of the foundation	$10,000	$45,000	$89,000	$85,440	$90,000	$5,000
162,658 cu. yd. common excav. for dam foundation	.60	.50	.48	.55	1.40	.40
5,644 cu. yd. rock excav. for dam cutoff trench	6.00	3.50	5.00	5.50	6.00	5.00
25,545 cu. yd. com. excav. for spillway and outlet struct.	.60	.50	.40	1.25	1.50	.40
41,430 cu. yd. rock excav. for spillway	4.00	1.50	1.50	3.75	5.50	3.50
409,670 cu. yd. earth fill in dam embankment, Zone I	.55	.85	.81	.74	.90	.625
272,685 cu. yd. earth fill in dam embankment, Zone II	.55	.85	.81	.87	.90	.625
22,246 cu. yd. rock riprap in dam embankment, Zone III	1.00	.80	1.00	1.95	1.00	.50
2,280 lin. ft. drilling 1½-in. grout holes	2.00	2.50	2.00	6.60	6.00	2.00
114 ea. grout connections	25.00	5.00	8.80	30.00	20.00	5.00
1,140 sacks pressure grouting with packers	15.00	4.00	4.40	6.30	4.00	5.00
55.6 cu. yd. furn. and placing conc. Class "B" for conduit pier	85.00	44.00	45.00	61.00	50.00	40.00
636.4 cu. yd. furn. and placing conc. Class "A" for spillway	65.00	60.00	53.00	72.50	65.00	65.00
87.0 cu. yd. furn. and placing conc. Class "A" for intake tower	85.00	80.00	82.00	89.00	80.00	90.00
192.5 cu. yd. furn. and placing conc. Class "A" for outlet conduit and outlet works	75.00	65.00	60.00	74.00	70.00	65.00
274.03 lin. ft. furn. and placing "centerline" lining in 36-in. conduit pipe	15.00	16.00	15.40	16.50	20.00	16.00
104,324 lb. furn. and placing reinf. steel bars	.15	.13	.16	.115	.20	.15
778.5 lin. ft. furn. and install 4 tile drains in spillway	3.00	2.00	2.20	4.00	3.00	4.00
3 only install 20-in. gate valve	195.00	200.00	308.00	450.00	500.00	300.00
1 only install 30-in. gate valve	250.00	400.00	605.00	460.00	750.00	$1,000
1 only install 18-in. gate valve	65.00	150.00	138.00	280.00	500.00	50.00
1 only install 12-in. gate valve	50.00	100.00	110.00	140.00	300.00	50.00
1 only install 8-in. gate valve	40.00	50.00	110.00	70.00	200.00	50.00
1 only install 2-in. gate valve	15.00	25.00	28.00	35.00	100.00	10.00
Lump sum, install steel pipe and fittings	$2,500	$4,000	$3,250	$3,550	$5,000	$5,000
1 only install 10-in. x 10-in. sluice gate	50.00	50.00	66.00	120.00	200.00	100.00
Lump sum, furn. and install weir	500.00	100.00	216.00	350.00	500.00	100.00
Lump sum, furn. and install manhole frames and covers	250.00	300.00	283.00	615.00	$1,000	400.00
Lump sum, furn. and install tower ladder	500.00	600.00	688.00	936.00	$1,000	400.00
Lump sum, furn. and install deck grill	250.00	50.00	53.00	70.00	250.00	25.00
Lump sum, furn. and install intake grills	250.00	550.00	704.00	$1,246	$1,000	350.00
Lump sum, furn. and install tower railing	100.00	300.00	386.00	260.00	500.00	300.00
Lump sum, install cast iron fittings	500.00	200.00	275.00	300.00	500.00	100.00

Miscellaneous . . .

Aerial topographic survey of highway route

Washington—Yakima County—State. Pacific Aerial Surveys, Inc., Seattle, with a bid of $2,229, was low before the Department of Highways for an aerial topographic survey on Secondary State Highway No. 11-A, Yakima to Moxee City. Unit prices were as follows:

(1) Pacific Aerial Surveys, Inc. $2,229
(2) Aero Service Corp. 2,542
(3) Fairchild Aerial Surveys, Inc. $3,283
(4) Gardner & Hitchings, Inc. 4,958

	(1)	(2)	(3)	(4)
10.6 sq. mi. topographic map	207.54	238.00	307.47	430.00
2 (sets) only stereoscopic contact prints	10.00	6.00	10.91	150.00
2 (sets) only photo-index maps	5.00	4.00	1.00	50.00

NEW BOOKS

Irrigation Engineering, Vol. I—By Ivan E. Houk. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y. 545 pages, 9¼ x 6. Price $9.00.

This volume of Irrigation Engineering devotes itself to the agricultural and hydrological phases of irrigation. The results of recent studies are explained, always with an emphasis on the engineering aspects. This is based upon the most recent material available, and every effort is made to provide practical data which those interested in this form of engineering will find essential. Among the subjects covered by the author are developments during the last few years which influence the subjects of soil moisture, wilting condition, snow surveys, runoff forecasting, return flow, drainage recoveries, use of water by crops, consumptive use on large areas and many others. Variable factors involved in irrigation are studied in this work also. An extensive bibliography is included at the close of every chapter and both a name and a subject index appear at the back of the book. This timely reference work permits the reader to examine an increasingly important field.

* * *

Mineral Wool Insulation Specifications and Standards—Published by Industrial Mineral Wool Institute, 441 Lexington Ave., New York, N. Y. Price $3.20.

This book contains 21 specifications and standards by four government agencies and the American Society For Testing Metals. In addition to serving as a valuable guide to the specification and installation of mineral wool products, the book should facilitate contractors and specification writers in meeting the standards of government contracts. Some of the subjects in the new reference guide are: types of products, characteristics, construction, selection, standard dimensions, temperature limits, thicknesses, auxiliary materials, application techniques and testing methods. The book contains a great deal of practical information under one cover and can be kept up to date by inserting further information in the rear.

* * *

Hydraulic Transients—By George R. Rich, Consulting Engineer. Published by McGraw-Hill Book Company, 327 W. 41st St., New York, N. Y. 260 pages; illustrated. Price $7.00.

Hydraulic Transients is an important round-up of theories and data developed by specialists in this field. The book is one of a series produced under the sponsorship of the ASCE, ASME, AIME and AIEE. Most of the information included is either being published for the first time, or is gleaned from a wide variety of technical literature here and abroad.

The book shows how arithmetic integrations and trial-and-error arithmetic are used in solving a wide variety of hydraulic and hydro-electric problems. George R. Rich, the author, combines the supporting theories for each solution with detailed analyses and integration calculations so that designing engineers, using this book, can solve their own special problems with a minimum of research and routine calculations.

Each of the following engineering problems is treated in separate chapters that include correlated bibliographies on American and foreign technical studies: Water Hammer, Turbine Speed Regulations, Stability of Governing, Water-hammer Pressures in Pump Discharge Lines, The Differential Surge Tank, The Restricted-orifice Surge Tank, Navigation Locks, and Surges in Power Canals—Tidal Harmonics. Nearly all the examples given show the actual commercial computations used on structures now in successful operation.

* * *

Soil Mechanics, Foundations, and Earth Structures—By Gregory P. Tschebotarioff. Published by McGraw-Hill Book Company, 330 W. 42nd St., New York 18, N. Y. 6¼ x 9¼. 655 pages. Price $6.50.

For the first time, the theory of soil mechanics in an integrated treatment with the practice of foundation and earth structure design and construction is presented in book form. The book should have an appeal for both the beginner and the person who is familiar with the subject. Every effort is made to show the interrelationships of the three title subjects. The theories are advanced, then analyzed on the basis of actual practice in the field. The limitations are included to give the reader a full picture of the theory in operation. The subject of lateral earth pressure, on which the author is a well-known expert, is treated in detail and attention is given to the related design problems. There is an interesting pattern throughout the book which consists of comparing laboratory predictions to actual field results. More than 400 illustrations appear in the book, along with 450 references to permit further investigation of the subject.

NEW LITERATURE

1001

A 28-page basic manual on grinding machines

In addition to being a factual description of **The Porter-Cable Machine Co.'s** new Abrasive-Belt Machines, this 28-page booklet is a fine basic manual on grinding machines. Each model is thoroughly discussed and displayed in photographs, and specifications, standard equipment, drive units and accessories are listed. In addition to the statistical portrayal of each model, information is given on the scope of its uses and suitability for particular jobs. Abrasive-belt machining is especially adaptable to defense production, and this booklet is a clearly written guide to an important line of equipment. Units discussed are wet belt, dry belt, centerless belt, backstand idlers, bench and utility grinders.

1002

20-page brochure tells how to eliminate leakage

A hydraulic cement for sealing steel-sheet piling, grouting of anchor bolts, patching and filling of concrete in heavy mass structures, cornices, sills, bridges, reservoirs, filtration tanks and masonry buildings of all types is described in this 20-page fully-illustrated brochure published by **Standard Dry Wall Products Co.** The entire booklet is a "how to do it" discussion of this powerful quick-setting hydraulic cement. Use of the cement for preventing possibility of vibration, such as with high-powered ventilator fans in tubes and tunnels, is also discussed. This designer's guide is free to construction engineers and superintendents and architects.

1003

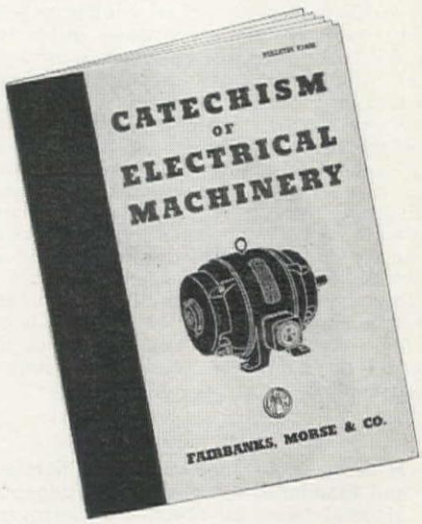
42 pages of data on conveyor idlers and machinery

Giving information on all the latest designs of Rex Conveyor Idlers and Machinery, this 48-page booklet is a complete digest of this important equipment. Filled with tables, diagrams and photographs, the booklet describes the new Rex Style No. 33RA Return Belt Training (Self-Aligning) Idler along with material on newly developed styles No. 40 and 46 steep-angle Troughed Belt Idlers. Latest data on lubrication material and techniques are included. Here also is a detailed description of zipper bunker seals and information on belt conveyor trippers along with guides to correct maintenance procedure. There are two pages of general engineering information to help in designing and specifying belt idler equipment.

1004

Abc's of electrical machinery in new 48-page reference work

"The Catechism of Electrical Machinery" presents in a simple, easily readable way, a brief but complete education on



the common types of direct-current and alternating-current motors, generators and control equipment. Released by **Fairbanks Morse & Co.**, and aimed directly at those who are not familiar with the intricacies of electricity and its technical terminology, the book employs the question and answer system to bring its points to bear upon the reader. A thorough index is included in the back to refer the reader to any specific question quickly and easily. In addition to diagrams and tables clarifying certain discussions, photographs are included throughout the text.

1005

Long wheelhouse truck hoist

A fully-illustrated bulletin is offered by **Hercules Steel Products Corp.** describing an advanced type of hoist for long wheelhouse trucks. The KDLL hoist uses the Hercules "center-lift" design which provides extra lifting power and smoother operation as explained in the booklet. Bulletin 8051 points out the hoist is designed for bodies 9 and 10 ft. long, with capacities to and including 3 cu. yd., and for 12- and 14-ft. platforms.

1006

Stainless steel statistics in 120-page bound handbook

To users of the heat and corrosion resistant metals, **Allegheny Ludlum Steel Corp.** is offering this 120-page, cloth-bound reference volume free of charge. The book is an up-to-the-minute report on stainless steel, and it discusses about 40 different types of Allegheny Metal stainless and steel from the standpoints of analyses, fabrication, heat

treatment and special conditions of service. Novel feature of the book is found in the first chapter. A selector table aids the reader in determining the proper type of stainless steel for the individual application. The table contains about 30 types, including both nickel-chromium and straight chromium steels, gives about 40 properties broken down in the general classifications of physical data, electrical properties and creep strength.

1007

Air brake guide

In 32 pages of illustrations, specifications and photographs, **Bendix-Westinghouse Automotive Air Brake Co.** offers a complete guide to vehicle owners and operators about Bendix-Westinghouse products. The selection of standard air brake and accessory kits, popular service parts and repair exchange material is a featured part of the catalog.

1008

For fewer "junk" batteries

In celebration of 4 years of existence, **Pioneers, Inc.** offers a new bulletin on the unique Battery AD-X2, which reconverts junk batteries into useful devices once again. The bulletin gives a brief history of the development of Battery AD-X2, an explanation of how mechanically sound "junk" batteries are re-processed and case histories attesting to the successful results obtained through usage.

1009

Dippers for all digging

Described in Bulletin 189 are the Esco general purpose cast-welded dipper, Esco all-cast manganese steel dipper, coal-loading dipper and Fastback Hoe Dipper. This bulletin is part of the recently planned consolidation of literature produced by **Electric Steel Foundry,** and its 8 pages offer a concise description of the material along with pertinent specifications. The right dipper for the particular digging operation is described in this helpful guide to the firm's line.

1010

Crane and shovel catalog

A thorough description of the Model 2000, **Manitowoc Engineering Works** 25-ton crane and 1¼-yd. shovel is contained in a new 12-page review just released by the firm. Details and photographs are packed into this bulletin to explain special features of the equipment in action. Two new features—the shovel crown chain arrangement and a swivel type dragline fairlead—are described. Individual diagrams show working ranges for crane, hoe and standard and high lift shovel front end attachments. Crane capacity chart covers the full lifting range from 25 tons at 12-ft. radius to 100 ft. boom at 70-ft. radius.

1011

56-page insulation manual

Important statistics on heat and vapor flow, vapor permeability, condensation and density, convection, etc., are but a few of the subjects discussed in "Simplified Physics of Vapor and Thermal Insulation." **Infra Insulation, Inc.,** offers the booklet free of charge to architects, public officials, educators, builders and contractors as a valuable reference guide to solve problems which arise on the job. This book is not written in the technical vernacular, but is aimed, instead at complete understanding by the average reader. Diagrams demonstrate the laws of heat and vapor flow, and other important illustrative material is included. All previous editions of this book are superseded by this revised issue, but the Chart of Thermal Insulation Values, a prominent feature of previous editions, has been retained and amplified. Another chart—Radiation and Emissivity of Materials—makes its initial appearance in this edition.

1012

"Organized Curiosity, Inc."

This is a very interesting, 12-page picture story of **International Harvester's** 290-man research team checking the company's products for quality from design to delivery in the $4,500,000 manufacturing research department in Chicago. Those who are interested in research methods aimed at the maintenance of high quality and durability will find this story an interesting one.

1013

Stabilizing gravel roads

A new 8-page booklet has just been released by **Seaman Motors, Inc.,** on the subject of "Stabilize Gravel Roads." The booklet discusses the hazards, wastes and maintenance difficulties of loose gravel roads compared to the economy of stabilized gravel surfaces. The bulletin shows a method by which $150 to $500 of gravel per mile can be salvaged from shoulders and ditches where it has been "kicked" by traffic.

1014

Selecting engineering irons

This 28-page basic reference bulletin is compiled primarily for design engi-

Continued on page 147

NOW AVAILABLE FOR 1951

The only directory of its kind for the Western construction industry

CONTAINS COMPLETE LISTINGS TO HELP YOU CONTACT:

DISTRIBUTORS

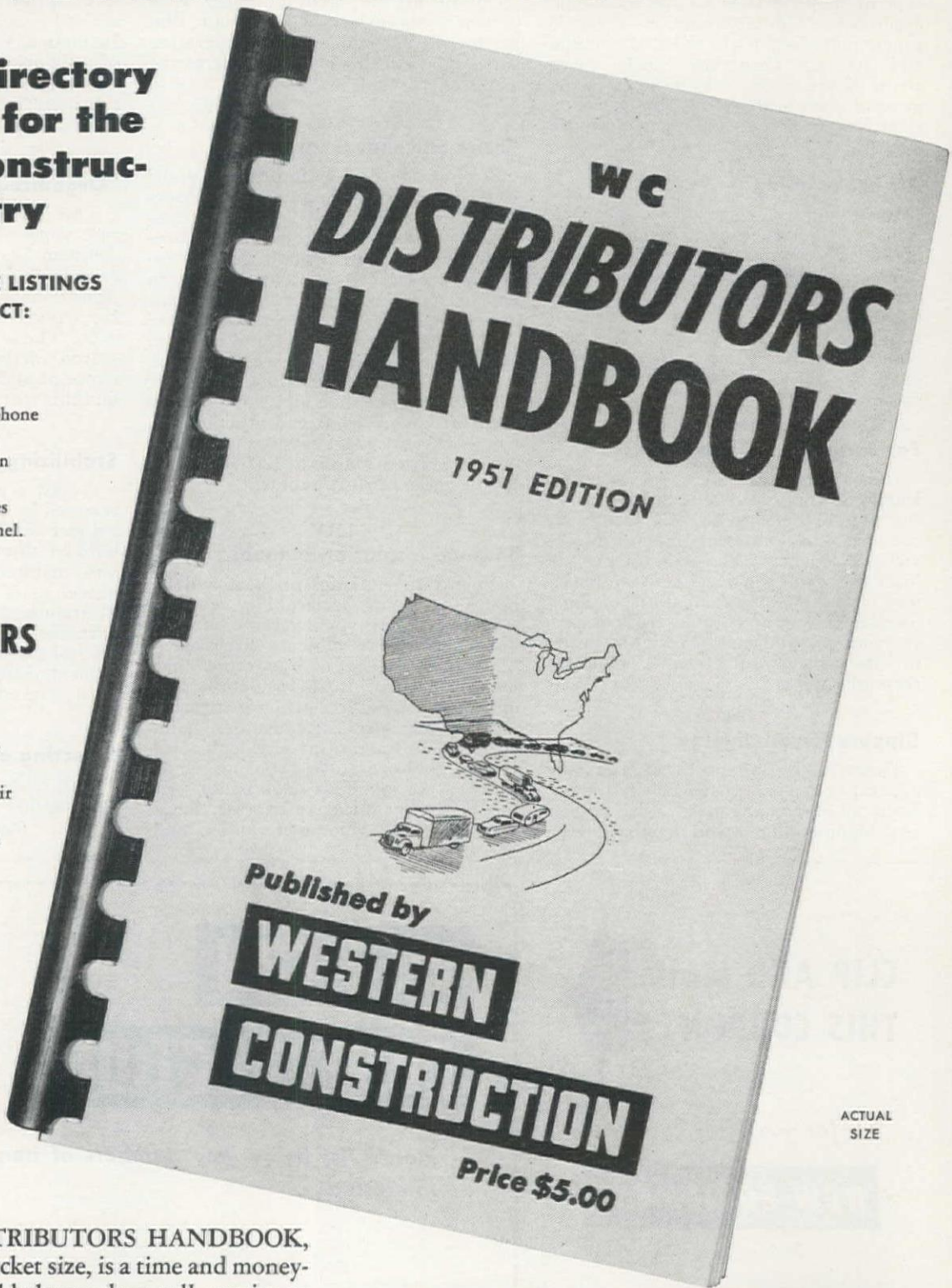
Names, addresses, and phone numbers of construction equipment distributors in the 11 Western States; their branch offices; lines they handle; key personnel. Listing is alphabetical by States.

MANUFACTURERS

Names and addresses of construction equipment manufacturers (listed alphabetically for entire United States); the products they make; their Western branches; key personnel; Western distributors.

PRODUCTS

Alphabetical listing of products with names of all manufacturers making each product.



ACTUAL SIZE

For Contractors, Manufacturers, Distributors, Purchasers, and Salesmen—

The 1951 WC DISTRIBUTORS HANDBOOK, prepared in handy pocket size, is a time and money-saving guide that will help you buy, sell, service or deal with construction equipment in the Western United States.

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neers. It presents many valuable characteristics of modern nickel cast irons and illustrates their acceptance throughout industry. Included in the bulletin are 50 illustrations displaying all sizes and shapes, 27 useful tables, charts and photo-micrographs to show how with nickel alone or in combination cast iron can be used to fit most service requirements. This is an **International Nickel Co., Inc.**, publication.

1015

Snow plow family bulletin

The entire line of snow plows manufactured by **The Baker Manufacturing Co.**, is described in Bulletin 1003, just issued by the firm. Descriptions of the V-Type, Reversible Tripping Blade and One-Way Tripping Blade plows in a complete range of sizes appear in the booklet. The 16-page guide offers information on the two types of plow mountings—underslung type and front-end push type—along with informative illustrations which point up product features.

Literature Briefs . . .

1016

MOTORS AND GENERATORS are discussed in a new pocket-size folder just released by **Fairbanks, Morse & Co.** The four-color, 28-page release gives pictures and descriptions of the firm's line of equipment in brief easy-to-read text.

1017

CATCH UP WITH CONVEYORS in this 12-page illustrated bulletin describing the complete line of flight and belt type portable conveyors and under-car unloaders manufactured by the **Lake Shore Engineering Co.**

1018

STORAGE AND LOADING BINS are covered in a four-page folder released by **Pioneer Engineering Works.** Sizes, specifications and applications are covered, together with the types of bin gates available for discharging the bins.

1019

SOIL SAVING SENSE is explained in **International Harvester Co.'s** new release "International Power Makes Soil Saving a Pay Dirt Proposition." The booklet is an eight-page resume of the Soil Conservation Service's 20-year program to save 10,000,000 acres.

1020

A TRIO OF MOTOR MODELS is described in three bulletins issued by **Fairbanks, Morse & Co.** The totally-enclosed fan-cooled motors, polyphase squirrel cage motors, and totally enclosed non-ventilated motors are described in the three booklets which are 12, 12 and 4 pages respectively.

1021

A SCAFFOLDING STORY told in 8 pages and well-illustrated, is offered by **Wilson-Albrecht Co., Inc.** The booklet describes the firm's Waco section steel scaffolding.

NEW EQUIPMENT

More information on any of the items in this section may be obtained by using the coupon on page 145.

1022

Hydraulic dragshovel is a new idea for trenching and general excavating

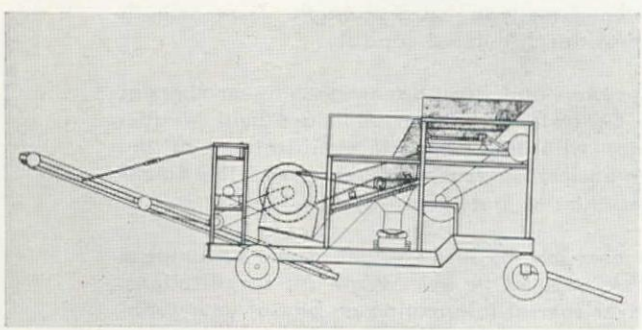
Among the new features on the Hydrohoe, a completely hydraulic truck-mounted dragshovel, are its two separate digging actions; fraction-of-an-inch movements through precision control; a dipper with a hydraulic ejector; lack of

bails, sheave blocks or drag ropes on the bucket to hinder loading and the ability to rapidly convert to clamshell or crane in the field. Force for the machine's primary digging action is applied by a hydraulic ram located between the boom and the dipper handle. A second, separate and distinct digging motion comes from the telescoping of the boom. The machine is capable of traveling up to 50 mph. on open highways—easy to move from job to job. By pushing the load out of the dipper with positive forcing action, the ejector eliminates the jerking and jarring necessary to shed sticky material with a conventional bucket. The Hydrohoe is manufactured by **Bucyrus-Erie Co.**

1023

Use this gravel plant wherever aggregate specs are limited

Diamond Iron Works, Inc., offers this single-pass gravel plant in three sizes. The single-circuit plant is expressly designed for use by counties and townships for the processing



of gravel in construction of secondary roads, and on small jobs where mobility counts. Capacities, based on 25% oversize passing a 1-in. screen, are approximately 20-24 tons/hr. for the No. 116 plant, 48-60 tons/hr. for the No. 120, and 50-65 tons/hr. for the No. 124 plant. The self-contained plant's single-pass design features a 1½-deck vibrator screen that scalps off the oversize and delivers it to the crusher. Crushed material is remixed with the by-passed gravel, eliminating rescreening or regrading. The new plants feature a steel I-beam gooseneck frame, 6 x 8-ft. grizzlies with 9 x 10-in. openings, 16-in. x 5-ft. reciprocal plate feeders, etc.

1024

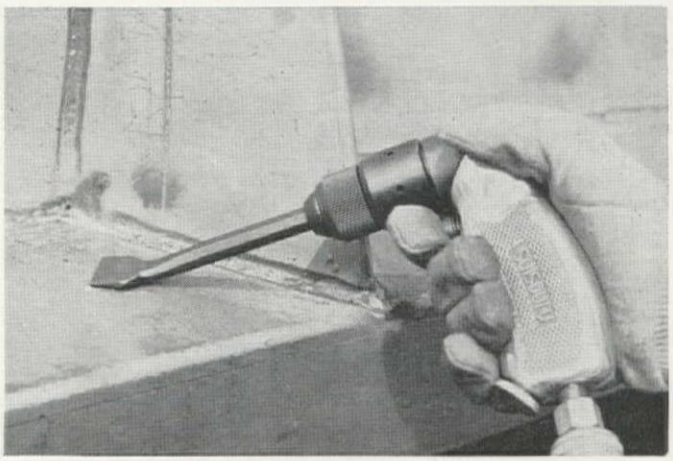
Say goodbye to fungi with new copper napthanate dip for wood

For wood that is subject to immersion in water, **The Wilbur & Williams Co.** is offering a new copper napthanate dip which protects the wood from dry rot. The substance turns green on the wood, indicating the treatment has been applied, and since it is non-crystallizing, can be painted over with normal or ship-bottom paint after drying 24 hours.

1025

Light air hammer strikes 6,000 blows per minute, weighs 2 lb.

Easy to use because of its 2-lb. weight, this new air hammer still offers good performance on medium-heavy duty work in general shop and maintenance work. The tool works at 120 psi., and strikes up to 6,000 blows per minute with maximum force, or may be metered to any lower speed or



striking power by means of a simple finger trigger action. Tools are locked into position by means of a newly patented 3-point ball-bearing chuck. This safety feature eliminates danger of tool ejection. The driving piston constitutes the only moving part. Sixty-six different tools are available for use with the G-200 Hammer, a product of **Salsbury Corporation.**

1026

Low-speed gear group improves "Cat" DW10 performance

A low-speed gear group to improve tractor-scraper performance for Caterpillar DW10 tractors, especially in pusher-loading earthmoving operations, is now being manufactured by **Caterpillar Tractor Co.** The new gear permits DW10 tractors to operate at lower speeds for better synchronization with the speeds of track-type pusher tractors in pusher-loading scraper work. First gear speed of DW10 tractors is reduced from 2.8 mph. with the new gear group. Second gear speed of Cat D8 track-type pusher tractors is 2.3 mph. and D7 tractors, 2.2 mph. These matching operating

speeds between pusher tractor and tractor-scraper unit, result in better loading efficiency. The low speed gear group also provides a greater potential tractive effort for self-loading operations. The remainder of the forward and reverse gears of the low speed gear group are the same as the standard group.

1027

Get high aggregate production in highway load limit areas

Two new gravel plants have been added to the **Pioneer Engineering Works, Inc.,** line of bottom deck feed gravel plants. Both models offer greater screening area and permit balanced crusher loads through adjustment of the jaw

crusher setting. Models 24V and 25V are designed especially for use in areas of restricted highway load limits where, in spite of weight limitations, reasonably high production of aggregates is required. The two plants differ only in the size of the jaw crusher, since 25V has a 10 x 36 jaw and the 24V has a size 10 x 24. Each model is equipped with a 24-in. x 16-

in. double roll crusher and a 3-ft. x 10-ft., 3½ deck vibrating screen, providing 60 sq. ft. of effective sized material screening area. Both plants are fed with swivel type field conveyor equipped with a 24-in. mechanical (reciprocating plate) feeder, and delivery of sized material is handled by a 24-in. x 25-ft. channel frame conveyor. The two models have a travel height of 12 ft. x 6 in., an overall length without the conveyor of 40 ft., and a 21-ft. wheelbase. Without the power unit the 25V weighs 46,000 lb., and the 24V approximately 42,100 lb.

1028

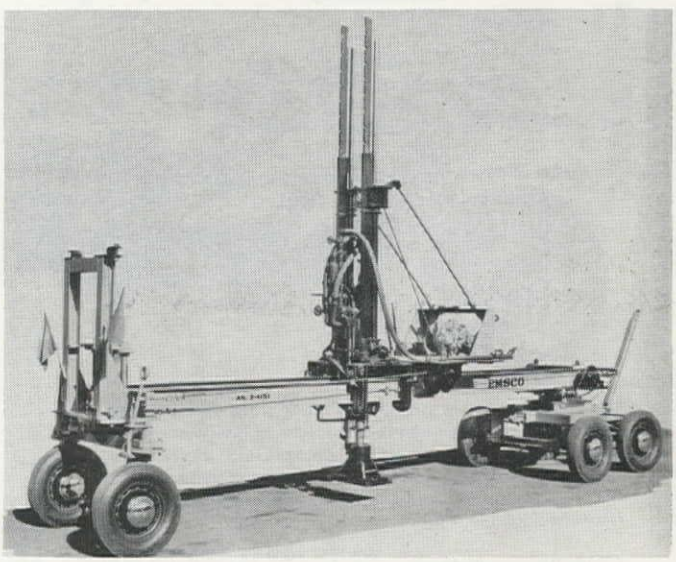
1 gal. of fuel per hour gives heat in a 25-ft. radius

This new and different type furnace is being offered to contractors by **The Chimney - Furnace - Western Co.** The portable device burns a gallon of fuel an hour and develops 140,000 Btu. of heat. Heat is blown out of the furnace to cover a floor area with a radius of about 25 ft., and this furnace does not require the use of a vent. In addition to its use as a zone heater, the furnace is successfully used to dry paint and plaster on construction jobs. The fact that the furnace is portable and uses a furnace fuel makes it desirable for the construction field where quick, clean heat is required. The company also manufactures a larger unit which can be vented and permanently installed. This unit develops 160,000 Btu's.

1029

Deep, wide tamping inexpensively done with this swivel-hipped machine

This machine is designed to give proper control of the hammer, while delivering the required impact blow which ranges from a patting action to the full force of the hammer,

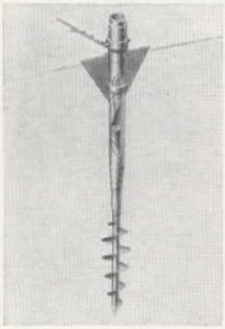


5,500 lb. Frequency speed of this deep tamper ranges from a few blows to sixty blows per minute. The machine can be swung around to right angles of the truck by swiveling the two rear wheels on the breaker, and then the draw bar is attached to wind with the breaker and the other to the

truck, which pulls the machine along with the truck. The other end of the tamper mounted on the four wheels is towed behind the truck as shown in the picture. The machine travels transversely with the ditch after it has been set astride the ditch and will tamp a trench 15 ft. wide and 15 ft. deep. It can also tamp a canal bank where dirt has to be put on and tamped down to a required density, as the end of the frame resting on the four wheels is hinged to allow the two members carrying the carriage and its wheels to be elevated to an angle of 45 deg. Two air motors control the machine. One propels it and the other serves to collapse it and bring the rear wheels closer to the truck. The machine is an **R. P. B. Corporation** product.

1030

Earth anchor installs in 5 minutes as dead-man or guy line anchor

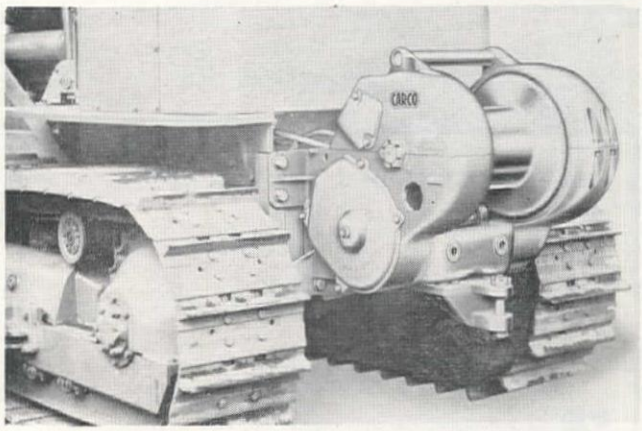


Anchoring guy lines, making dead-man installations and providing piling and piering for various types of construction are some of the functions of the new EZY Earth Anchor. Permanent or temporary installations are possible with the new device which offers high load resistance to tension and compression. The device pulls itself into and locks itself to the earth with the wide-flange screw on its pointed steel body. About 3 to 5 minutes or 15 turns are required to install the anchor, and it can be backed out in a matter of two minutes. Attachments and accessories make it possible to increase the strength and depth penetration of the devices where needed, i.e., marshy land. **Van Dyke Industries** offer two body sizes, 2-in. x 66-in., and 2½-in. x 54-in. Telescoping barrels are available in 3-in. to 5-in. diameters by ½-in. steps and in lengths from 35 in. to 31 in., respectively.

1031

Winch improvements suit logging, general construction uses

Pacific Car and Foundry Co. announces an improved model of Carco "G" winch. Exterior nuts and bolts are recessed and drum flanges are shrouded to minimize cable

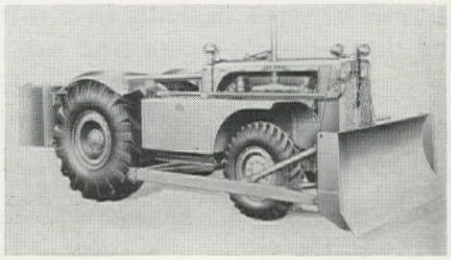


damage. Cable controls, now standard on most winches in the Carco line, leave the tractor fender and winch case free of projections. Flexible cable controls permit a choice of locations for the control stand. A new toggle-type, self-energizing brake gives the operator increased braking leverage and permits inch-by-inch lowering of the load. When released, it leaves the brake band completely separated from the drum. It is claimed this brake will hold any load the largest tractor can pull.

1032

Straight blade bulldozer for Caterpillar DW10's

Similar in design to other Caterpillar bulldozers, components of the new No. 10S bulldozer include the blade, push arms and braces, hitch, sheave support and heavy-duty radiator guard, combination cable and sheave group. Trunnions are included in the weight box and frame group, which differs widely from the company's track-type tractors. This group is a substantial assembly, fabricated of heavy structural steel plate, mounted in conjunction with the Caterpillar DW10 tractor frame. The heavy-duty weight box and frame group not only provides support for the bulldozer trunnions at each side of the tractor, but includes a heavy box at the rear of the tractor to accommodate four counterweights, each weighing 7,000 lb. Counterweight box is designed with a towing hitch, so the tractor can also be used for drawbar purposes. Product of **Caterpillar Tractor Co.**



1033

No seal wear or leaks in new truck mixer unit

Featuring a permanently leak-proof seal between hopper and mixing drum, the Transomixer is a new truck mixer unit in production by **The Transmission and Gear Co.** Patented "Transo Direct Drive" eliminates sprockets, drive chains and ring gears, and results in a saving of from 800 to 1,600 lb. dead weight. A planetary type transmission eliminates shock loading, assures smooth starting and discharging and holds equipment wear to a minimum. The Transomixer has two starting and discharge speeds, and the built-in water pump has a separate spring-loaded clutch. Built to specs of the Truck Mixer Manufacturers' Bureau, the unit is available in both 3½- and 4½-cu. yd. sizes.

1034

"Handie-Talkie" keeps in touch with field operations

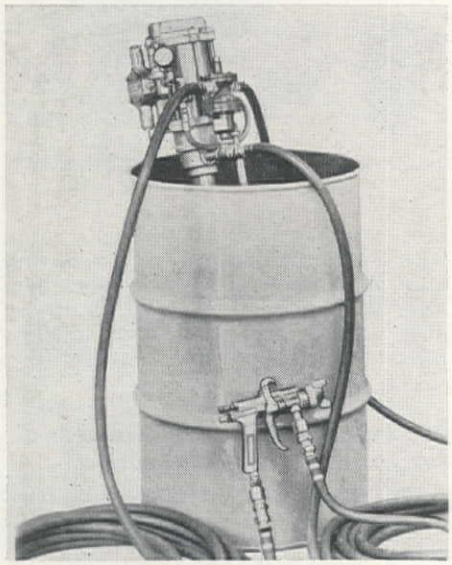
For those who must keep in touch with operations on big jobs that are

spread over a wide area, the "Handie-Talkie" portable FM radio-phone produced by **Motorola, Inc.**, might supply an answer. This new version incorporates an adjustable squelch which reduces the annoyance of tube and circuit noises encountered in an FM receiver in the absence of a signal. The squelch control, mounted on the power supply chassis, provides a normal operating range of no-squelch up to 25 to 50 db noise reduction. These portables are available with either wet- or dry-cell power supplies for operation in either the 25-50 megacycle or the 152-174 megacycle bands.

1035

Lightweight pump speeds paint and mastic handling

Designed specifically for speedier handling of materials from heavy mastics to enamels and lacquers, the Shel-



burne Hi-Vol is being manufactured by the **A. Shelburne Co.** Engineered to requirements of painters and contractors, the pump gives faster delivery by double action materials pistons which force material through the lines on both up and down stroke of air motor. Its 9 to 1 ratio permits spraying of material to great heights. Time is saved by pumping directly from material drum. Also available with agitator, oiler and pressure regulator for use on a five-gun circulating system. Special units designed on request.

1036

This steel rule can see in the dark

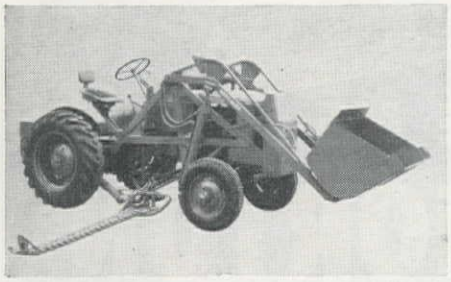
Inside measurements in hard-to-reach, poorly illuminated places can stop being a problem when this new multi-purpose measuring tape goes into action. The user butts the right-angle tip of the streamline tape against one wall of the space to be measured, extends the tape until the straight sided case is flush against the opposite wall and then a flick of the locking lever positively retains the measurement. The rule can be moved into the light and the measurement read directly at the top of the case without computation. Can be used for inside or

outside measure, height or depth gauge, outside caliper measure, or turn it over so graduations are flush for layout work. Manufactured in 6-ft., 8-ft., or 10-ft. lengths by **Master Rule Manufacturing Co., Inc.**

1037

Split-second dumping with new Lull Shoveloader

Design of the new 3-B Shoveloader built for the Case VAI industrial tractor, permits the installation of the Case VAI-5 mower attachment without interfering with the operation of the Shoveloader or the mower. Both loader and mower operate independently of each other and neither must be removed while operating the other. Parallelogrammic control mechanism on bucket provides for split-second dumping, great digging power and controlled scooping action. Interchangeable loader attachments available for the **Lull Manufacturing Co.** unit are the ⅜-yd. material bucket, a ½-yd. loose material bucket, ¾- to 1-yd. coal or snow bucket, bulldozer, lifting crane, fork lift and motor-driven sweepers.



1038

Retractable radial arm mounts handsaws in a jiffy

A fully retractable radial arm on which electric handsaws can be mounted in a matter of seconds is a new product of **Consolidated Machinery & Supply Co.** The unit, called the Comet Radial Arm, comes complete with column, portable steel base and hardwood work table. The radial arm increases the utility of electric handsaws by making them suitable for trimming studs, cutting rafters and other production sawing. The arm has a cut-off movement of 24 in., ample for all ordinary lumber sizes. Bevel range is 0 to 45 deg. Mitre range is 45 deg. right or left. Column on which the arm is mounted adjusts 9¾ in. vertically. Supplied complete for $160 f.o.b. Los Angeles.

1039

Side-dump gooseneck trailer for fixed point dumping

A lift door side-dump of 15-ton capacity, product of **Easton Gear & Construction Co.**, is designed for service with the Caterpillar DW-10 diesel tractor. The lift door body is especially designed for fixed point dumping using the Easton electric overhead dumping system. The push-button controlled overhead hoist operates a dual hook which engages the two dumping bars on the lift door. The door is raised clear of the load, then serves as a bail to raise the body to the complete discharge angle. Stabilizer feet, incorporated with the body hinges at each end, rest on the hopper wall to stabilize the trailer frame as the unit is dumped. Maximum dumping angle is 70 deg. Lift door trailers of the same design will be available to 30 tons capacity, for use in combination with a larger tractor. The new Easton line of side-dump gooseneck trailers will also include 15- and 30-ton automatic drop door, hydraulically dumped units for pit, mine and construction service.

1040

200-amp. transformer welder for maintenance, production

This rugged unit, built for long service in garages and job shops, has a full 200-amp., 50% duty cycle. Four variations are available—220-volt or a 220/440/550-volt unit, each with or without power factor correction. Two open circuit voltages are provided—80 volts on the low range and 55 volts on the high range. Outstanding features of the unit, a product of **Air Reduction Pacific Co.**, are: complete insulation throughout, easy-to-

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CLASSIFIED SECTION

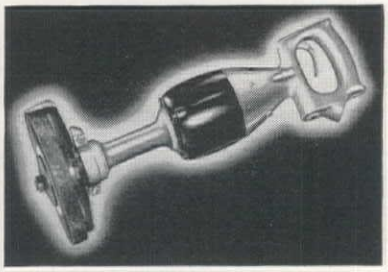
Rates are $6.50 a column inch. Copy should be sent in by the 10th of preceding month if proofs are required; by the 15th if no proofs are required.

operate controls, easy-to-read current indicator and no moving parts for minimum maintenance.

1041

Hand grinding unit with built-in safety

An added safety device, part of this new air grinder manufactured by **Ingersoll-Rand Co.**, prevents overspeed operation and possible accidents. A motor governor is contained in the unit to



maintain correct wheel speed, plus a built-in unit called the "overspeed safety coupling." In case the motor overspeeds because of governor wear, abuse, maladjustment or dirty air, the coupling automatically uncouples the arbor and grinding wheel from the motor. Another safety feature is a multiple exhaust system by which the exhaust can be directed in any of four directions away from the work. The grinder is available for 8-, 6- or 5-in. wheels.

1042

Laboratory vibrators now equipped with rubber tips

Since use of the rubber tips on concrete vibrators proved successful and popular, **Viber Company** is now using the tips on laboratory models. This means the lab models can be used on moisture-absorbent form lining materials and plaster of paris moulds in lab and experimental work with a minimum of damage to forms. It is also recommended for use in vibrating test cylinders or beams, making concrete products, small scale hydraulic structures and all experimental work. Model 11 is 27 in. long from hand grips to lower end, with an outside diameter of 1-5/16 in. The tool is powered by a Universal ¼-hp. electric motor, with a vibrating speed of over 10,000 rpm.

1043

Emergency surface hardening of small tools and parts

"Instant Hardner No. 1," a product of **Eutectic Welding Alloys Corp.**, hardens steel tools, parts, edges, threads, dies, drills, etc., in a hurry without the fuss and mess of conventional heat treating. "Instant Hardner No. 2" applied in the same manner as No. 1, is strengthened with small hard facing particles mixed into the compound. These hard particles, when heated, fuse with the parent metal to give a combination of hardening and hard overlay. Both easy-to-use, moderately priced compounds can be applied with an ordinary torch.

1044

Small scraper has thousand-and-one uses

This new McGee scraper can be used to backfill, scarify and grade (both rough and finish) on playgrounds, airports, streets, athletic fields, etc., accord-

ing to **The Tractor Sales Corp.**, distributor for Leland T. McGee Angledozers. The small unit is claimed as the only scraper with cradle action and a hydraulic upper-link control. The hydraulic control represents the first time hydraulic control of scraping angle has been applied to a scraper. The operator merely touches the control valve to adjust the tilt, and the tilt can be changed for scraping, backfilling or scarifying, all without dismounting from the tractor. With a bucket capacity of ¾ cu. yd. and a cutting and backfilling blade 5½ ft. wide, total weight of the scraper is 450 lb.

1045

Completely hydraulic trencher works faster and smoother

Power is positive through applied hydraulics in the new **Be-Ge Manufacturing Co.** "Hydraspeed" trencher.

Trenching jobs go faster and smoother with this light, fast and maneuverable unit. The Be-Ge "Hydratrans" positive displacement fluid motor regulates the digging speed from 0 inches to 12 ft. per min., with positive finger-tip control at all times. Specifications are: digging depth, 5 ft. maximum; digging width, 12 to 24 in., depending on bucket size; road speed, 18 mph.; conveyor speed, synchronized with digging wheel; conveyor, reversible and adjustable.

1046

Pump operates under 800 feet of water

A pump and electric motor designed to operate under water that can be set as deep as 800 ft. is being produced by **Lancaster Pump and Manufacturing Co.** These pumping sets come in diameters as small as 4 in., and capacities as large as 2,000 gpm. Motor sizes range from ½ to 250 hp. The pumps eliminate all rods, plungers, cylinders and there are no long shafts or bearings. No priming is required. The pumps are the easiest type to install and they require no attention after installation as there is no seal in either the pump or motor part.

INDEX TO ADVERTISERS
★ IN THIS ISSUE ★

SYMONS FORMS with STEEL RIBS

FOR HIGH WALLS — FAST POURS

For pouring concrete walls with pressures of 650 to 1500 pounds per square foot, we recommend Symons ¾" Plywood Forms reinforced with steel ribs every 12". These heavy-duty forms allow the use of additional ties where the pressure is greatest.

Strength is combined with speed. Setting-up and stripping are finished in half the time due to the Symons Forming System of securing forms and ties in one operation. The life of the forms is increased many times due to reinforcement of vital parts. The forms are adaptable for all types of jobs. Being modular, the forms may be combined vertically and horizontally for any height.

Weight of forms averages five pounds per square foot allowing one man to easily carry any panel.

The Symons Clamp & Manufacturing Company will prepare a form layout for your next job without charge—Send in your plans.

Forms may be rented with rentals applying on the selling price.

Sears Roebuck Store, Chicago, Illinois
James Stewart Corporation, General Contractor
Gateway Engineering Co., Concrete Contractor

Symons

CLAMP and MFG. COMPANY
4295 West Diversey Avenue • Chicago 39, Illinois

Please send me the items checked:

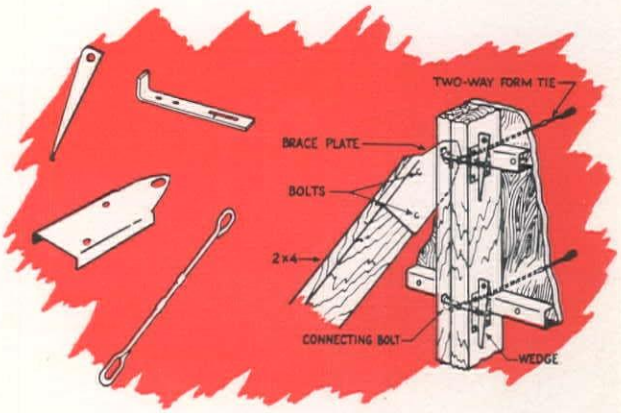
☐ Information regarding Symons Panel Forms

☐ Information regarding Column Clamps, Shores, Bar Ties

Name_____

Address_____

City_____ Zone____ State_____



WESTERN REPRESENTATIVES

DENVER
National Builders Supply Co.
204 Denham Building
Phone: Alpine 2221

PORTLAND
A. McMillan Company
220 S. E. Ankeny
Phone: East 0178

SAN FRANCISCO
Mr. William J. Martin
2496 Leonardo Way
Hayward, California
Phone: Lucerne 28737

SEATTLE
Safeway Equipment & Supply Co.
305 Lenora Street
Phone: Seneca 5874

SPOKANE
Blackwell-Coleman Equipment Co.
South 118 Division Street
Phone Riverside 0703

We Must Face the Highway Crisis Now

—*there is only one real cure!*

ONE of the greatest home-front threats to the welfare of every American is the congestion on our highways today.

It is not only a menace that costs thousands of lives in needless accidents and millions of dollars in wasted time every year—*it is a peril to national security!*

Without motor transportation the nation would stagnate. It has become the lifeblood of America's economy. The highways are its arteries—and they are hardening fast!

Remember these facts

Motor transport now carries 80% of all interstate passenger traffic — takes more than 50% of all workers to their jobs.

It speeds 90% of all foods to market—hauls 75% of all general freight.

It is the swift plant-to-plant conveyor of raw materials, parts and subassemblies that keeps America's mass-production lines going—that makes America's unprecedented prosperity possible.

Roads are the bottleneck

To keep America moving today requires the daily use of almost FIFTY MILLION motor cars, trucks and buses —more motor vehicles than all the rest of the world possesses!

Yet this vital transport system is now jam-packed into an obsolete highway system—*most of it designed prewar to comfortably accommodate less than half today's vehicular mileage!*

And motor registrations have been soaring since the war at the rate of 3.7 million per year.

We should have action NOW!

We cannot cut this Gordian knot by restrictive laws. The crux of the problem is not the number of cars or the size of trucks—*it is too few modern roads!*

To keep our nation mobile, we must start building a new national highway system now, designed for modern traffic needs and speeds.

Such a modern road system is essential to our prosperity and vital to our defense in this atomic age. And we have the world's most efficient road-building industry equipped to construct it in less time than ever possible before.

The time has come when we must do something about better roads besides talk. The demand for action must come from everyone who uses the highways—and that's just about everybody.

P. W. Litchfield

Chairman of the Board
THE GOODYEAR TIRE & RUBBER COMPANY, INC.

GOODYEAR

THE GREATEST NAME IN RUBBER