WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

PUBLISHED MONTHLY
VOLUME XXIV, No. 12

DECEMBER 15 • 1949

35 CENTS A COPY
$4.00 PER YEAR

IN THIS ISSUE

VOLCANIC ROCK at Devil's Punchbowl is moved by a Koehring Dumptor on the 27-mi. highway relocation around the Equalizing Reservoir for the Columbia Basin Irrigation Project. Strong & McDonald is contractor for this section of the $2-million grading job.

USBR Photo.

HIT IT HARD! *Marfak* won't splatter like ordinary grease—proof that heavy loads and rough roads won't hammer it out of spring shackles, tie rods and other chassis parts . . . proof that *Marfak* gives safer, longer-lasting protection with fewer applications.

This test "hammers home" the fact that...

Maintenance Costs Less

Because TEXACO MARFAK won't jolt or squeeze out of bearings... assures longer life for all chassis parts

HAMMERING jolts . . . heavy loads . . . road splash—you can protect your chassis bearings against all of them by using *Texaco Marfak.* It's the world's most famous chassis lubricant. *Texaco Marfak* guards bearings against dirt, rust and wear for extra hundreds of miles . . . assures longer life for chassis parts . . . reduces maintenance costs.

To give wheel bearings the same protection, use *Texaco Marfak Heavy Duty.* It seals itself in, assuring safer braking . . . seals out dirt and moisture . . . rust-proofs the bearing metal. No seasonal change is required.

Let a Texaco Lubrication Engineer help you simplify your lubrication procedures . . . get greater efficiency, lower maintenance costs. Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

ALREADY SOLD—***More than 300 Million Pounds of Texaco Marfak!***

BETTER PROTECTION FOR CRAWLER TRACK MECHANISMS

Lubricate with *Texaco Track Roll Lubricant.* It gives full, long-lasting protection . . . effectively seals out dirt and water . . . reduces wear. It's easy to apply . . . economical to use. *Texaco Track Roll Lubricant* assures lower maintenance costs . . . keeps your machines on the job.

TEXACO

REG. T.M.

TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

TEXACO STAR THEATRE presents MILTON BERLE on television every Tuesday night. METROPOLITAN OPERA broadcasts every Saturday afternoon.

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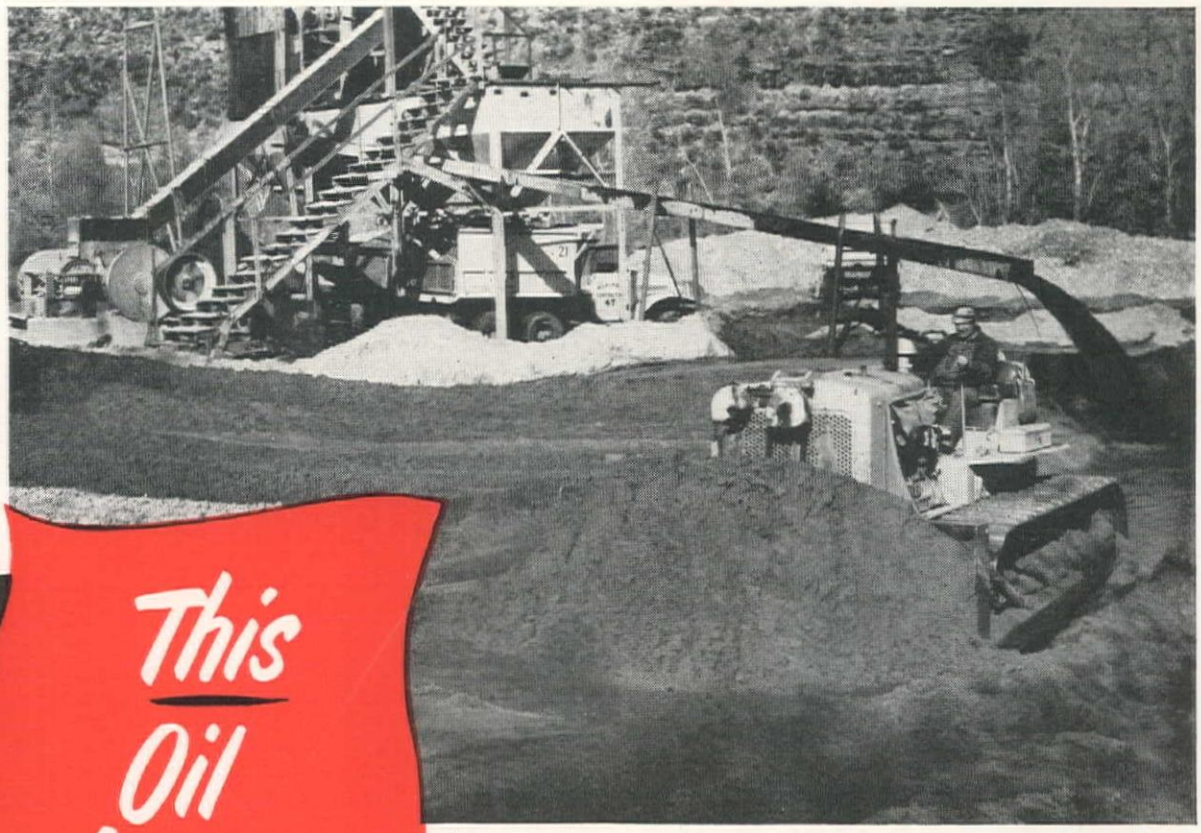
MUNICIPALITIES AND THEIR PROBLEMS



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Texaco Ursa Oil X** cleans as it lubricates . . . reduces both fuel consumption and maintenance costs

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FOR ALL CONTRACTORS' EQUIPMENT

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for J. A. Terteling & Sons, Inc.
Boise, Idaho

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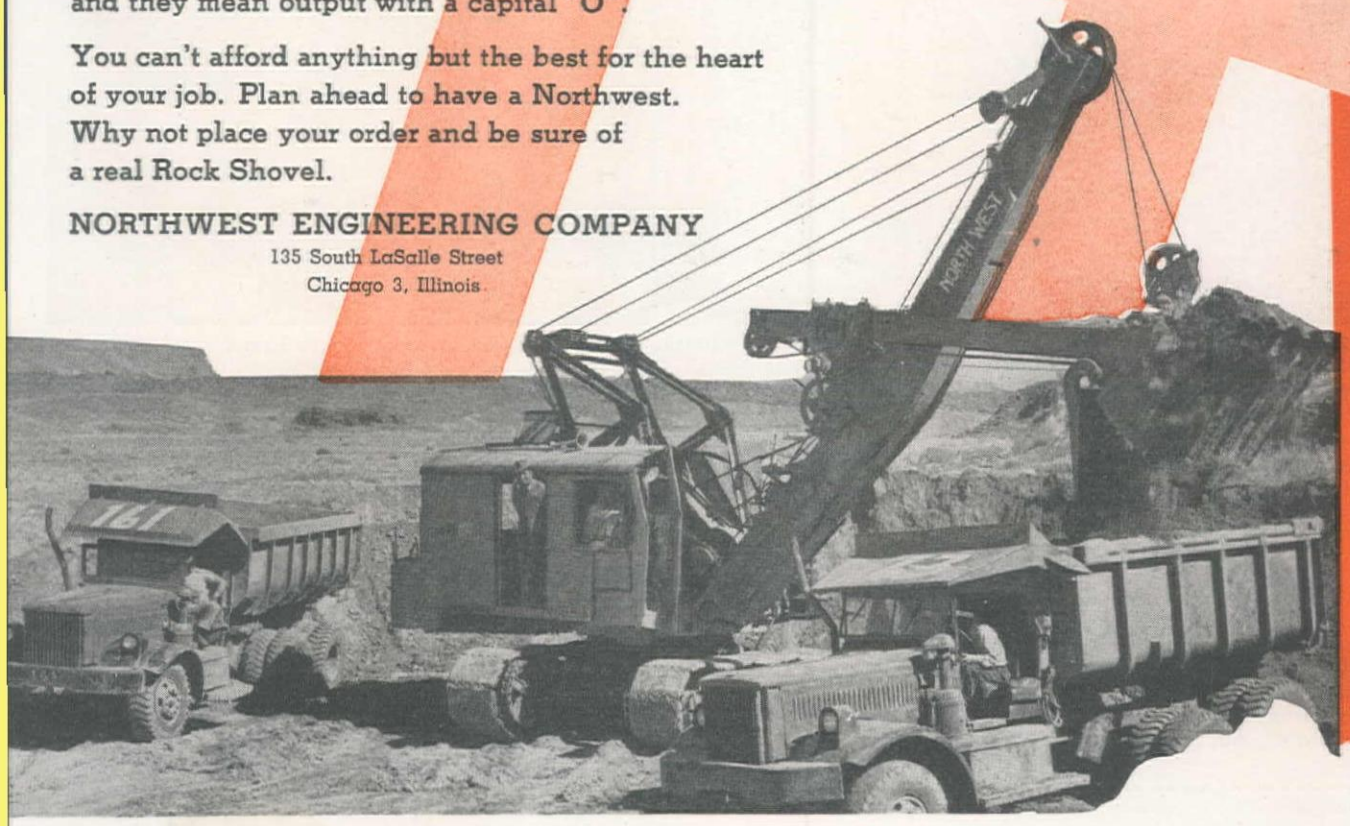

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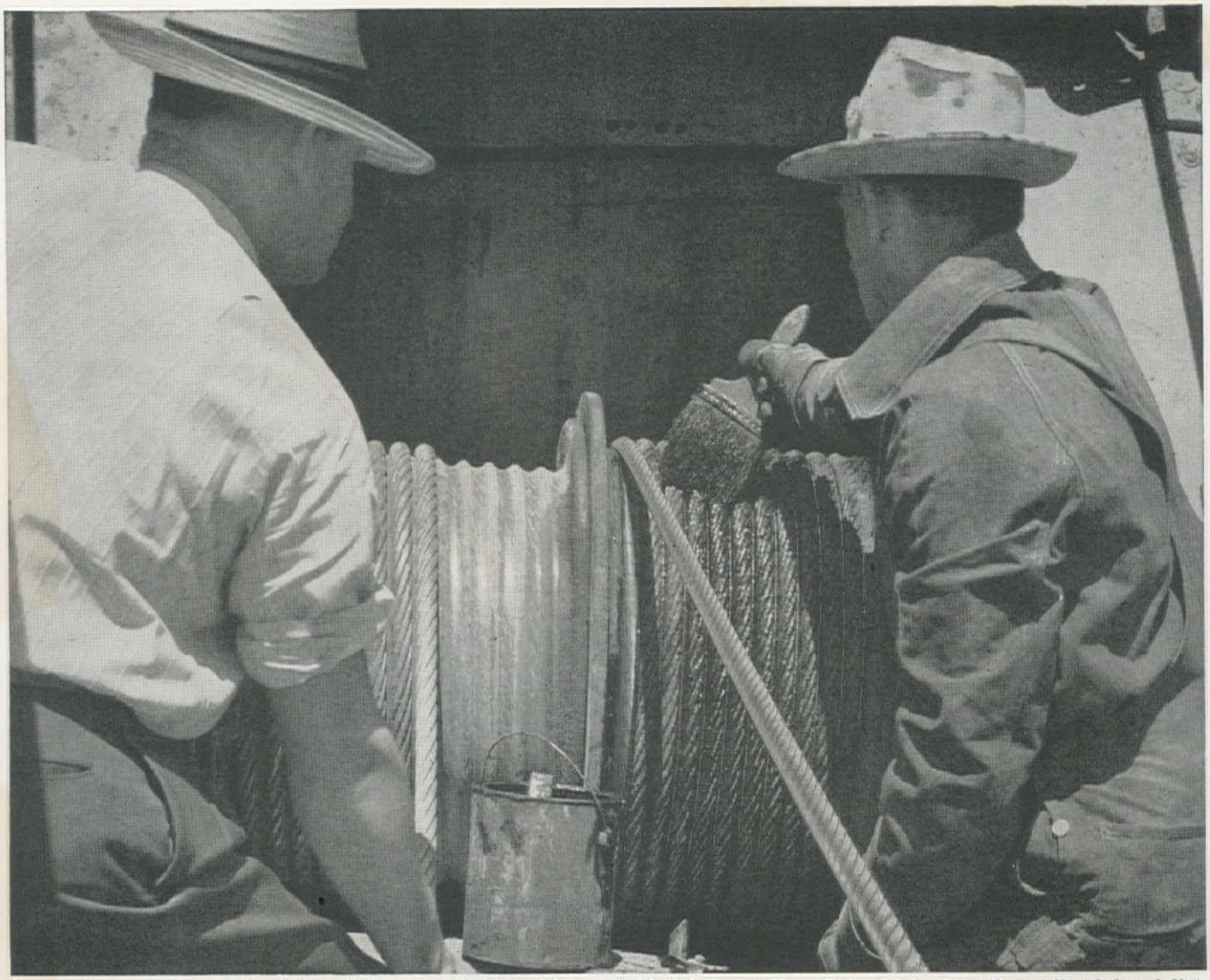

To get top wear, rope should be oiled now and then with a suitable lubricant. Here Columbia's Tiger Brand Field Specialist discusses one method...just one of many of his services to users.

How to stop wire rope trouble—before it starts

Making rope perform best and last longest is a job for a Tiger Brand Field Specialist...a job he'll be glad to do for you. He'll make a complete check of your equipment and its working conditions...help you get the one right rope for your job. Tough American Tiger Brand is one rope that's carefully controlled from raw ore on through to the finish. It dotes on rugged work. But to make sure you get all the stamina that's been engineered into Tiger Brand, we offer you the services of a Field Specialist. No charge or obligation, of course. Just contact your distributor or write Columbia Steel Company, Room 1422, Russ Building, San Francisco 4, California.

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Tiger Brand Tip: During its carefully-controlled fabrication, Tiger Brand is lubricated internally. But time and conditions make re-lubing necessary. Paint it on, as shown. Drip it on as rope bends over a sheave. Or apply it in any other way best suited to your installation.

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Please address all communications to the San Francisco Office

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Volume 24 | OCTOBER 15 • 1949 | Number 10

TABLE OF CONTENTS

Covering Construction in the Western Half of the United States

A NEW ALL

Your International Industrial Power Distributor is now ready to furnish you with three great new stars of earthmoving power and performance—the new TD-24, the new TD-18A and the new TD-14A.

The great new TD-24 is America's most powerful and versatile crawler tractor with unmatched features for easier operation and far greater production. No other crawler tractor can give you all the features found in the new International TD-24.

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INTERNATIONAL HARVESTER COMPANY

THE NEW TD-24

The new TD-24 offers you more horsepower than any other crawler tractor available today—180 hp. at the flywheel, 140 hp. at the drawbar—plus dozens of features found only in the new TD-24.

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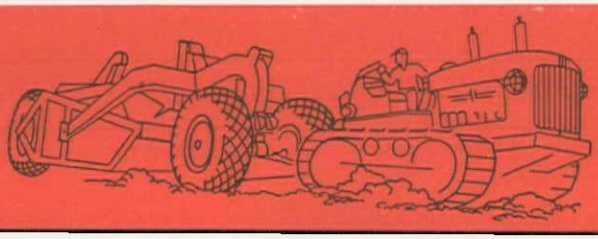

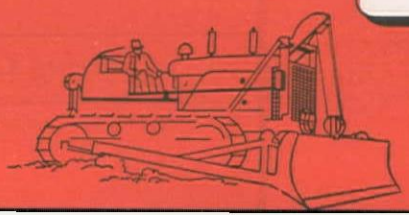

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earthmoving team are the TD-18A and TD-14A. Known for years for their dependable performance, these two efficient tractors have had their power increased to do more work, to operate with even greater ease and economy.

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See your International Industrial Power Distributor now. Find out the facts and get these new tractors to work for you. You'll have an all star cast in your earthmoving line-up.

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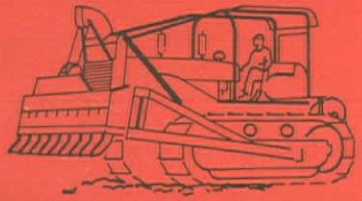
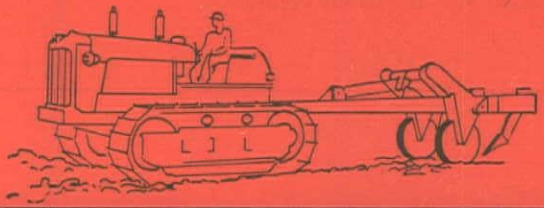
THE NEW TD-18A

Famous for its power and dependability, the new TD-18A now gives you 87 drawbar horsepower. All the famous International diesel engine features and the durable construction of the new International TD-18A make this tractor an even greater producer than ever before.





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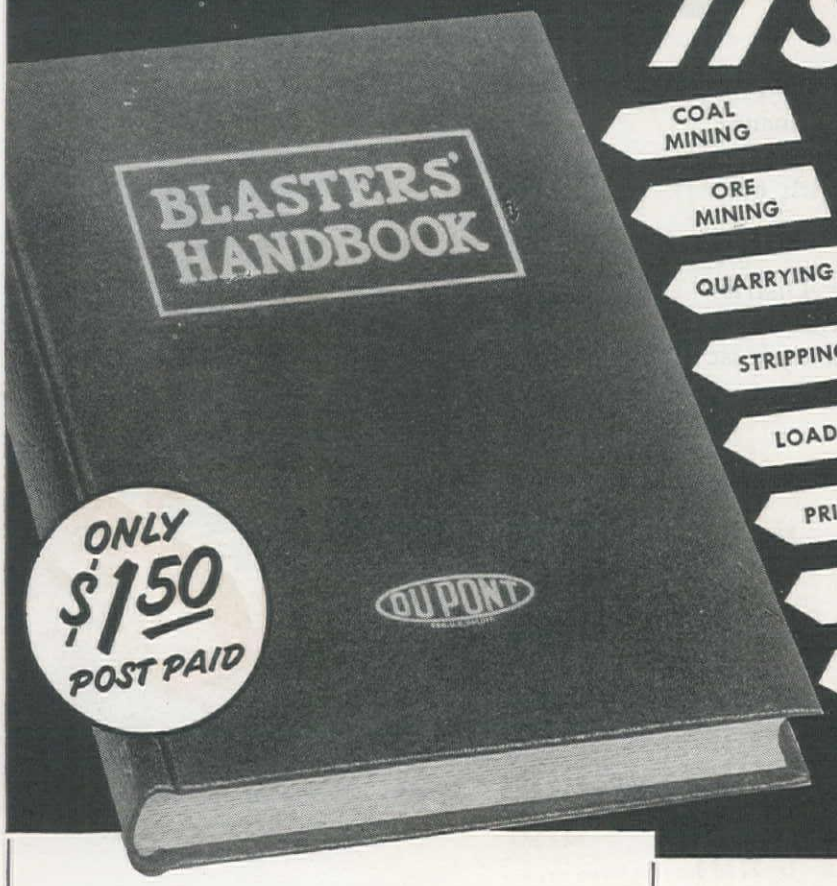

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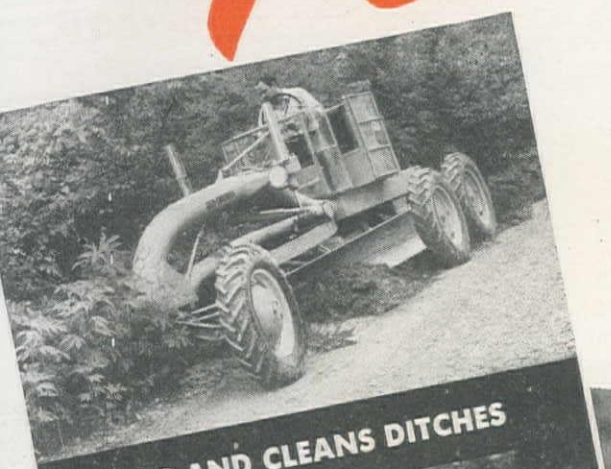

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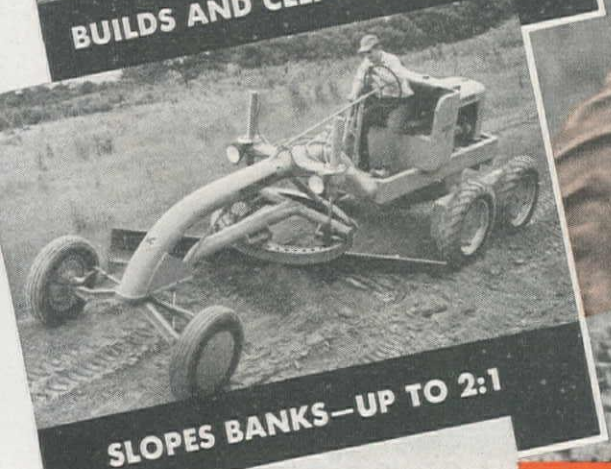

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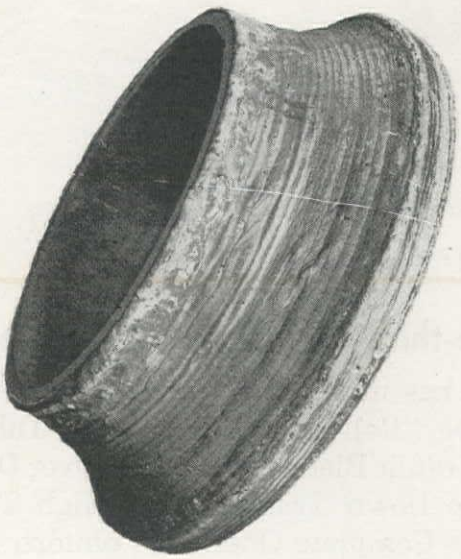

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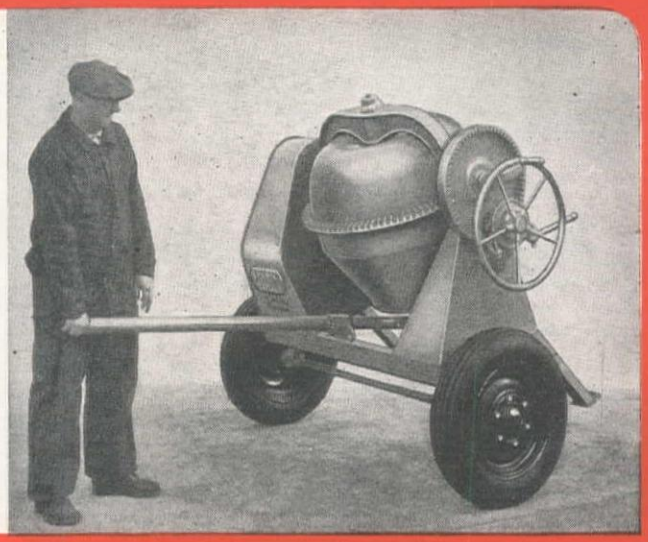

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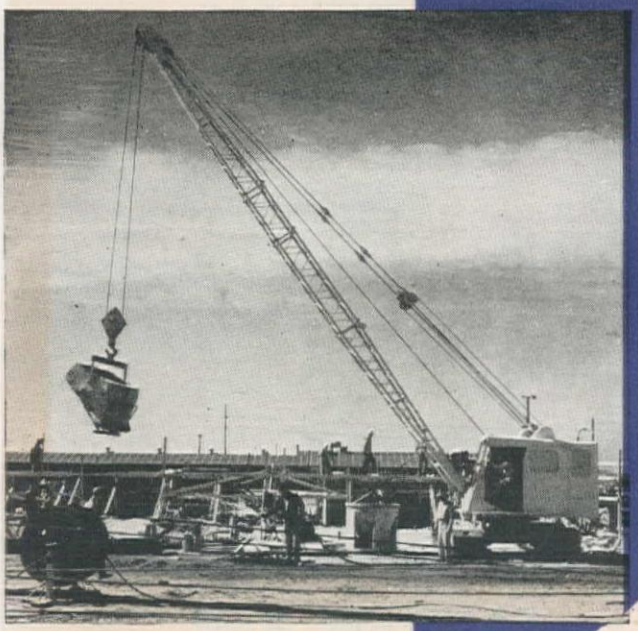
3/4 to 1 CUBIC YARD



33-M CRANE

33-M SHOVEL

33-M PULL SHOVEL

33-M CLAMSHELL

33-M DRAGLINE

33-M PILE DRIVER

MORE

of the features that count!

Quickly Convertible Changeovers made quickly in the field for shovel, dragline, clamshell, crane, pull shovel and pile driver service. No changes necessary in machinery, drum laggings, sprockets or levers.

Anti-Friction Bearings There are TWENTY-TWO ball or roller bearings in the MARION 33-M covering the critical points of friction.

Simplified Design Only two horizontal shafts on the machinery deck. Only 12 gears in the entire machine. All machinery units readily accessible for maintenance.

Marion Air Control Clutches controlled by air govern all operations. Only 12 pounds' lever pressure needed to apply full power. Machine free from levers, bell cranks, toggles, pins, etc.

Quality Materials Shafting of alloy steel. Gears are heat treated. Grooved drums of alloy cast steel mounted on ball bearings. Crawler rollers and crawler pads are forgings. All gears machine cut.

Welded Construction Maximum strength without cumbersome weight. Positive rigidity and assurance of lifelong alignment.

SEE YOUR **MARION** AGENT TODAY . . .
OR WRITE FOR BULLETIN NO. 395-A

EDWARD R. DALEY, Marion Power Shovel Company.....571 Howard Street, San Francisco 5, California
STAR MACHINERY COMPANY.....1741 First Avenue, South, Seattle, Washington
RAY CORSON MACHINERY COMPANY.....350 Kalamath Street, Denver 9, Colorado
M & F EQUIPMENT COMPANY.....2521 Isleta Highway, Albuquerque, New Mexico
WM. F. LANIUS.....2505 N. E. 33rd Avenue, Portland, Oregon
BROWN-BEVIS EQUIPMENT COMPANY.....4900 Santa Fe Avenue, Los Angeles 11, California

Facts you should know

about the New General Motors Diesel Engine-Torque Converter Unit

Two 190 H.P. 6-Cylinder GM Diesel Engine-Torque Converter units power the new 34-ton Euclid 1-FFD tandem axle rear-dump. Each engine drives one rear axle, eliminating the conventional inter-axle power divider. A 3-speed Allison Torqmatic transmission does away with the clutch pedal and manual shifting. Designed for off-the-highway haulage of large tonnage, the mammoth 1-FFD has a top speed of 25.4 m.p.h. with full pay load.

ONE MANUFACTURER ONE RESPONSIBILITY The new torque converter is specifically designed and manufactured by General Motors as an integral unit with the Series 71 two-cycle Diesel engine. Result: a big saving in size and weight—no compromise designs—no divided responsibility.

AUTOMATIC SHIFT FROM TORQUE MULTIPLICATION TO FLUID COUPLING Desirable features and advantages of *both* torque converter and fluid coupling are combined in this converter. Continuous *automatic* transition from 3.6-to-1 torque ratio at stall speed to 1-to-1 torque ratio in fluid coupling. Unit goes into fluid coupling whenever load requirements equal engine torque, without regard to output shaft speed.

MORE WORK IN LESS TIME This new power unit gets the most work done in the least time. Because it is not rigidly geared to the load, the engine responds to the throttle and immediately accelerates to a high output range regardless of the speed of the load.

FREEDOM FROM SHOCK LOADS Transmission of power through a liquid, cushions both engine and driven machinery from sudden shock loads. Operation is liquid-smooth (free from jerks) at any speed or throttle setting.

FREEDOM FROM STALLS WITH OVERLOAD Fluid circuit prevents engine stalling under any load condition. Ability to exert a smooth pull at any output shaft speed down to zero permits GM Converter-equipped machines to do some operations that are impossible with conventional units.

EASE OF HANDLING Eliminates time lost in unnecessary low gear operation. Operator fatigue is reduced. Work is speeded up with less effort on the part of the operator.

WIDE RANGE OF MODELS The new GM Diesel Engine-Torque Converter unit is made available in 3-, 4- and 6-cylinder single engine units, Twin 4 and Twin 6 multiple engine units with engine ratings from 64 to 294 B.H.P. to meet a wide range of power requirements. *Write or wire for full details.*

DETROIT DIESEL ENGINE DIVISION

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

GENERAL MOTORS

GM GENERAL MOTORS DIESEL POWER

DIESEL BRAWN WITHOUT THE BULK

Evans Engine & Equipment Co.
SEATTLE 9, WASH.

Cate Equipment Co.
SALT LAKE CITY, UTAH

Fred M. Viles & Company
SPOKANE 8, WASH.

Mountain Tractor Co.
MISSOULA, MONT.

Gunderson Bros. Equipment Corp.
PORTLAND 9, ORE.

Olson Manufacturing Co.
BOISE, IDAHO

Capitol Tractor & Equipment Co.
SACRAMENTO, CALIF.

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

This oil...

FOR ALL YOUR PASSENGER CARS AND LIGHT TRUCKS

...fights Acid Action of "On and Off" operation

THE MAJOR CAUSE OF ENGINE WEAR

Unique "X" Safety Factor in Shell X-100 Motor Oil Counteracts Acid Action

It's not friction, as generally believed, that causes the most engine wear.

It's Acid Action — chemical etching of engine parts that take place in the low engine temperatures of "On and Off" operation.

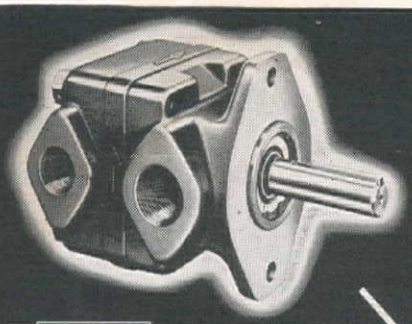
Intermittent use . . . long runs at idling speed . . . frequent stopping and starting — under such conditions, engines seldom warm up to efficient operating temperatures. They run "cold." Hence, combustion may be incomplete and partially burned fuel gases and moisture attack the smoothly polished metal surfaces *chemically*. It's this biting Acid Action that accounts for up to 90% of engine wear!

Shell Research worked all out on this problem . . . developed a unique "X" safety factor to combat Acid Action. Now, 2½ million miles of road testing and millions of miles of use by motorists have proved conclusively that with this "X" safety factor Acid Action is effectively counteracted — engine life is prolonged.

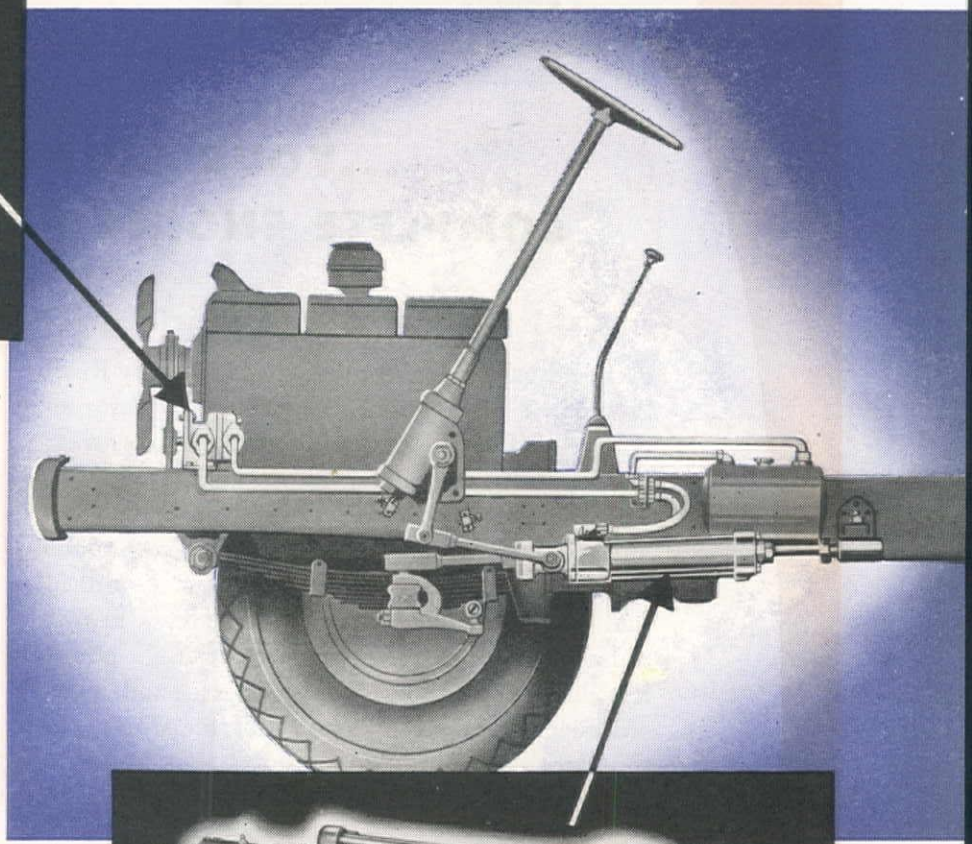
This triumph of Shell Research — another Shell "first" — comes to you only in Shell X-100 Motor Oil. This oil, long famous for its ability to protect your engine under the stresses of sustained high speeds and extreme operating conditions, now gives you this added protection. It is unequalled by any other motor oil, no matter its price.

It's Incomparable!

VICKERS Hydraulic Steering System COSTS YOU 20% Less THAN PREWAR



VICKERS SERIES V-200
BALANCED VANE PUMP
See Bulletin 49-52



At the current low prices, your new models should offer the added sales advantages made possible by VICKERS Steering System

VICKERS HYDRAULIC STEERING BOOSTER with integral overload relief valve . . . *See Bulletin 47-30a*

Improved design, better tooling and production methods of the past 10 years have resulted in a more than 20% price reduction in the Vickers Hydraulic Power Steering System. This saving greatly broadens the application possibilities of the Vickers Steering System.

Important among the many advantages of the Vickers Steering System are safety, effortless steering, adaptability and operator satisfaction. The resulting substantial customer acceptance and preference for Vickers Hydraulic Power Steering System is evident from its specification as original equipment by an increasing number of mobile equipment builders and operators alike.

3987

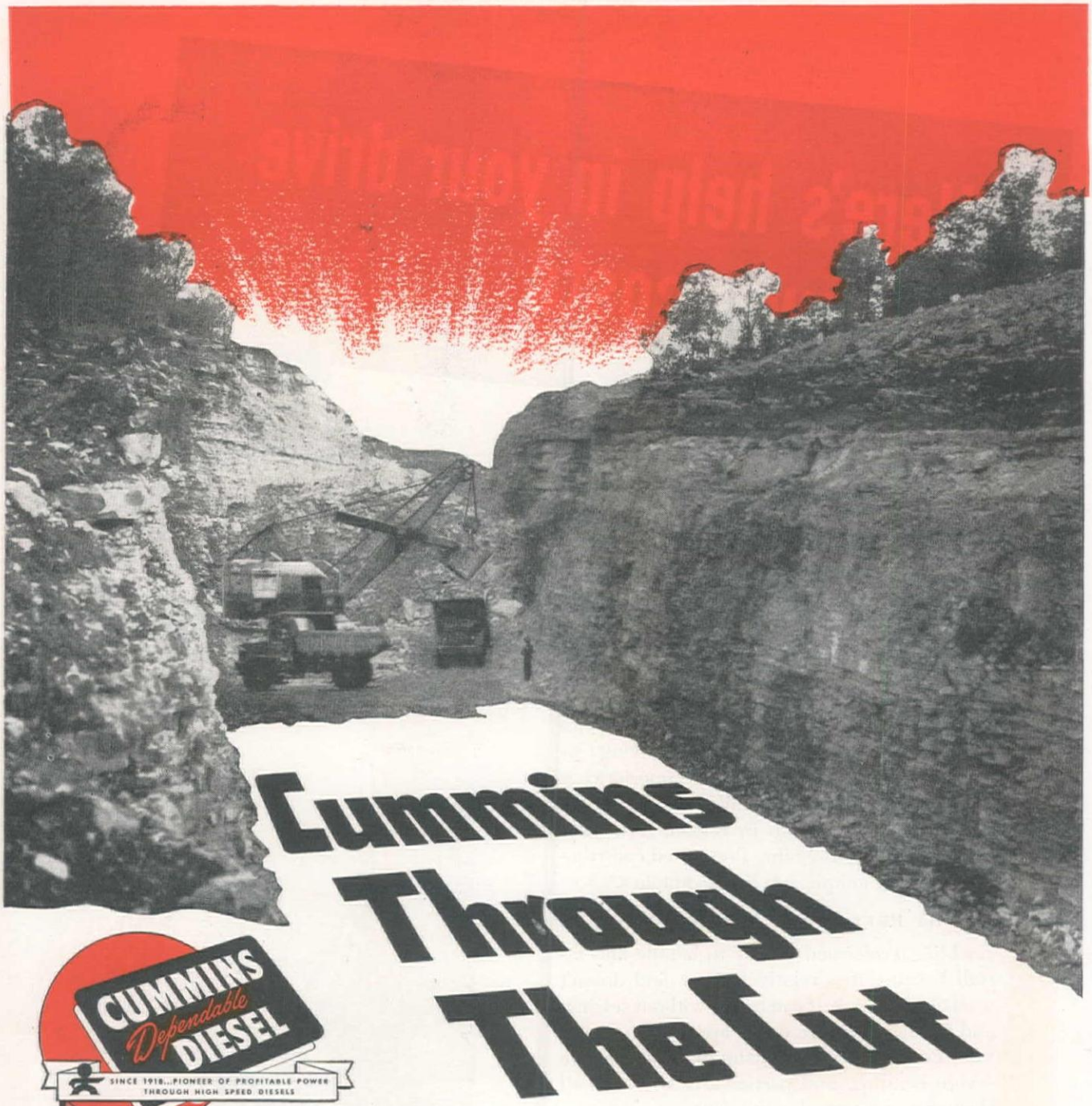
VICKERS Incorporated

DIVISION OF THE SPERRY CORPORATION

1498 OAKMAN BLVD. • DETROIT 32, MICHIGAN

Application Engineering Offices:

ATLANTA • CHICAGO • CINCINNATI • CLEVELAND • DETROIT • LOS ANGELES • PHILADELPHIA • PITTSBURGH • ROCHESTER • ROCKFORD ST. LOUIS • SEATTLE • SUMMIT, N.J. • TULSA • WASHINGTON • WORCESTER



Cummins Through The Cut

CUMMINS Dependable DIESEL

SINCE 1918...PIONEER OF PROFITABLE POWER THROUGH HIGH SPEED DIESELS

On a railroad relocation project near Burnside, Kentucky, the Burnside Construction Company, Inc., is using nine Cummins Diesels in slashing a deep cut through a mountain of solid rock. The cut averages 65 feet in depth, 90 feet in width, and is 2,600 feet long.

So far, 170,000 yards of rock have been loaded into rock haulers by a 1201 Lima shovel powered with a Model LI-600 Cummins Diesel. The rock haulers are eight Euclid Rear Dumps . . . all powered with Model HBID-600 Cummins Diesels.

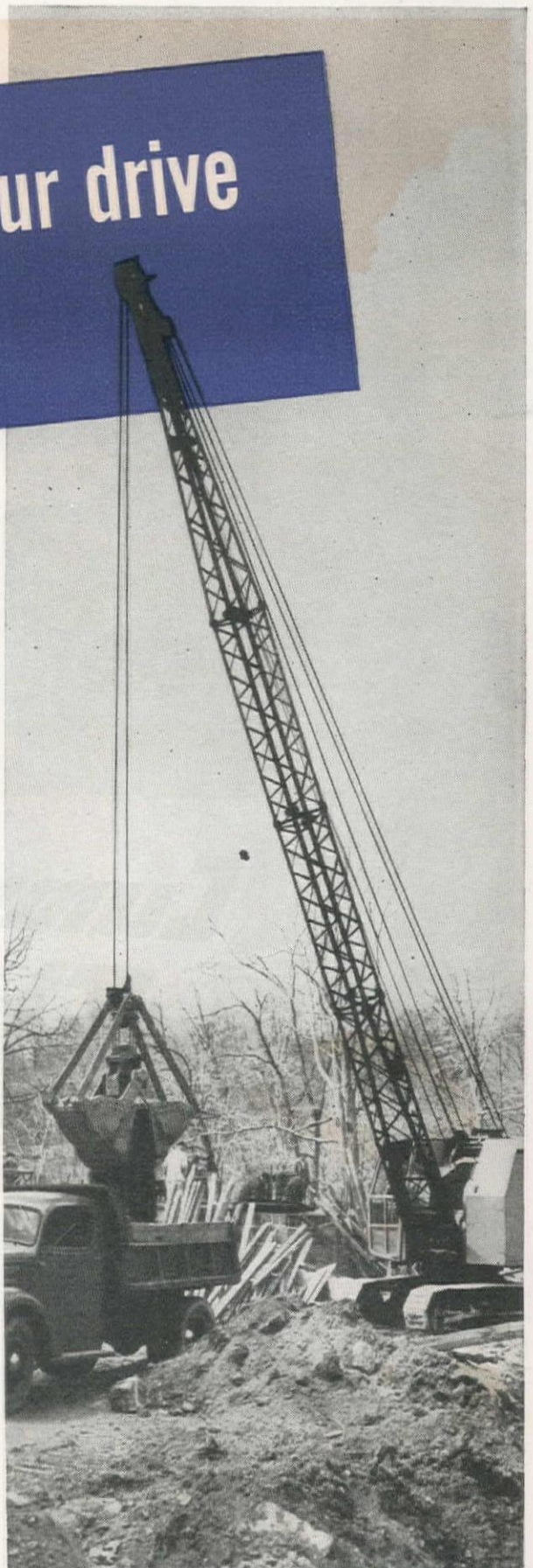
In one three-shift day, 4,123 yards of stone were handled by the Cummins-Powered shovel and hauling units. The round-trip haul that day averaged 5,330 feet . . . over a rough and rocky road.

Can you afford any other power?

CUMMINS ENGINE COMPANY, INC. • COLUMBUS, INDIANA

EXPORT: CUMMINS DIESEL EXPORT CORPORATION • COLUMBUS, INDIANA, U.S.A. • CABLE: CUMDIEX

Here's help in your drive for lower costs



Preformed "Blue Center" Wire Rope lasts longer . . .

ROPE THAT STAYS on the job longest saves you wire rope dollars; brings fewer shut-downs; cuts down replacement time. And Roebling Preformed Lang Lay "Blue Center" Steel Wire Rope gives you exactly these money-saving features . . . One big reason for this superiority is "Blue Center" Steel specially developed for wire rope and made only by Roebling. Another big reason is the Roebling Preformed construction with its unique service advantages.

WHY PREFORMED IS ECONOMICAL

Roebling Preformed is easy to handle and install because it is relatively inert and doesn't tend to set or kink. It can be cut without seizing, and fittings are more easily applied. In operation, Preformed gives outstanding life despite severe bending, and particularly where small sheaves and reverse bends occur.

FREE ENGINEERING SERVICE

Call on your Roebling Distributor for help in selecting the *right* wire rope for longest service and rock-bottom cost. If you have specially tough problems in wire rope selection, installation or maintenance, your Distributor will secure the assistance of a Roebling Engineer. John A. Roebling's Sons Co. of California, San Francisco—Los Angeles—Seattle—Portland.

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

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

ROEBLING

A CENTURY OF CONFIDENCE

Morey Bros., pioneers in the building materials field, own and operate the plant shown

QUICK CHANGE to MORE BUSINESS and GREATER PROFITS

NOBLE Batching Set-up Changes Peninsula Building Materials Co. from Dry Materials Yard to Complete Ready-mix Plant

● When Peninsula Building Materials Co., long-time supplier of rock, sand and gravel at Menlo Park, decided to expand into the ready-mix field, they chose Noble batching plants. *Here's why—*

Custom Built from Standard Units

Noble standard units enable them to modernize without scrapping existing aggregate storage facilities. They installed one large CA-500 ready-mix batching plant with 500-bbl. cement silo, and a smaller CA-154 aggregate batching plant. Then used Noble 24-inch conveyors, assembled from standard lengths, to feed aggregate from the original storage set-up to new batching plants.

Special Advantages

This set-up enables Peninsula to wet batch into Dumpcretes; dry batch into mixer and dry-batch trucks; or to batch plaster sand and other aggregates without cement. Noble poise beam scales assure accuracy to within .2 of 1%—buyer gets exactly what he specified, and Peninsula eliminates losses from overweighing.

Noble Cement Silo gives Peninsula the profit on lower cost bulk cement; eliminates handling of individual sacks; keeps cement alive.

Modernize with Standard Units

Like Peninsula Building Materials Co., you can get a plant engineered to your exact needs. Ask Noble engineers to help you select the most profitable plant layout for you. No obligation; just wire, write, or phone *NOW.*

DESIGNERS AND BUILDERS OF

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

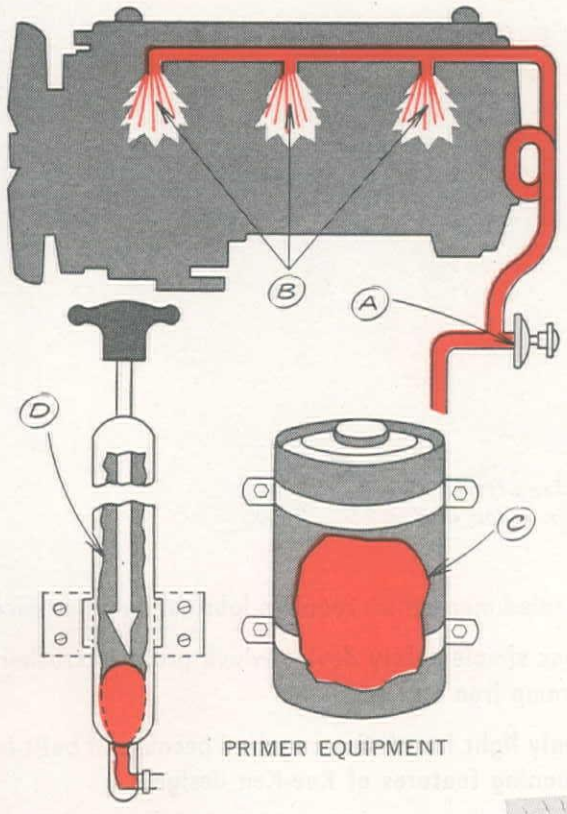
NOBLE CO.

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

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

Case 1174—Easy engine starting

Engines start in 10 seconds at 50° below zero!



PRIMER EQUIPMENT

When Chevron Starting Fluid was sprayed into intake manifolds of engines that had been standing idle all night in 50° below zero weather, they started in less than 10 seconds of cranking. Valuable for starting at low temperature in either gasoline or Diesel engines. Comes in convenient, easily handled capsules of two sizes -- 7 CC's and 17 CC's, packed 12 and 24 in metal containers. Also available for bulk use in 3-pint cans.

Chevron Starting Fluid is atomized and injected into intake manifolds as engine is cranked ... process is continued until engine warms sufficiently to run on regular fuel ... portable primer spray gun or permanently-attached system may be purchased from fluid supplier.

A. Pump of permanent primer system mounted on dash convenient to engine operator ... forces fluid to manifold.

B. Nozzles adapted to manifold atomize fluid.

C. Storage tank for bulk fluid supply connected to system when capsules not used.

D. Special tool for puncturing capsules of fluid replaces storage tank when fluid obtained in this form ... installed near pump convenient to operator.

FREE BOOKLETS that tell how to start engines quicker and easier and keep ice from clogging fuel tanks and lines are yours for the asking. Just send requests by letter or postcard to Room 1410, to 225 Bush St., San Francisco 20, California.

Chevron Starting Fluid contains a lubricant that helps prevent starting wear on upper cylinder walls and promotes easier starting. An oxidation inhibitor and other special additives prevent formation of deposits in engines and ice crystals in primer equipment.

Trademark Reg. U. S. Pat. Office

CHEVRON STARTING FLUID

STANDARD TECHNICAL SERVICE will make your maintenance job easier. If you have a lubrication or fuel problem, your Standard Fuel and Lubricant Engineer or Representative will gladly give you expert help; or write Standard of California, 225 Bush St., San Francisco 20, California.

STANDARD OF CALIFORNIA

5 TO 10 TIMES Longer Jaw Plate Life!

Kue-Ken* Crushers Give Greater Production at *Lower Cost*

Across the country users of Kue-Ken Crushers report 5 to 10 times *longer jaw plate life,* and 2 to 3 times more capacity, with less power. These advantages and economies come from Kue-Ken's revolutionary principle of "crushing without rubbing."

Exclusive Kue-Ken design places the hinge pin on the center line of the crushing zone. As the jaw swings back and forth, it describes an arc which is normal to both crushing faces. Crushing is done by compression alone. RUBBING is impossible with this motion. Time down for replacements is greatly reduced.

Pitman is always in compression, bearing against lower side of shaft ONLY, and there is 90% saving in Pitman weight. This lighter Pitman weight plus balanced mechanism permits 50 to 60% more crushing strokes per minute, giving greater production at lower cost.

Kue-Ken crushers are operating throughout the world. Write today for Bulletin 605. You, too, can reduce your crushing costs with Kue-Ken equipment.

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

17 sizes from 12″ x 7″ to 42″ x 25″.

1. **Sealed mechanism requires lubrication only twice a year.**
2. **Has simple safety device which protects crusher against tramp iron and overload.**
3. **Only light foundation required because of built-in smooth running features of Kue-Ken design.**
4. **Automatic oil pressure switch stops crusher and motor if oil pressure drops below normal setting.**

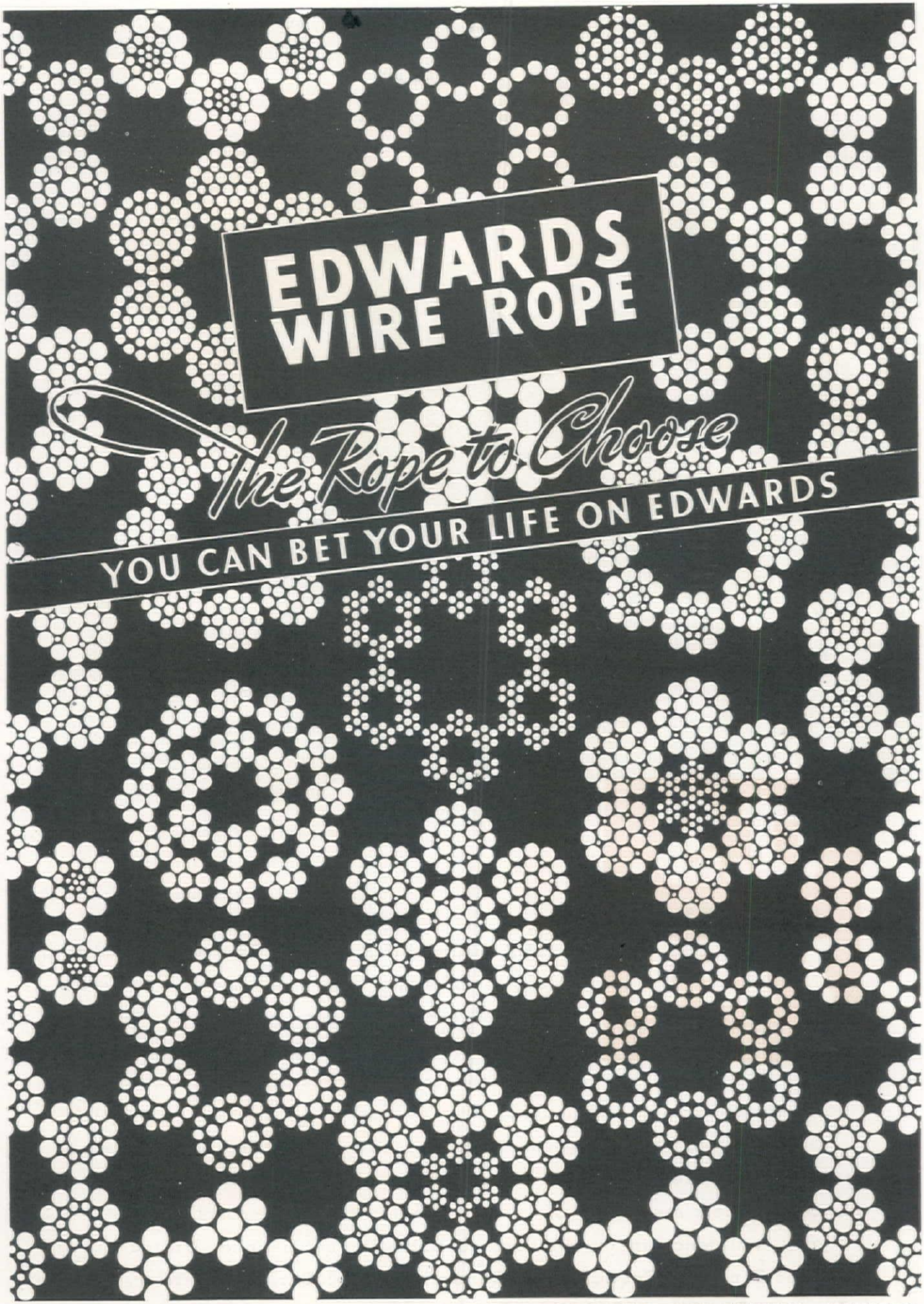
Oregon-Washington	**P. L. Crooks & Co.**	***Portland***
Montana	**Caird Engineering Works**	***Helena***
Texas	**Engineered Sales Co.**	***San Antonio***
Utah	**Lund Machinery Co.**	**Salt Lake City**

DEALERS: SOME TERRITORY IS STILL OPEN!

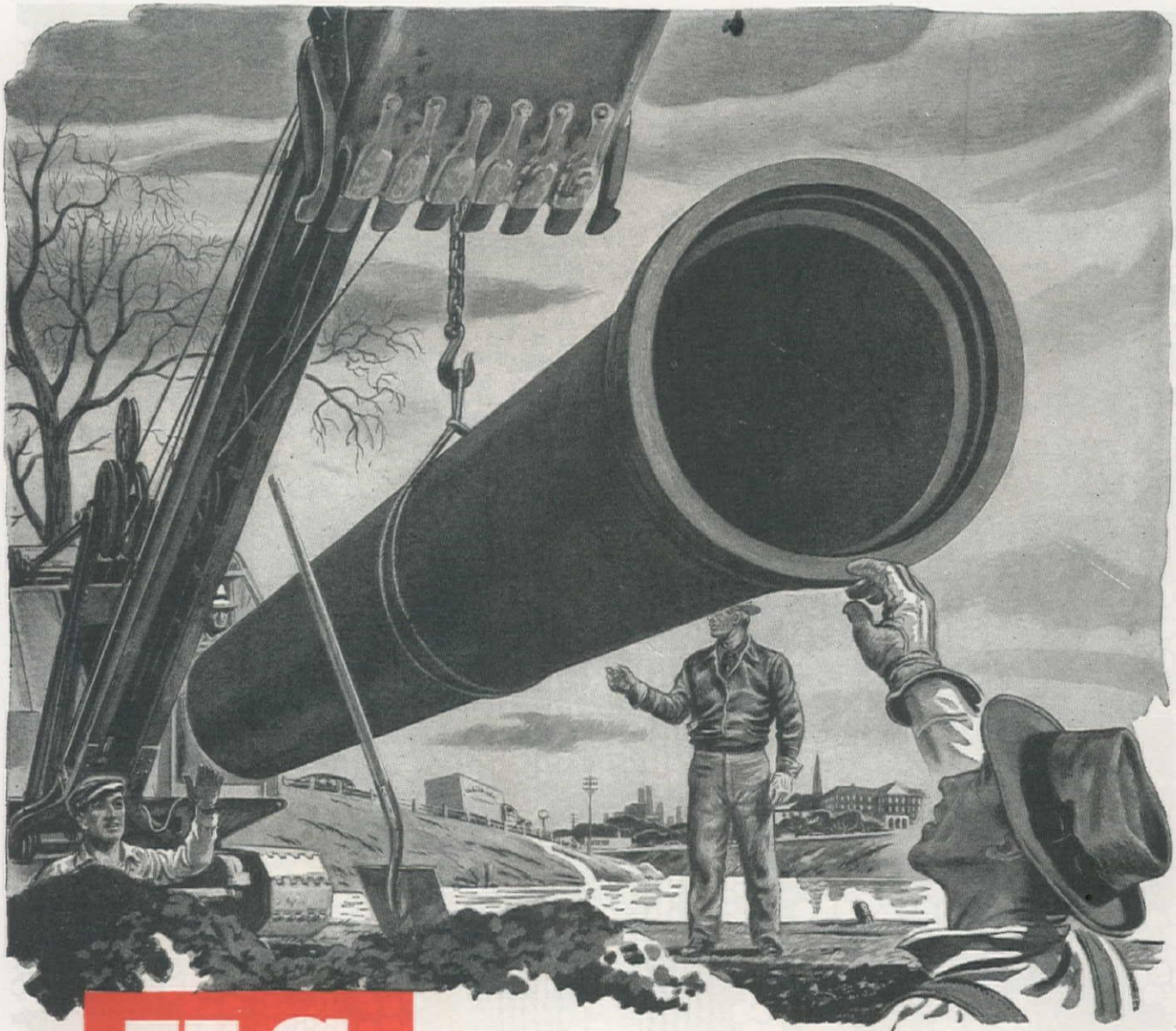
532 CHESTNUT STREET • OAKLAND 20, CALIFORNIA

STRAUB MFG. CO.

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



E. H. EDWARDS COMPANY — SEATTLE • PORTLAND • SAN FRANCISCO • LOS ANGELES • HOUSTON



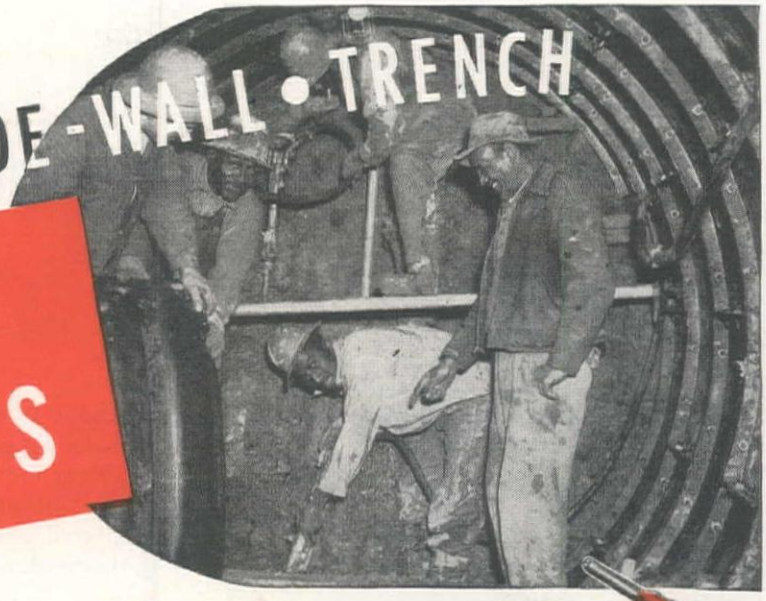
Painted for U. S. Pipe & Foundry Co. by Paul Laune

U.S. cast iron PIPE

FOR WATER, GAS, SEWERAGE AND INDUSTRIAL SERVICE

THE quality of U. S. Cast Iron Pipe is controlled to a degree undreamed of by pipe founders a generation ago. Before the molten metal is poured into the mold of a Super-deLavaud centrifugal casting machine the important characteristics of the iron have been determined by our metallurgists. After the pipe has been cast our plant and research laboratories conduct numerous tests, in addition to acceptance tests, to assure the maintenance of quality in U. S. Pipe. This routine procedure at our several plants is enforced so that *we* may be confident that *your* confidence in our product continues to be justified. **United States Pipe and Foundry Co., General Offices: Burlington, New Jersey, Plants and Sales Offices Throughout U. S. A.**

OVER-HEAD • SIDE-WALL • TRENCH



Thor DIGGERS

GET IT DONE FASTER!

A light-weight tool for over-head work—a heavy-duty machine for slashing through gravel, frozen ground or hard pan—Thor offers hard-hitting Pneumatic Diggers for every class of work, fitted with closed handle for spading or extended "T" handle for effortless trenching.

The light-weight "412" class features screw-on retainers, internal rubber bumpers to absorb shock and exclude dirt.

The powerful "18" and "19" tools are built with famous Thor Short-Travel Tubular Valve, Latch-Type Steel Retainer; can also be fitted with ax blade for timber and hitch cutting, or with moil point for light pavement breaking.

See your Thor distributor today for a demonstration!

No. 19 TRENCH DIGGER 29 lbs.

No. 18 CLAY DIGGER 29 lbs.

No. 412 CLAY DIGGER 18-¾ lbs.

No. 412T TRENCH DIGGER 23-¾ lbs.

INDEPENDENT PNEUMATIC TOOL COMPANY

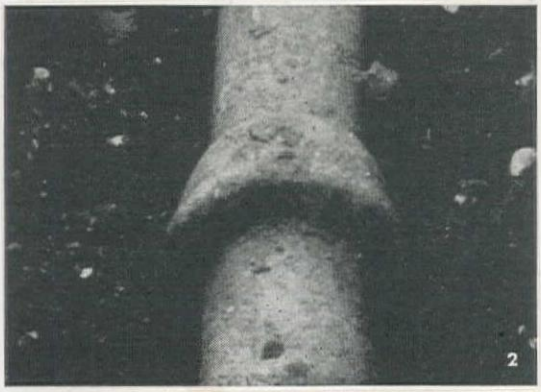
Aurora, Illinois

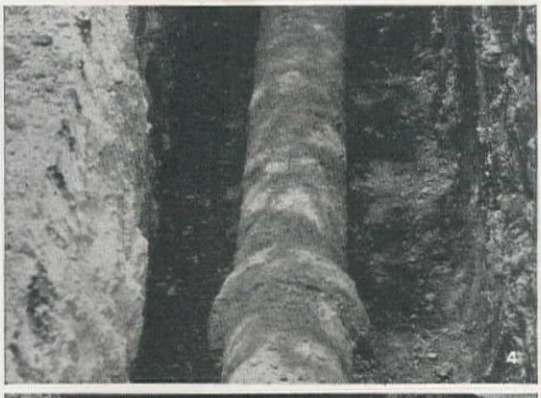
Export Division: 330 West 42nd St., New York 18, N. Y.

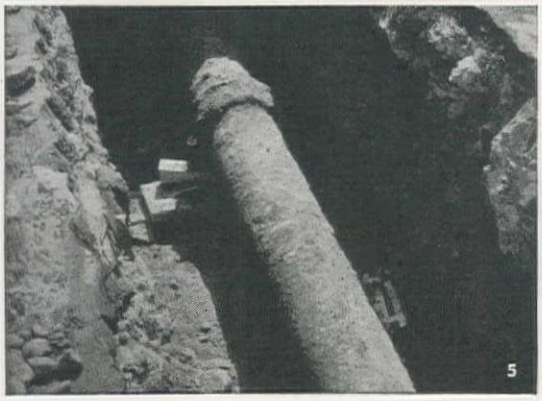
Birmingham Boston Buffalo Chicago Cincinnati Cleveland Denver Detroit Houston Los Angeles Milwaukee New York
Philadelphia Pittsburgh St. Louis St. Paul Salt Lake City Seattle San Francisco Toronto, Canada Sao Paulo, Brazil London, England

Thor PORTABLE POWER TOOLS

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







Going strong in their 2nd Century

About 30 of the older American cities have cast iron water or gas mains in service which were laid from 100 to 132 years ago. Most of these mains, on or after their 100th Anniversary, have been uncovered, inspected and photographed for the record. Five of them—all water mains, are shown in this advertisement.

While it is well known that cast iron water mains in England, France and Germany have service records that approach three centuries, we, who make cast iron pipe, nevertheless get a thrill out of looking down into the trench at an uncovered section of a main that has been in service for 100 years—and so, we are told, do water works and gas engineers.

When one considers the radical changes which have occurred in a century in vehicular traffic, and the vast development of underground construction for the many utility services, the fact that these mains are now in their second century of service is all the more remarkable.

(1) This 101-year-old cast iron water main is serving Frederick, Maryland.

(2) Still in use after 118 years of service in the water supply system of St. Louis, Mo.

(3) This water main, installed 117 years ago, is still serving Richmond, Va.

(4) Lancaster, Pa. laid this cast iron water main 105 years ago. It is still serving.

(5) One of several cast iron water mains that have been serving New York City for more than a century.

96% OF ALL 6-INCH AND LARGER CAST IRON WATER MAINS EVER LAID IN 25 REPRESENTATIVE CITIES ARE STILL IN SERVICE.

Based on the findings of a survey conducted by leading water works engineers.

Cast Iron Pipe Research Assn., T. F. Wolfe, Engr., Peoples Gas Bldg., Chicago 3.

CAST IRON PIPE

SERVES FOR CENTURIES

BIG CAPACITY PLUS THE SPEED OF STRAIGHT-LINE-LOADING

With one straight-in-line action, the single operator of the AUSTIN OVERSHOT LOADER dozes his load and swings it smoothly and quickly overhead into the waiting truck. Naturally the action is faster! No time-consuming swings...cleaner mucking...good, solid "bites."

This revolutionary loader attaches to any late model crawler type tractor. It is 100% MECHANICALLY OPERATED and ruggedly built to stand up to severe conditions. Horizontal mounting of main bucket arm lets you doze the load with full power of the tractor.

- Offered in three sizes: for 1½, 2½, and 3½ cu. yd. (rated capacity) buckets. Write for prices—surprisingly low—and full mechanical data. John Austin, Inc., P.O Box 807, Longmont, Colorado.

THE AUSTIN OVERSHOT LOADER

BIG BITES MEAN HIGH SPEED LOADING, typical of the Austin Overshot Loader, shown here working granite on Loveland Pass, Colorado, well over 11,500 feet above sea level. (6 yd. Dumpsters keep hiballing by maximum one minute loading time).

FOR LONGER PROFITS investigate the Austin Overshot Loader...Today.

JOHN AUSTIN, INC.
LONGMONT, COLORADO

GMC radiator grilles are as durable as they are distinctive. All 300 to 900 series grilles are frame-mounted, angle-braced and surrounded by bars of heavy, spring steel bumper stock.

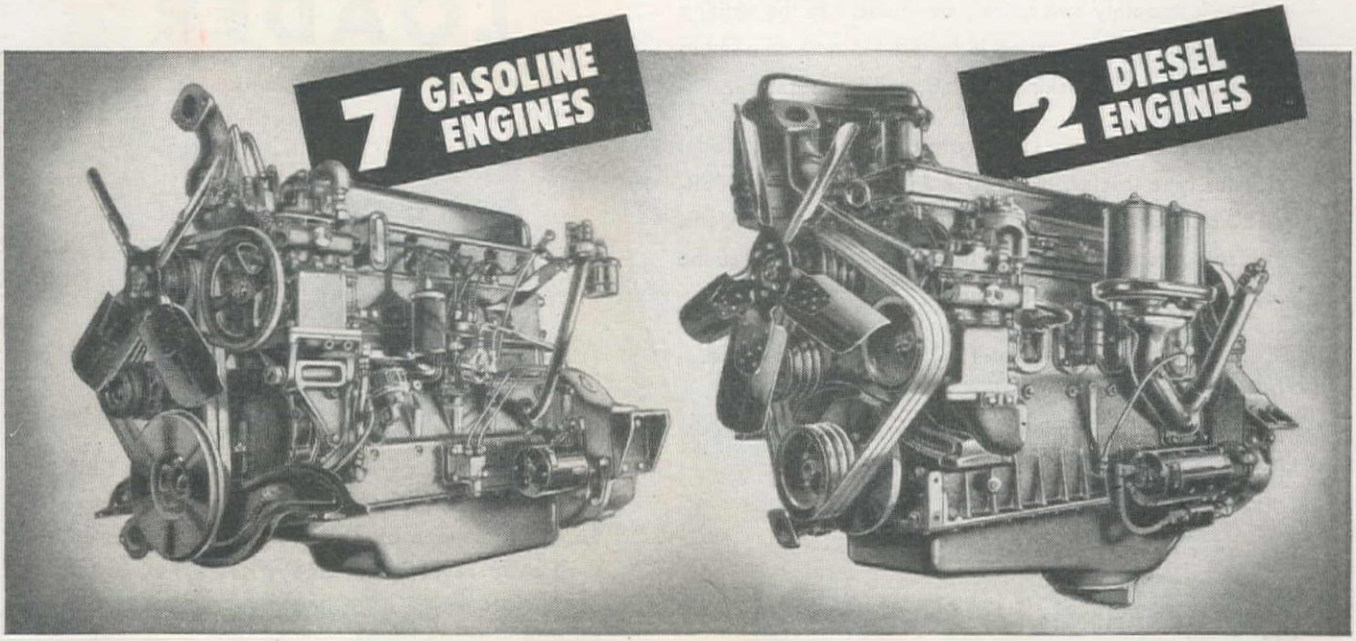
BACK OF THESE "BUMPER-BAR" GRILLES . . .

Best Engines in the Business

The increasing popularity and acceptance of GMC trucks are reflected in current registration figures which show GMC making substantial gains in new truck sales. In fact, new GMC truck registrations are the highest in the Company's history according to latest available figures.

Much of this increase can be attributed to the famous GMC truck-built engine line . . . because everyone recognizes the engine as the "heart" of any motor truck.

GMC now offers an engine range to fit every vocational requirement. Each engine, gasoline or Diesel, is the most powerful in its class with the most advanced features of design and construction ever offered by GMC. From every angle GMC truck engines are the "best in the business" . . . from every angle the best for your business.



GMC gasoline engines range from 228 to 503 cu. in. displacement and from 95 to 190 horsepower. From the smallest to the largest, they are all GMC-built . . . all of war-renowned "Army Workhorse" design.

GMC
GASOLINE • DIESEL
TRUCKS

GMC Diesel trucks are powered by famous GM 2-cycle four and six cylinder Diesel engines that are outstanding for light weight and great economy. The four develops 133 horsepower; the six provides 200.

GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION

EATON
2-Speed Truck
AXLES

Last Longer because Moving Parts are Always Thoroughly Lubricated

More Than a Million Eaton 2-Speed Axles in Trucks Today

Eaton's exclusive forced-flow lubrication system starts oil on its way to all moving parts the instant the axle turns over. This protection to gears at low truck speeds, as well as high, reduces friction and wear on moving parts, adds thousands of miles of trouble-free life to Eaton 2-Speed Axles. Your truck dealer will be glad to explain how Eaton Axles contribute to lower operating and upkeep costs by embodying a balanced combination of pulling power and speed on most trucks of the 1½-ton class and larger.

Axle Division
EATON MANUFACTURING COMPANY
CLEVELAND, OHIO

PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • 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

BIGGE USES TRAILMOBILES in moving GIANT MACHINES—

GIANT CANALS are one of the segments of the reclamation projects by which the government brings water to arid lands, and the contractors who work for the Bureau of Reclamation have serious problems in moving giant machines weighing up to 165 tons, from one location to another. The machines shown here work on those sections of canals which must be concrete lined—one machine trims the banks, a second lays the concrete, and a third does the grooving and finishing.

Precious weeks used to be consumed in dismantling and setting up these machines every time they were moved, until Bigge Drayage Co. came onto the scene and suggested to the contractors that with the right equipment they could move these machines "as is" without dismantling. Bigge consulted with TRAILMOBILE engineers and came up with the TRAILMOBILE LOW BED and two special 12-tire three-axle drag type dollies shown in the pictures here, and successfully moved the first machine.

Since then Bigge has really been busy moving these machines for the contractors on the Columbia River Basin and the California Central Valley projects, on one job alone making 20 moves in a period of 96 days. That's what can be done by the right men with the right equipment.

THE TRAILMOBILE COMPANY
BERKELEY, CALIFORNIA

TRAILMOBILE

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

take your pick of PERFORMANCE

• From the complete line of Oliver "Cletrac" Crawler Tractors and Oliver Industrial Wheel Tractors you can pick exactly the tractor you need and be assured of performance *in advance.*

The finest in industrial machinery is more than a slogan to Oliver . . . it is an accomplished fact that has been proved in year after year of outstanding performance. Design, materials, workmanship, and plant equipment are all based on one standard . . . the built-in dependability that adds up to more years of service in the field . . . lower operating and maintenance costs to you.

Combine this unsurpassed dependability with the *extra* service offered by your Oliver "Cletrac" Distributor . . . a complete line of industrial crawler and wheel tractors . . . a full line of allied equipment . . . complete service facilities and adequate stocks of genuine Oliver "Cletrac" repair parts . . . plus a broad background of field experience . . . and you'll see why you can take your pick of performance.

OLIVER Cletrac SALES SERVICE

A Complete Line of Crawler and Industrial Wheel Tractors

The OLIVER Corporation
Industrial Division, 19300 Euclid Ave., Cleveland 17, Ohio

State of Arizona: Guerin Implement Co., Phoenix, 1401 S. Central St. *State of California:* Gustafson Tractor Co., Eureka; Mechanical Farm Equipment Dist., Inc., San Jose; Ashton Implement Co., Salinas; Comber & Mindach, Modesto; Tractor Service Company, Inc., 820 Broadway, Chico; Tractor & Equipment Co., San Leandro; Flood Equipment Company, Sacramento; W. J. Yandle Company, Santa Rosa; Jim Ingle Company, Fresno and Tulare; Oliver Implement Co., Bakersfield; Turner & Chapin, Whittier; Farmers Tractor & Implement Supply Company, Colton. *State of Washington:* Inland Diesel & Machinery Company, Spokane; Pacific Hoist & Derrick Co., Seattle; Melcher-Ray Machinery Co., 202 East Alder Street, Walla Walla; Central Tractor and Equipment Co., Wenatchee. *State of Oregon:* Loggers and Contractors Machinery Co., Portland, Eugene & Klamath Falls. *State of Idaho:* Idaho Cletrac Sales Co., Lewiston; Engineering Sales Service, Inc., Boise. *State of Montana:* Western Construction Equipment Company, Billings and Missoula. *State of Nevada:* B & M Tractor & Equipment Corp., 1420 S. Virginia St., Reno. *British Columbia:* Pacific Tractor & Equipment, Ltd., 505 Railway Street, Vancouver.

Amsco Dipper Teeth

WESTERN POINT
(Patented)

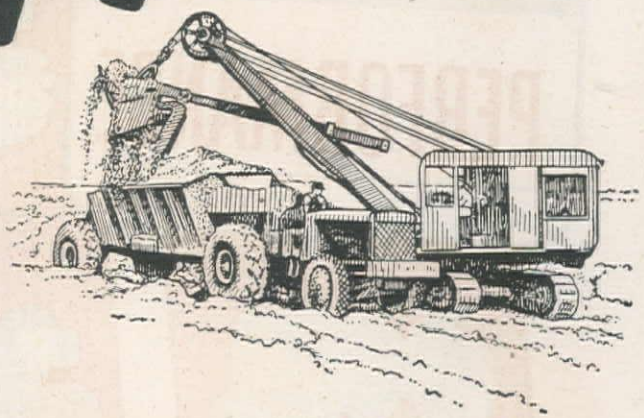
A tough, long-wearing, reversible tooth for all types of digging operations. Its vertical-wedge fastening system insures quick, easy removal and replacement.

WHISLER POINT
(Patented)

For exceptionally hard service. Widely used on large dippers in mining ore and stripping coal. The wedge and C-clamp in the assembly serve to force the "crotch" of the tooth tight against the dipper lip and insure a snug fit between the tooth and the base.

* * *

In addition to the above, Amsco also manufactures other dipper teeth in a wide range of designs for any kind of service. For details, see Amsco Bulletin 547-DS.



To avoid loose Tooth Trouble

Poorly fitting dipper teeth can't last long. Any play in tooth fit means rapid wear and possible breakage of the tooth base. So specify Amsco when ordering replacement teeth. You can always be sure of a correct fit; every dipper tooth produced by Amsco is checked on a master base.

Made of tough austenitic manganese steel, Amsco dipper teeth work harden radically under heavy impact and develop a plowshare polish which greatly lengthens service life. This hard, shiny surface is self-renewing during the entire life of the part.

Other Amsco products are: Welded-type, renewable lip, and Missabe dippers; dipper parts; crawler shoes, rollers, treads and tumblers; dragline buckets and parts; pulling chains; and Amsco welding products for hardfacing and repair.

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
CHICAGO HEIGHTS, ILL.

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

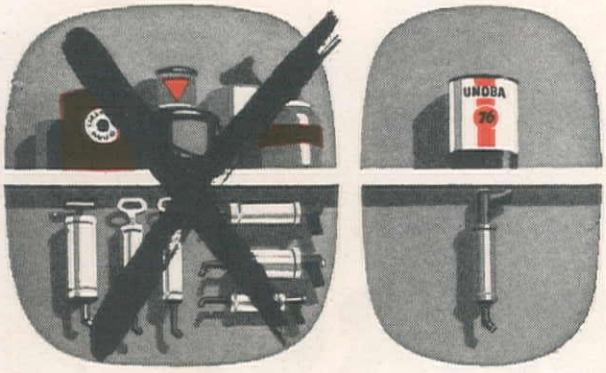
SIMPLIFY YOUR LUBRICATION with MULTI-PURPOSE UNOBA!

Unoba is Union Oil Company's multi-purpose barium base grease that resists *both* heat and water! Unoba simplifies your lubrication because it performs the jobs that formerly required many different greases.

HERE'S WHY UNOBA IS TOPS FOR AUTOMOTIVE AND INDUSTRIAL USE:

1. UNOBA is heat and water resistant! Neither boiling water nor dry heat can cut its protective coating. Unoba gives thorough protection at temperatures from much below freezing to 300° F.

2. UNOBA protects against rust and corrosion! Because of its remarkable resistance to moisture and heat and its unusual adhesiveness to metal, Unoba protects even idle equipment over long periods.



3. UNOBA reduces costs, saves time! With Unoba only one gun and one container need be used in most cases. Thus Unoba holds stock inventory to a minimum, saves you time and cuts equipment costs.

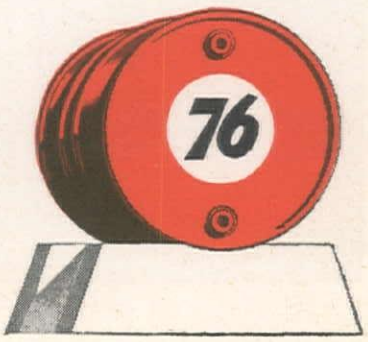
For full information phone your local Union Oil Representative or write Sales Department, Union Oil Company, 617 W. Seventh St., Los Angeles 14, Calif.

ANOTHER

UNION OIL

SUCCESS-TESTED

PRODUCT



AVOID HIGH DEPRECIATION CHARGES

You don't have to tie up heavy capital in machines with high depreciation when you do breaking, drilling, driving or tamping. Specify the Barco Gasoline Hammer, industry's rough, tough, economical workhorse. Barco speeds up work schedules, handles intermittent or scattered jobs, avoids heavy transportation costs or carrying charges on idle equipment. Barco works in difficult or hard-to-reach spots, packs a strong wallop anywhere and anytime. Let Barco save you money. Write Barco Manufacturing Co., 1819 Winnemac Avenue, Chicago 40, Illinois. In Canada: The Holden Co., Ltd., Montreal, Can.

PICK BARCO

LOW FIRST COST
LOW MAINTENANCE

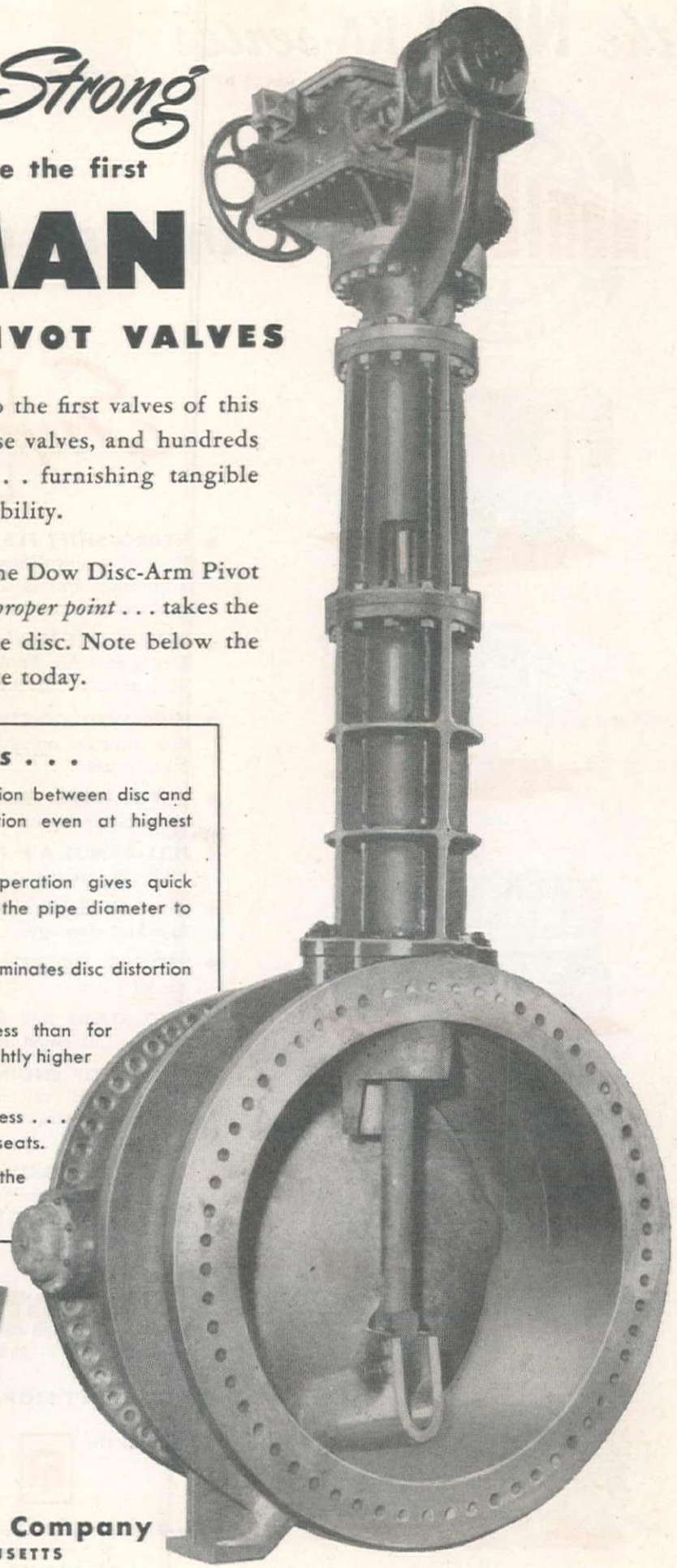
Free Enterprise—The Cornerstone of American Prosperity

Still Going Strong

after more than 25 years are the first

CHAPMAN

DOW DISC-ARM PIVOT VALVES



More than a quarter of a century ago the first valves of this design were installed. And today these valves, and hundreds more, are giving excellent service . . . furnishing tangible evidence of unusual strength and reliability.

An improved type of butterfly valve, the Dow Disc-Arm Pivot Valve *applies the operating force to the proper point* . . . takes the deflection out of the lower half of the disc. Note below the advantages of this design . . . then write today.

Check These Advantages . . .

NO VIBRATION! Because of direct connection between disc and operating mechanism there is no vibration even at highest velocities.

FAST OPERATION! Simple and direct operation gives quick closing in emergencies . . . only one-half the pipe diameter to travel.

EXTREME TIGHTNESS! This unusual design eliminates disc distortion . . . ensures extreme tightness.

LOW HEAD LOSSES! Head losses are less than for needle or plunger type valves . . . only slightly higher than gate valves.

SMOOTH OPERATION! None of the jerkiness . . . none of the wear of valves with sliding seats.

EASY INSPECTION! Disc mechanism is on the downstream side when valve is closed.

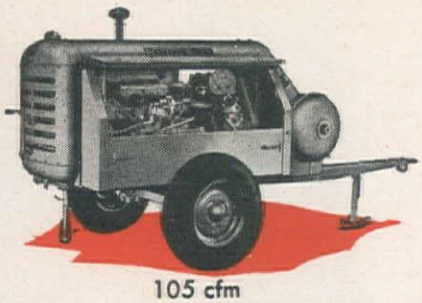
FOR COMPLETE ENGINEERING DATA AND RECOMMENDATIONS WRITE FOR THIS BULLETIN No. 40

The Chapman Valve Mfg. Company
INDIAN ORCHARD, MASSACHUSETTS

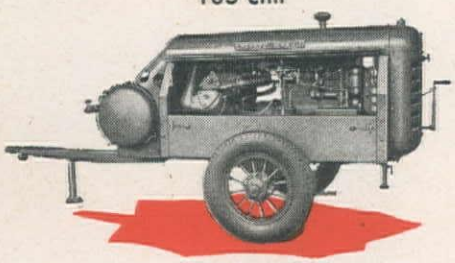
the NEW KA-*series*

Ingersoll-Rand MOBILAIR AIR POWER

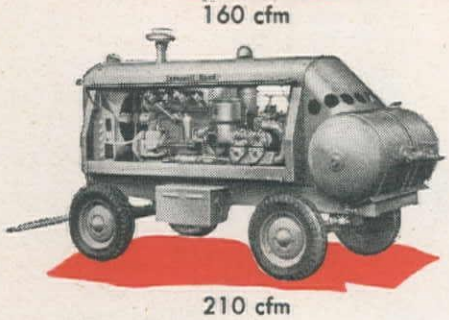
...the line of Compressors full of SuperRfeatures



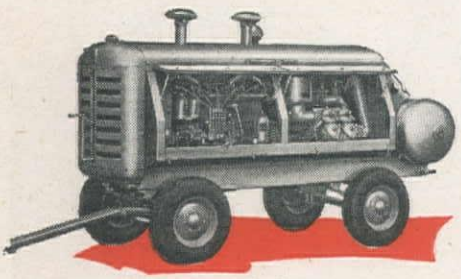
105 cfm



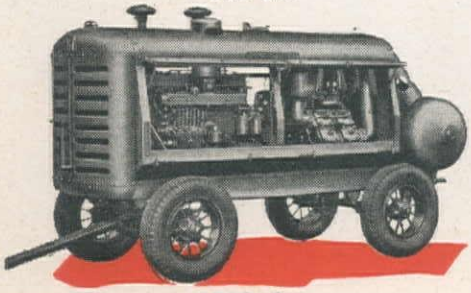
160 cfm



210 cfm



315 cfm



500 cfm

- **HYDRO-SHIFT FLEX-DISC CLUTCH** . . . Finger-tip hydraulic shifter simplifies starting. The clutch is completely self-adjusting, and is the only clutch in which facings can be replaced without major disassembly.
- **DRILL-MORE Multi-Speed Capacity Control** makes Rock Drills and Air Tools work up to 15% faster . . . saves up to 40% in fuel . . . reduces wear on both engine and compressor.
- **IMPROVED CONTROL OF COOLING SYSTEM** . . . Adjustable shutters on radiator and thermostatic control of water circulation.
- **PISTON-TYPE FREE-AIR UNLOADERS** eliminate troublesome diaphragms . . . operate only at half speed.
- **FULL-RANGE AIR FILTERS** automatically maintain their high efficiency at part capacity.
- **HINGED SIDE COVERS** permanently attached, prevent loss and damage.
- **SPRING MOUNTING AND AUTOMOTIVE STEERING** on all sizes.
- **TWO-STAGE AIR-COOLED COMPRESSOR** with Channel Valves and constant-level lubrication.
- **CHOICE OF ENGINES** . . . High-economy gasoline engine or Type "H" oil engine on all sizes . . . International-Harvester easy starting Diesel available on 160, 210, and 315-cfm sizes.
- **ARMORED AGAINST DEPRECIATION** . . . Resistant to break-down, dependable on all kind of weather, and good for many years of hard service . . . easy to operate, service, and maintain . . . tough machines that stay efficient.

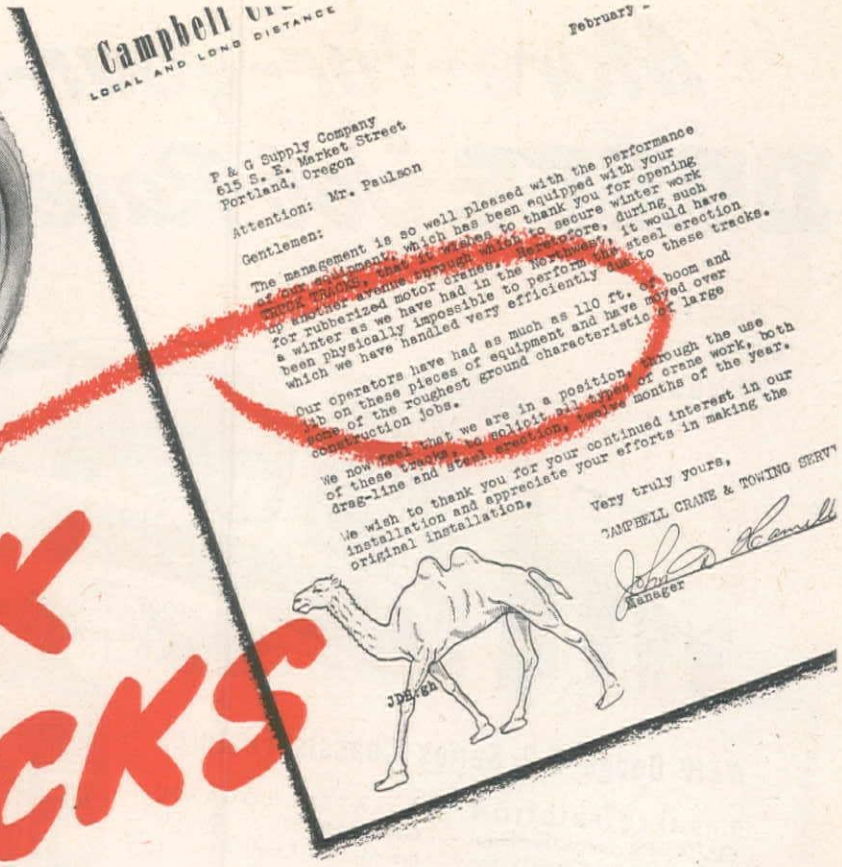
Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y. 330-2

DON'T STOP WITH A GOOD COMPRESSOR!

Use the RR CONTRACTORS' COMBINATION

Everything you need for rock drilling • Top quality machines that work as a team. • Machines designed, built, sold, and serviced by men who know rock excavation . . . application "know how."

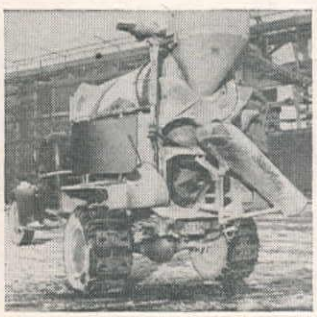


TRUCK TRACKS

ADD TRACTOR ADVANTAGE!

TRUCK TRACKS made possible a four-month winter contract for this crane operator.

Dump trucks can operate on soft fills.



TRUCK TRACKS improve single axle performance.

TRUCK TRACKS can ELIMINATE shutdowns on the job due to bad weather by adding **tractor performance** to your rolling equipment! Ideal for desert operation the year 'round.

Drivers mount TRUCK TRACKS in 10 minutes time . . . remove them in less. Adjustments are simple and easy to make. Nothing to break, bend or loosen . . . maintenance is negligible. TRUCK TRACKS provide extra traction for either single or tandem axle equipment. They fit almost all standard rear duals.

HOW TO ORDER: Just send tire size; whether single or tandem axle. Accompany order with a check for $50.00 deposit per set, and your TRUCK TRACKS will be shipped balance C.O.D. the day your order is received. Please include shipping instructions.

ALL-STEEL Construction

PRICES:

$285	$145
Per Tandem Axle Set. Fits tires up to 11:00 x 22	Per Single Axle Set. Fits tires up to 9:00 x 20

Additional pads to fit larger tires available at $6.50 each. Freight Additional.

If you're bogged down Call, Wire or Write

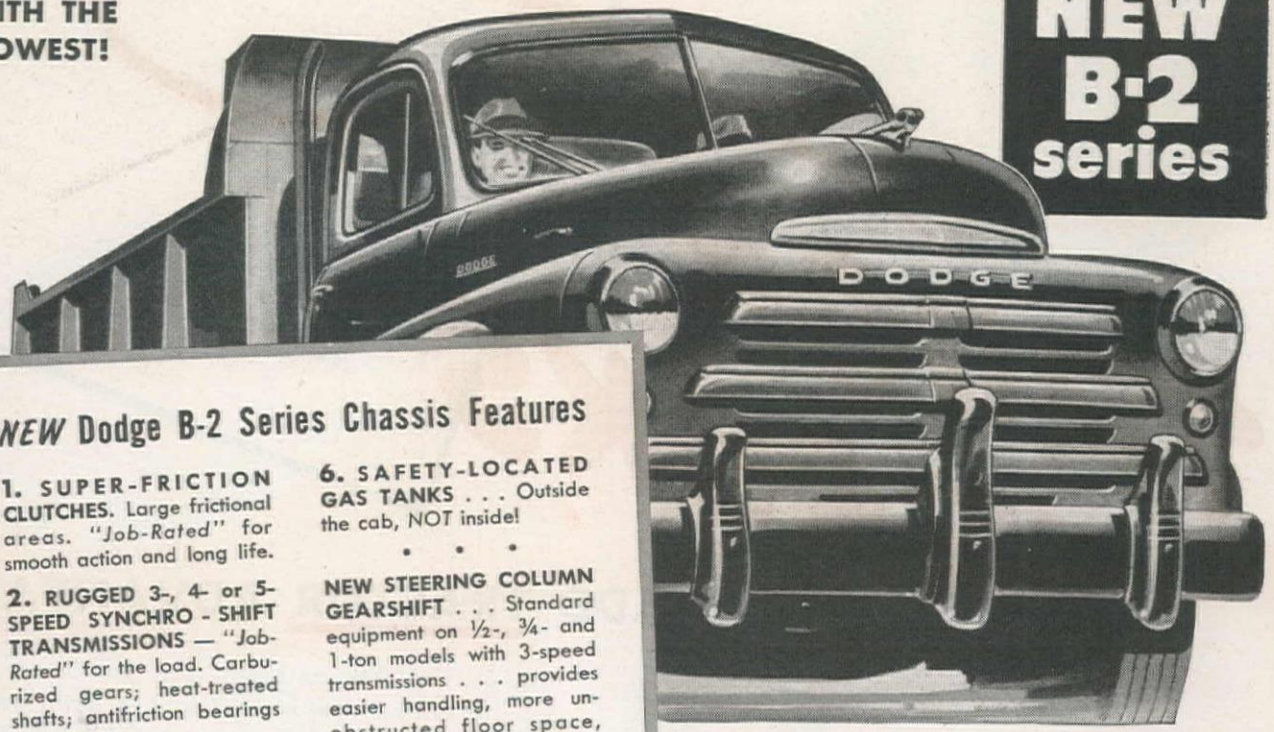
P. & G. SUPPLY CO. **Dept. WC**

615 S. E. Market Street **Portland 14, Oregon**

More-for-your-money...
DODGE "Job-Rated" TRUCKS

PRICED WITH THE LOWEST!

NEW B-2 series



NEW Dodge B-2 Series Chassis Features

1. SUPER-FRICTION CLUTCHES. Large frictional areas. *"Job-Rated"* for smooth action and long life.

2. RUGGED 3-, 4- or 5-SPEED SYNCHRO-SHIFT TRANSMISSIONS — *"Job-Rated"* for the load. Carburized gears; heat-treated shafts; antifriction bearings throughout.

3. FULL-FLOATING REAR AXLES . . . Hypoid design; banjo-type housing . . . *"Job-Rated"* for the load. Long life . . . low upkeep cost.

4. CYCLEBONDED brake linings (no rivets) prolong brake life.

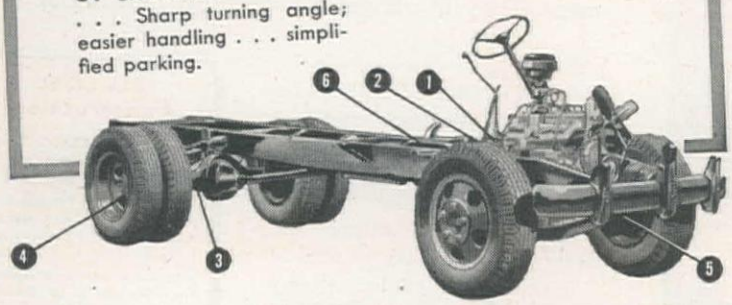
5. CROSS-TYPE STEERING . . . Sharp turning angle; easier handling . . . simplified parking.

6. SAFETY-LOCATED GAS TANKS . . . Outside the cab, NOT inside!

• • •

NEW STEERING COLUMN GEARSHIFT . . . Standard equipment on ½-, ¾- and 1-ton models with 3-speed transmissions . . . provides easier handling, more unobstructed floor space, greater safety of operation.

"RIGHT-SPOT" HAND BRAKE . . . under the center of the cowl . . . *right where you want it.* Standard on all ½-, ¾- and 1-ton models. Provides unobstructed floor space; easier passage through either cab door.



THEY'RE more-for-your-money any way you look at them!

Read why . . . on this page. *See* why . . . at your Dodge dealer's.

New B-2 Series Dodge *"Job-Rated"* trucks are designed throughout to last longer . . . to save you money!

Compare them—feature for feature, price for price, value for value—with any other trucks! Know what you're getting for what you pay.

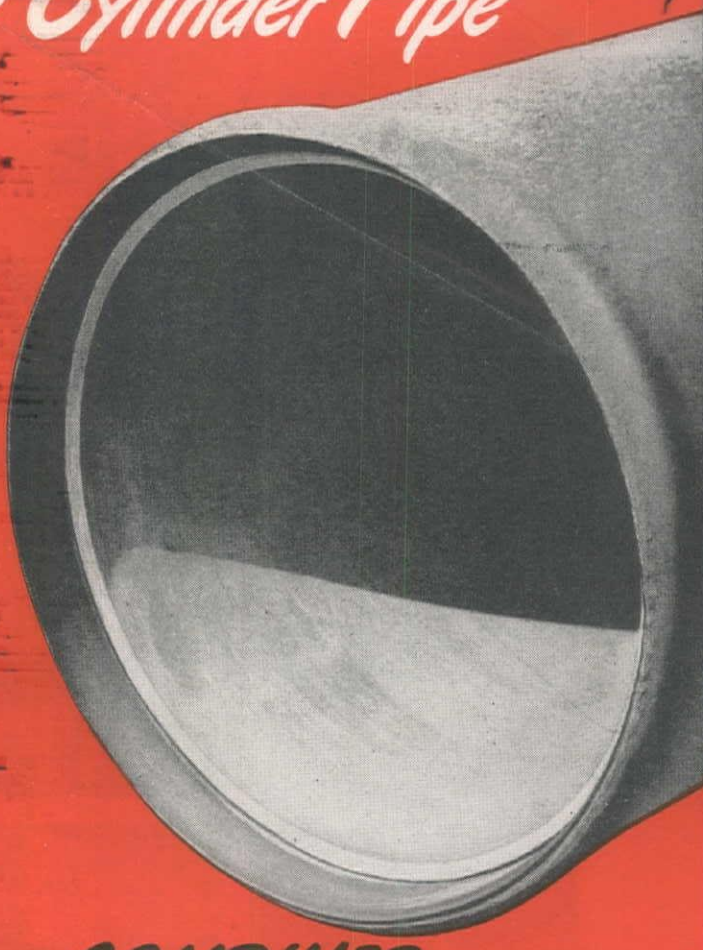
Switch to Dodge. See your Dodge dealer . . . now . . . and *save money!*

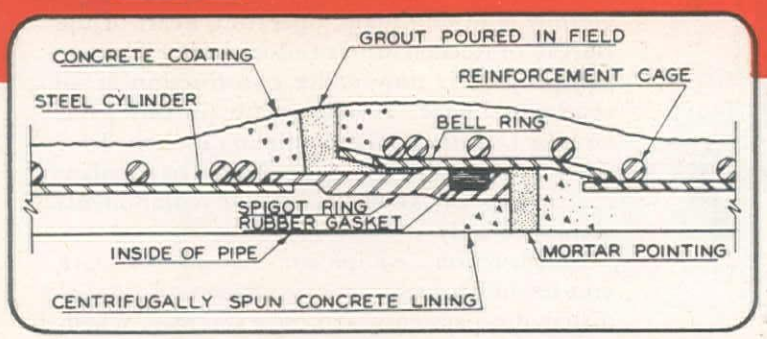
NEW Dodge B-2 Series Engine Features

- **FAMOUS DODGE L-HEAD TRUCK ENGINES** . . . "Job-Rated" for your loads. Save gas, oil—cut service expense.
- **COMPLETELY SPLASH- AND DUST-PROOF ELECTRICAL SYSTEM** . . . with high-output generator. Resistor-type spark plugs, and high-output coil, provide amazingly smooth engine operation; insure longer plug life.
- **EXHAUST VALVE SEAT INSERTS** . . . resist wear, pitting. Reduce valve grinding; preserve performance.
- **REPLACEABLE PREFITTED MAIN BEARINGS** . . . precision, long-life quality. Reduce maintenance costs.
- **FULL-LENGTH CYLINDER COOLING** . . . uniform cooling of cylinders, protects . . . reduces wear.
- **4-RING ALUMINUM ALLOY PISTONS** . . . for top performance; longer bearing life; low oil consumption.
- **FULL-PRESSURE LUBRICATION** . . . positive pressure to main, connecting rod and camshaft bearings and camshaft drive; prolongs engine life.
- **OIL-BATH AIR CLEANER** . . . highly effective in protecting the engine from dust and dirt.

356 BASIC CHASSIS MODELS, RANGING FROM 4,250 TO 23,000 LBS., G.V.W.

American Concrete Cylinder Pipe





COMBINES

- ✓ **The physical strength and characteristics of steel**
- ✓ **The positive protection and permanency of concrete, inside and out**
- ✓ **The simplicity, flexibility and safety of Lock Joint Rubber Gasket Joints**

TO REDUCE THE COST OF DELIVERED WATER

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

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

THREE PLANTS TO SERVE YOU

Over 750,000 feet of American Concrete Cylinder Pipe are now serving more than 50 major cities and population centers throughout the West.

American PIPE AND CONSTRUCTION CO.

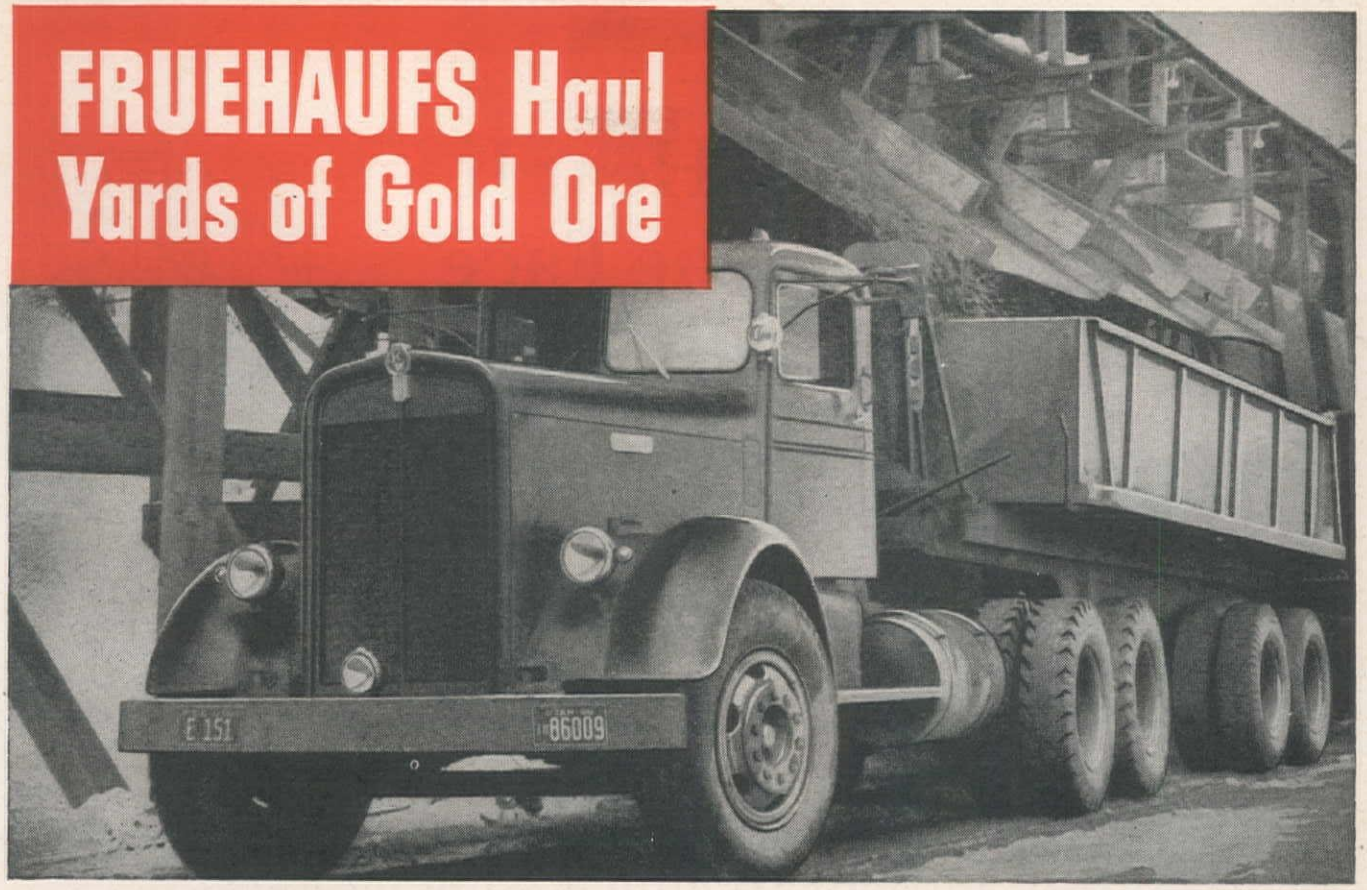
Concrete Pipe for Main Water Supply Lines, Storm and Sanitary Sewers, Subaqueous Pipe Lines

P.O. Box 3428, Terminal Annex, Los Angeles 54, California

QUALITY PIPE LINE PRODUCTS MANUFACTURED AND INSTALLED BY AMERICAN INCLUDE . . . LOCK JOINT CONCRETE CYLINDER PIPE, AMERICAN CONCRETE CYLINDER PIPE, PRESTRESSED LOCK JOINT CONCRETE CYLINDER PIPE, CENTRIFUGAL CONCRETE PRESSURE PIPE

Main Offices and Plant — 4635 Firestone Boulevard, South Gate, California • District Sales Offices and Plants — Oakland — San Diego — Portland, Oregon

FRUEHAUFS Haul Yards of Gold Ore



Silver and Other Metals also Get Trailer Ride

FROM the tipple of the New Park Mining Co's. Mayflower mine, Young's* fleet of Fruehauf Dump Trailers haul 16-20 cu. yd. loads of ore containing gold, silver, lead, copper and zinc 52 miles to a smelter at Midvale, Utah.

Gold and silver are "luxury" ores, but the hauling has to be done on a "copper" basis. Cost-pennies count, as a competitive form of transport is available. Mountain grades make operating conditions tough.

Young's knew what they would be up against on this job. They had to be extremely careful when selecting equipment. They knew that Fruehauf's I-Beam Axles of chrome-molybdenum steel had greater strength, although light. They knew the bearings were over-size and that the frame of high-tensile pressed steel could best withstand the shocks from tipple loading and the strains from twin-hoist dumping.

Young's bought Fruehaufs and have not been disappointed. They have been hauling ore profitably for over a year, because they chose the right make of Trailers—Fruehaufs. You, too, can haul bigger loads at a profit when you own Fruehaufs. Dumpers, Low-Beds, Tilt-Decks—any type of Trailer your job may call for are built by Fruehauf.

World's Largest Builders of Truck-Trailers

FRUEHAUF TRAILER COMPANY

Western Manufacturing Plant, Los Angeles

Sales and Service: Los Angeles • San Francisco • Portland • Seattle San Diego • Fresno • Sacramento • Spokane • Billings • Salt Lake City Boise • Phoenix • Albuquerque • El Paso • Denver

*Firm name—Harry L. Young & Sons

Hear Harrison Wood in "This Changing World"—every Sunday Afternoon over ABC. Consult your Local Paper!

FRUEHAUF Trailers

"ENGINEERED TRANSPORTATION"

WORLD'S LARGEST BUILDERS OF TRUCK-TRAILERS

You Hear It At The Face And In The Front Office

"ROCKMASTER "16" is the greatest improvement in blasting methods since ATLAS introduced milli-second blasting!"

IN UNDERGROUND WORKINGS, pits, quarries, and construction jobs you hear a lot of enthusiastic talk from men and management about the advantages of the ROCKMASTER "16" Blasting System.

For example, blasting men at the face talk about better breakage, savings in dynamite, better control of throw, quicker return to the face. And mining men talk about a safer roof—the result of the lack of vibration typical of ROCKMASTER "16" shooting. When this talk finds its way to the front office, it is quickly translated into greater safety for workers, less expensive handling and milling of rock, less degradation of coal, better rock-production at less cost.

Blasters everywhere—underground and on the surface—find that ROCKMASTER "16" helps them produce more material per pound of explosive. *Sixteen* periods—a wide choice of short or long milli-second delays—add up to better control over throw, back-break, and material size. And underground, *sixteen* delay periods firing in 550 milli-seconds mean less dust and a quicker return to the face . . . less strain on timbers and roof.

Ask your Atlas representative for the new ROCKMASTER booklet explaining how ROCKMASTER "16" fits into your operations.

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.

For greater

SPEED...

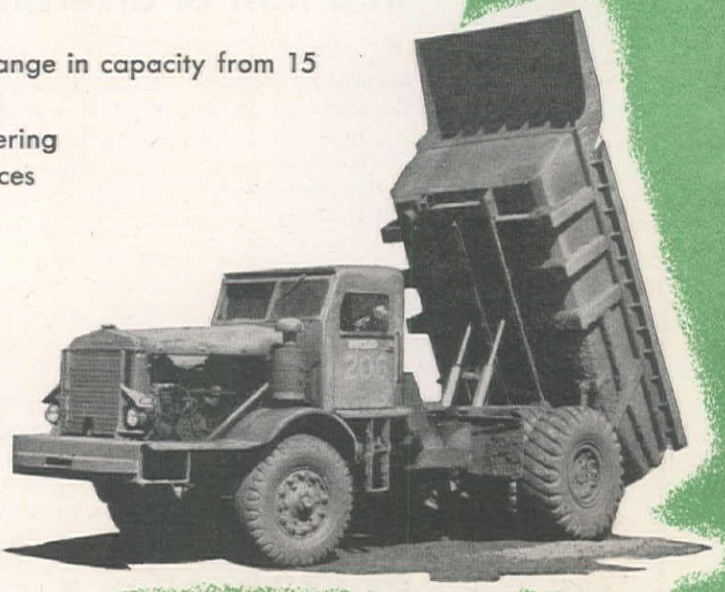
STABILITY...

SMOOTHER RIDING...

SPRING MOUNTED REAR-DUMP EUCLIDS

This new line of spring mounted Rear-Dump Euclids is designed for greater speed and stability on the haul road and long life in off-the-highway service. Heavy leaf springs are free floating in spring brackets to assure smooth riding and prevent breakage caused by twisting action on rough roads. Axles are positioned to the frame by longitudinal radius rods.

Rear-Dump Euclids with spring mounted drive axles range in capacity from 15 to 34 tons . . . diesel engines to 380 horsepower . . . and have travel speeds up to 32.2 m.p.h. Hydraulic booster steering assures positive control over all road conditions and reduces driver effort on sharp turns and rough hauls.

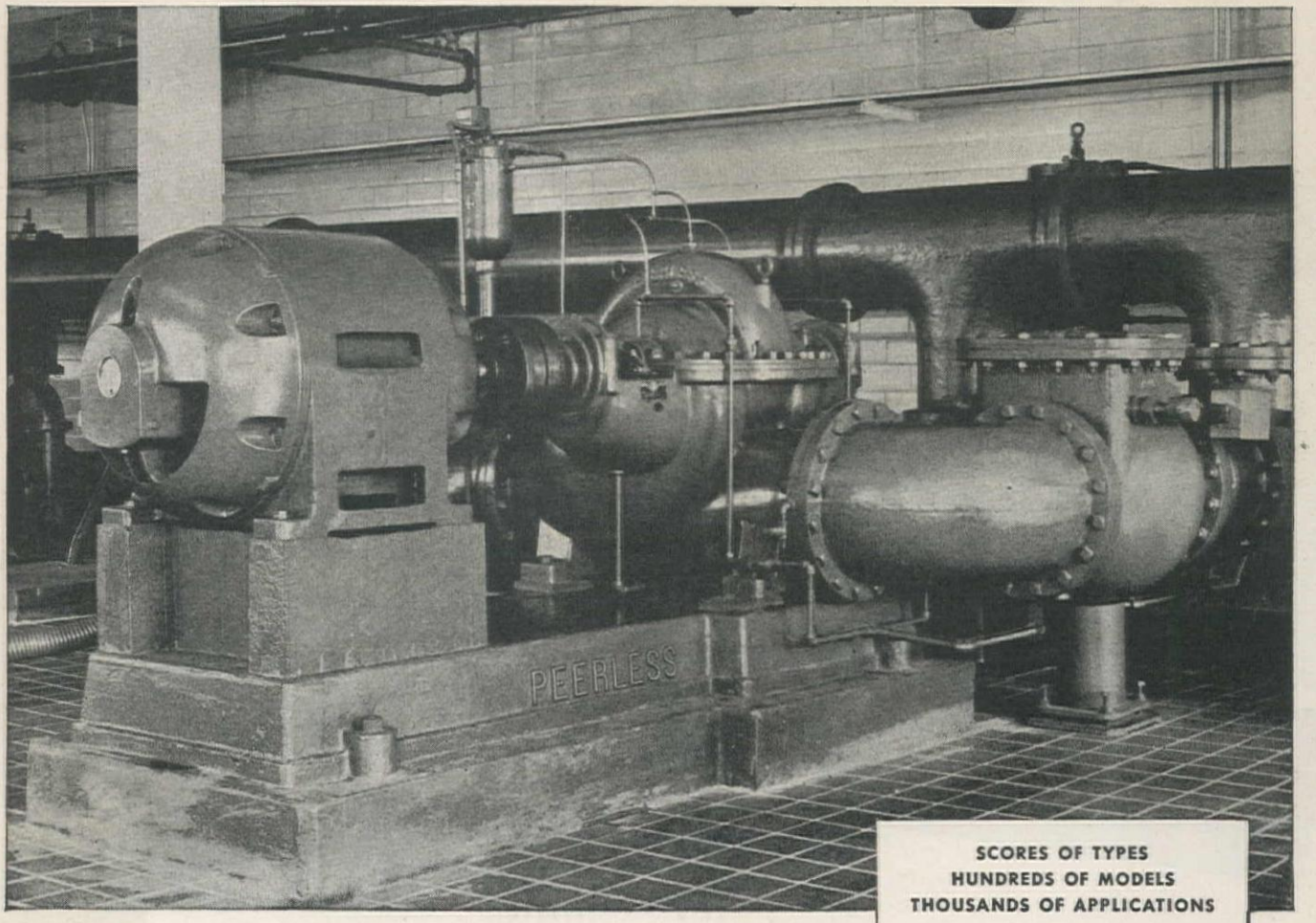


Built to the same high standards of construction and design that have made "Eucs" the favorite for tough hauling jobs, these improved models provide outstanding performance and lowest cost per ton or yard moved. Your Euclid distributor will be glad to show you how Euclid equipment can help cut your hauling costs and make more profit for you.

The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO

EUCLIDS *Move the Earth*

PEERLESS HORIZONTAL CENTRIFUGAL PUMPS



SCORES OF TYPES
HUNDREDS OF MODELS
THOUSANDS OF APPLICATIONS

Here are a few of the services which Peerless horizontal pumps can perform. Plan with Peerless. Request copies of the Bulletins you need by Bulletin number.

Pump Service	Bulletin No.
Water Supply	B-1300
Fire Protection	B-1500
Chemicals and Oils	B-810
Vaporous Liquids	B-2201
Butane-Propane	B-2200
Boiler Feed	B-806
Sewage and Solids	B-154
Hi-Pressure	B-310
Acids and Caustics	D-2400
Process Services	B-803
All-purpose Pumps	B-2301

For continuous or intermittent duty in a host of diversified services

Select the pump you need for the process you use from the diversified line of Peerless horizontal pumps. The pump shown above, a Peerless general purpose pump handling plant process water, typifies a host of efficient Peerless centrifugal pumps which are boosting output and cutting costs for manufacturers and municipalities everywhere. With its comprehensive line of horizontal pumps Peerless can handle chemicals or alkaline liquids, pump clear water or solids in suspension. There are pumps for fluids at high temperatures or they can furnish water or foam for approved plant fire protection. Peerless will move volatile butane-propane or tricky caustics and acids. Pumps are available for all practicable heads and capacities. Duty can be continuous or intermittent. Construction materials are suited to the liquid being pumped. And, backing up their installation qualified Peerless field engineering service is available in all principal cities to see that each pump matches or exceeds customer expectations. Write today for pump engineering information on your process or service. The chart at right lists a number of the types of Peerless horizontal centrifugal pump bulletins in which you will be interested.

Peerless
VERTICAL AND HORIZONTAL
Pumps

PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION
Los Angeles, California · Indianapolis, Indiana
District Offices: New York 5, 37 Wall St.; Chicago 40, 4554 N. Broadway; St. Louis 8, 3908 Olive St.; Atlanta Office: Rutland Bldg., Decatur, Ga.; Omaha, Nebr., 4330 Leavenworth St.; Dallas 1, Tex., 3905 Elm St.; Fresno, Calif.; Los Angeles 31, Calif.

LaPLANT-CHOATE MOTOR SCRAPERS

make earthmoving more profitable!

THESE are but a few of the outstanding profit-making advantages of the LPC Motor Scraper which let you carry 17½ heaped yards each trip, even in the heaviest materials. Higher speeds mean more trips per hour — per day — per year.

Bigger tires give you *surplus* traction and flotation in any type of material. And you get this better all-around performance with less wear and tear on the tires and with fewer tire replacements.

Add to these advantages the big new constant-mesh transmission — 12-cu. ft. piston type air compressor — 32 amp. generator — new and improved power control unit and controls. All these with the original high production features — double-acting hydraulic steering, four-wheel air brakes, curved offset cutting edge, low wide bowl, positive forced ejection, high apron lift, equal weight distribution, and many others — mean still lower costs per yard.

It will pay you to investigate all the money-making advantages of the Motor Scraper. See your nearest LPC Distributor now. Ask for a demonstration. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa — 1022 77th Ave., Oakland, California.

Compare..

	LPC Motor Scraper (225 H.P.)	Earthmover "A" (150 H.P.)	Earthmover "B" (200 H.P.)
H.P. per Struck Yard of Capacity	16.1	13.8	14.3
Price per H.P.	$124.00	$143.33	$135.00
Weight per H.P.	204 lbs.	194.6 lbs.	226 lbs.
Hauling Capacity in 3000 lb./yd. Without Tire Overload	13.4 yds.	10.9 yds.	8.44 yds.
Speed M.P.H.	19.3	17.3	16.8

INDUSTRIAL EQUIPMENT COMPANY OF SOUTHERN CALIFORNIA
4441 Santa Fe Avenue, Los Angeles 11, California

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

GENERAL EQUIPMENT COMPANY
1201 East 2nd Street, Reno Nevada

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

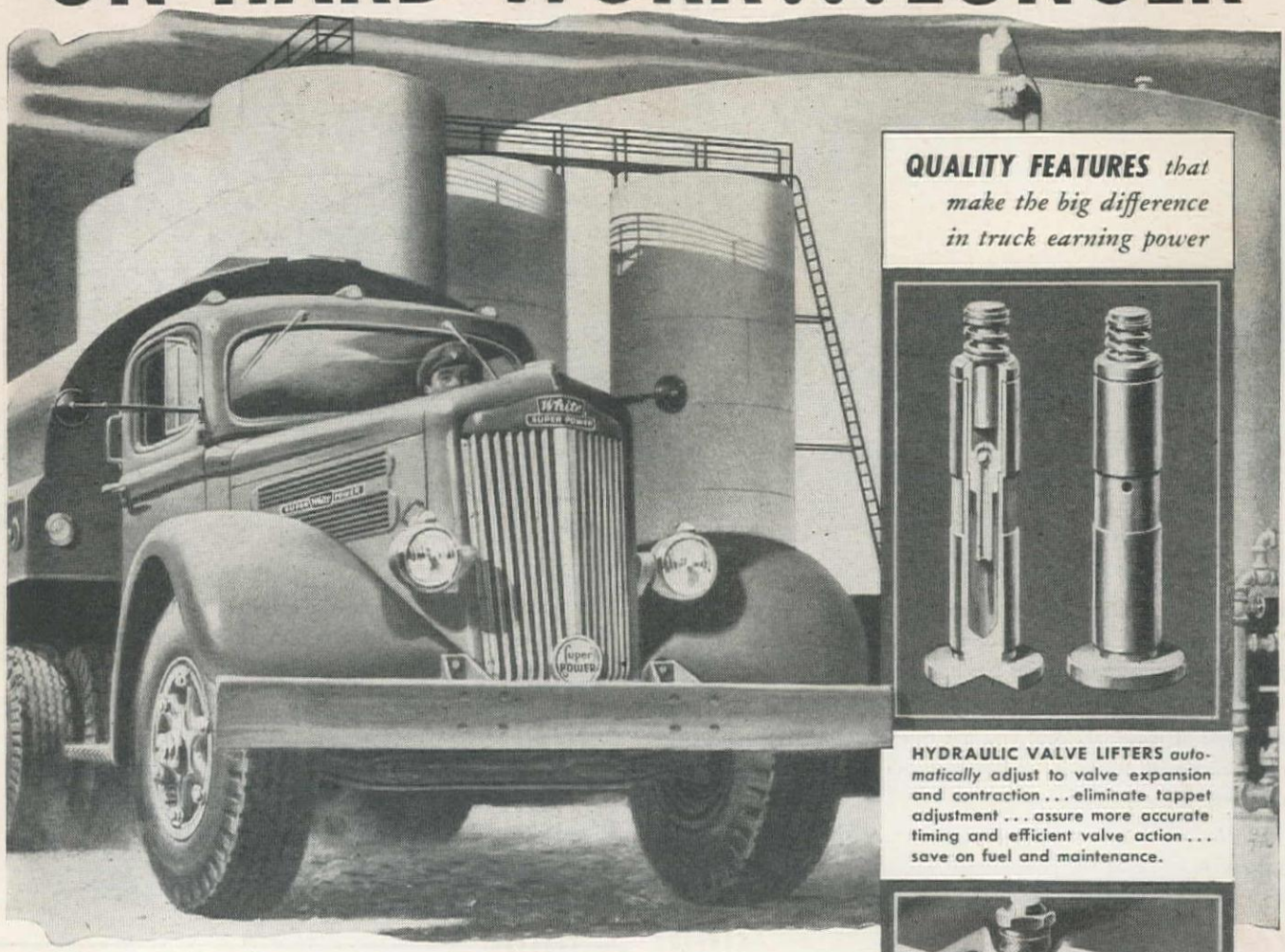
N. C. RIBBLE CO.
1304 N. Fourth Street, Albuquerque, New Mexico

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

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

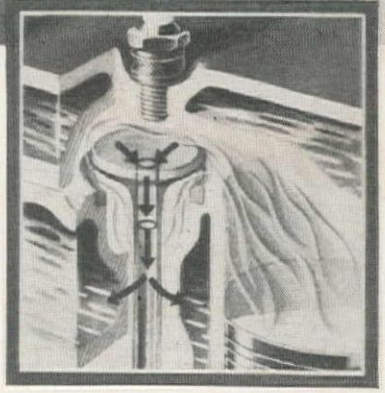
LaPLANT-CHOATE

HERE IS WHY WHITES THRIVE ON HARD WORK...LONGER



QUALITY FEATURES *that make the big difference in truck earning power*

HYDRAULIC VALVE LIFTERS *automatically* adjust to valve expansion and contraction . . . eliminate tappet adjustment . . . assure more accurate timing and efficient valve action . . . save on fuel and maintenance.



SODIUM COOLED VALVES are cool-running . . . eliminate warping . . . permit higher compression ratios . . . improve engine performance and save on fuel. Both valves and seats are stellite-faced for long life.

EARNING POWER . . . in a motor truck . . . comes from its high quality *plus* its exact fitness for the work it does. These two essentials—high quality and selectivity—are what make White Super Power the best investment you can make in truck transportation. Creative engineering has shaved dollars off their cost of maintenance . . . stepped-up their fuel economy and made million-mile records commonplace in high mileage types of service. When price and earning power are compared, the advantages of an investment in White Super Power become obvious. Let your local White Representative show you how Super Power, correctly applied to your own business, will *earn more, cost less.*

White

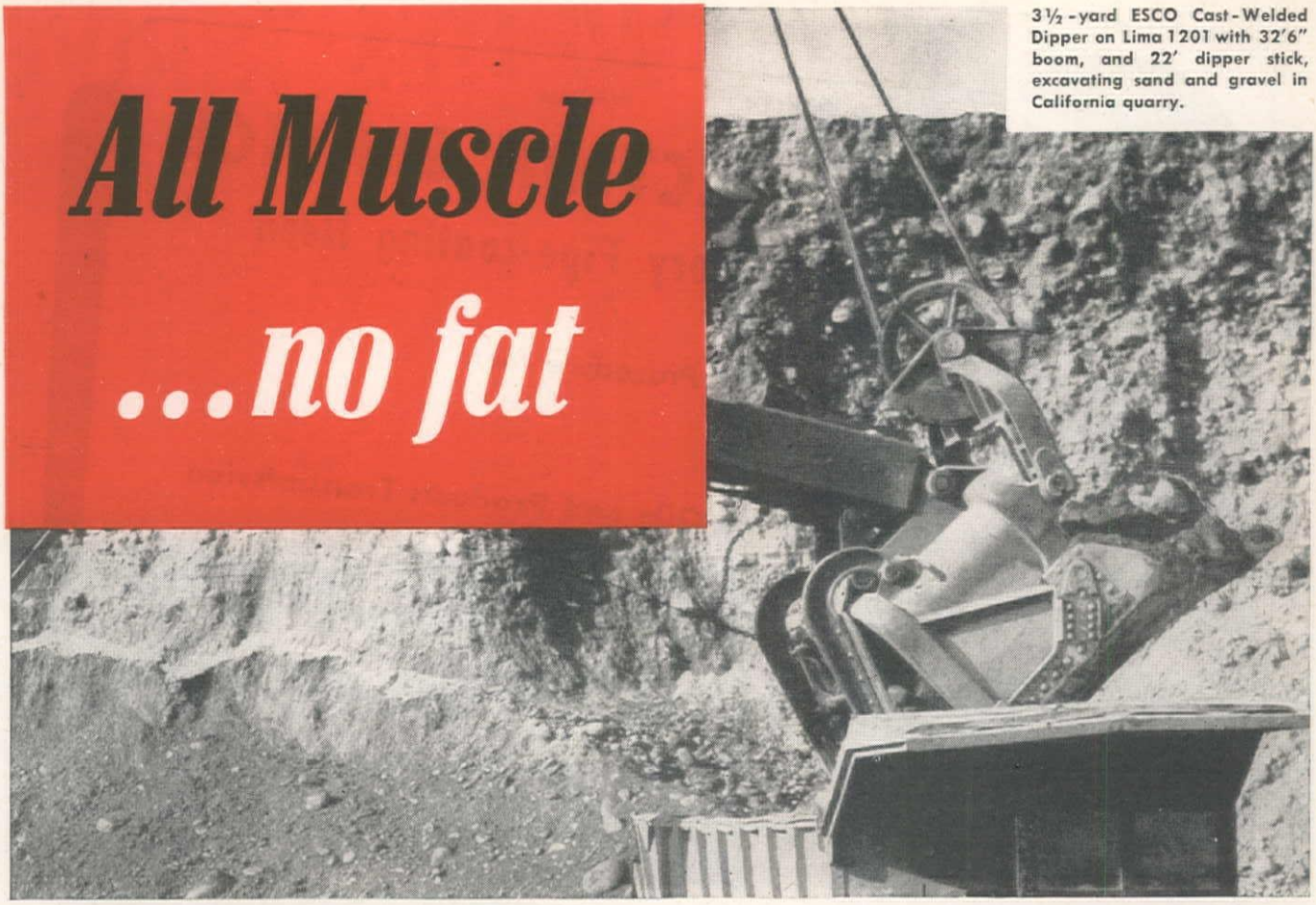
THE WHITE MOTOR COMPANY

Cleveland 1, Ohio, U. S. A.

THE WHITE MOTOR COMPANY OF CANADA LIMITED • FACTORY AT MONTREAL

FOR MORE THAN 45 YEARS THE GREATEST NAME IN TRUCKS

All Muscle ...no fat



3½-yard ESCO Cast-Welded Dipper on Lima 1201 with 32'6" boom, and 22' dipper stick, excavating sand and gravel in California quarry.

Strength to lick tough jobs, but without useless weight to slow down your digging—that is the story of the *ESCO* Cast-Welded dipper bucket shown here. It means that full fighting strength remains after excess weight has been engineered out. Or, in terms of your digging jobs, it means

Greater Capacity per Pound
More Passes a Day
More Payload per Pass

A close inspection of these buckets points out the basic reasons for the performance of *ESCO* Cast-Welded dippers. It shows

Manganese Steel for Wearing Parts
Cast Alloy Hollow Back Beams
Flaring Outside Teeth for Full Bite
Streamlined Dipper Front
Tapered Box for Easy Loading and Quick Discharge

Let your nearest *ESCO* representative tell you about this all-muscle-no-fat dipper bucket. Or fill in and mail the coupon for illustrated literature. Electric Steel Foundry, 2163 N.W. 25th Avenue, Portland 10, Oregon. 722 Porter Street, Danville, Illinois. Offices in Pottsville, Pa.; Eugene, Oregon; Chicago; Honolulu; Houston; Los Angeles; New York City; San Francisco; Seattle and Spokane. In Canada, *ESCO* Limited, Vancouver, B.C.

ESCO

Dragline, Dipper and Coal Loading Buckets

ELECTRIC STEEL FOUNDRY
2163 N.W. 25th Avenue, Portland 10, Oregon
Please send catalog on your Cast-Welded Dipper Buckets to:

Name_____

City_____ State_____

Address_____ Zone_____

Make and model of machines used_____

PROTECTION SERVICE
Covers Every Pipe-coating Need

Materials and Application Procedure for:

1. Water Industries
2. Natural Gas, Crude Oils and Products Transmission
3. Professional Application in Plants and Yards
4. Distribution Systems
5. Reconditioning Operations
6. Gathering Systems
7. Recycling Operations

Materials and Application Procedure for

RECONDITIONING OPERATIONS

It has been established that the cost of reconditioning an uncoated or poorly coated pipe greatly exceeds the cost of a good initial installation.

However, when replacement is not necessary or feasible, other measures may be used to restore the line to operating condition.

If the pipe is not too badly pitted, spot welding can restore the original wall thickness. In other cases, a half-sole is recommended. Cleaning, re-priming, re-coating and re-wrapping can be counted on to extend the usefulness of the line.

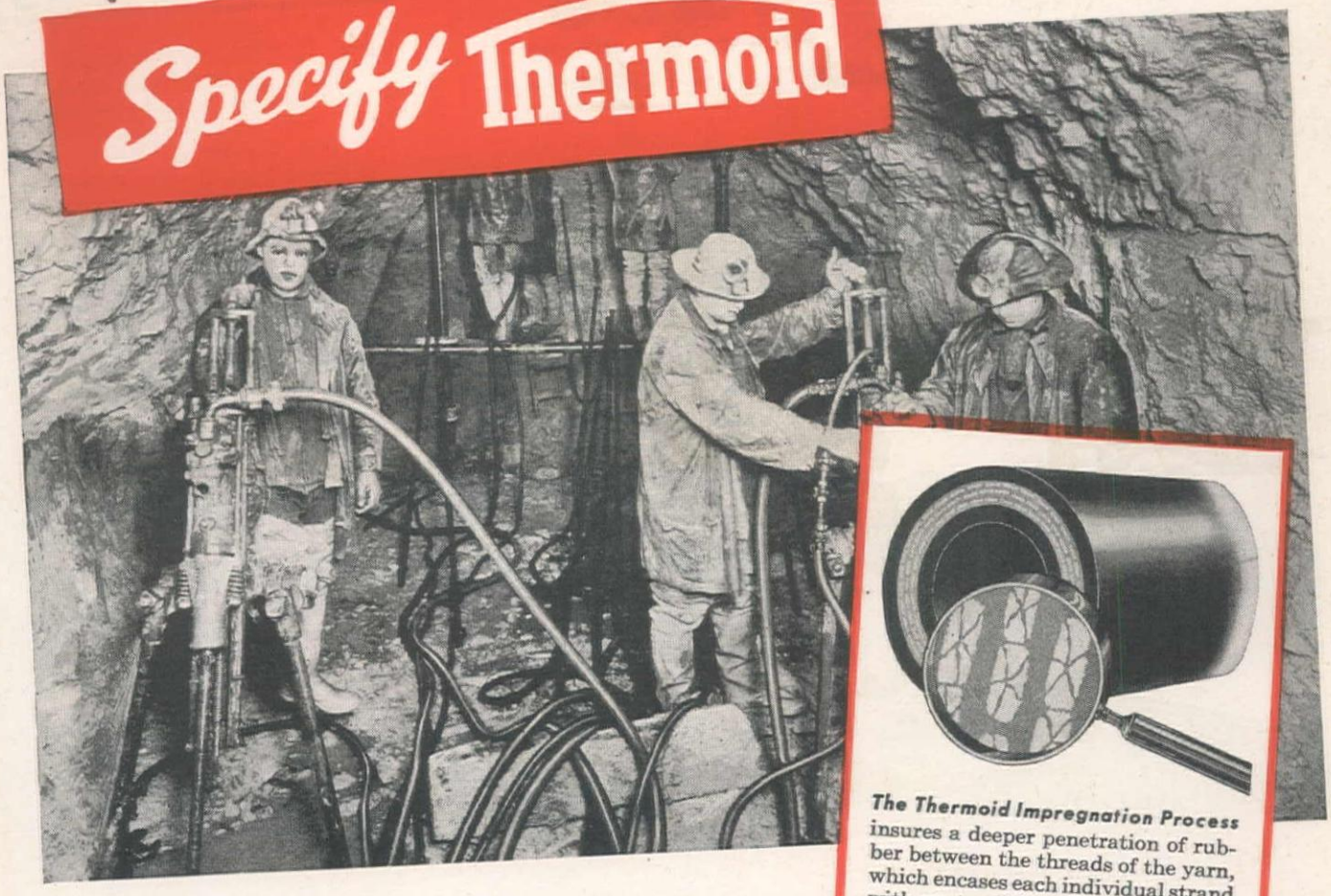
Barrett can furnish coating materials for every kind of reconditioning job. If you have any trouble spots in your pipelines, call on us for help. Our long experience is at your service.

Barrett can furnish coating materials for every kind of reconditioning job.

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

*Reg. U. S. Pat. Off.

Specify Thermoid



New Air Hose For Mine Service

From Thermoid's planned program of product development and improvement—a new air hose for mine use. Specifically designed for this exacting requirement—field proven in actual operation—it offers the maximum in trouble-free service. Heavy synthetic rubber oil-proof tube—rayon cord reinforcement for greatest strength and flexibility—smooth extra heavy rubber cover for maximum resistance to abrasion and cutting from sharp rocks.

Mandrel-built to assure uniform inside diameters. All sizes from ¼″ to 1½″ inclusive in 50′ lengths. Available from your nearest Thermoid distributor or if you prefer write us for additional information.

It will pay you to *Specify* Thermoid!

Thermoid Quality Products: Transmission Belting • F.H.P. and Multiple V-Belts • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Molded Products • Industrial Brake Linings and Friction Materials.

The Thermoid Impregnation Process insures a deeper penetration of rubber between the threads of the yarn, which encases each individual strand with protective rubber. The rubber acts as a sheath between the strands and prevents the destructive abrasive action as the product is flexed in use. To obtain the required rubber penetration, the twist of the yarn must be to exact specifications. With the yarn twisted too tightly, proper penetration of the rubber compound is impossible. This condition produces abrasion, causing premature failure. On the other hand, if the yarn is twisted too loosely, the product lacks tensile strength. Thermoid has discovered the optimum twist of the yarn which assures maximum rubber penetration and greatest strength. The development of Thermoid Impregnation Process is another step forward in Thermoid's planned program of product improvement, assuring maximum service and lower operating costs to industry through the use of Thermoid Industrial Rubber Products.

Thermoid Company

Western Offices and Factory • Nephi, Utah, U.S.A.

Main Offices and Factory • Trenton, N. J., U. S. A.

Industrial Rubber Products • Friction Materials • Oil Field Products

The Mail Bag...

Editor, Western Construction News

I am delighted to read the paper by J. R. Benson on buried asphaltic membrane canal lining, which appeared in your Sept. 15 issue.

Recently I spent one month inspecting irrigation projects in Alberta and Saskatchewan, Canada, with special reference to canal lining needs and the possibility of reducing drainage costs by adequate lining. Some of the older projects are in urgent need if lining. On the newer projects in Saskatchewan where perhaps one-half million acres will be brought under irrigation in the next few years, adequate canal lining will greatly reduce drainage costs.

On my return from Regina to Logan, I stopped at Casper, Wyoming, and also at Riverton and Pavillion and inspected the condition of the lining described by Benson, and submitted detailed reports to E. A. Olafson, engineer for the Canadian work. His organization has recently decided to line one mile of canal. We may perhaps interest Mr. Olafson in making a report of this lining for publication in *Western Construction News.*

We are continuing and enlarging the laboratory experiments at Logan.

O. W. ISRAELSEN
Research Professor of
Irrigation and Drainage,
Utah State Agricultural College
Logan, Utah.

Editor, Western Construction News

I enjoyed your editorial on county road work in the Sept. 15 issue, but in one respect must take exception in your recommendation that the $3,000 limitation on force account be raised to $10,000.

Our experience has been that if you "give an inch, you give a mile," and through the practice of pyramiding work orders the municipal agencies get around the maximum figure, no matter what the dollar valuation is.

As you know, this chapter has introduced legislation on many occasions, attempting to hold the force account expenditures to an absolute minimum, as well as making it a misdemeanor for counties or other authorities to pyramid their work orders.

The maintenance problem is a bad one, particularly as related to the State Highway Department in its ever-expanding maintenance of roads. Many of the alleged works of this type could be readily done by contractors and particularly at this time, when competition is keen, we believe the state would receive many bids and the work would be pursued in a more expedient and economical manner than when done by the force account method.

W. D. SHAW
Manager, Southern California Chapter,
Associated General Contractors
Los Angeles, Calif.

Barber-Greene

Sensational

NEW CAR UNLOADING TEAM!

54718

unloads car of rock or crushed stone in 45 minutes

358 B-G HOPPER CAR UNLOADER

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

363 B-G PORTABLE CONVEYOR

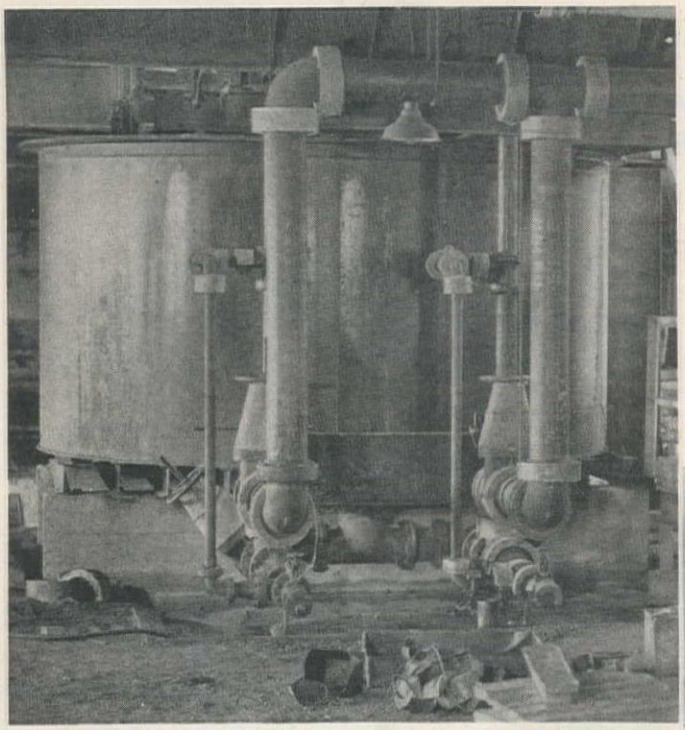
The newly designed B-G Model 363 Portable Conveyor is an extremely flexible machine that will prove to be profitable to yards, industrial plants, contractors, etc. Speeds up stockpiling or transfer of material from car or stock pile to trucks. Entirely new in design, the 363 features V belt drives, pneumatic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

84

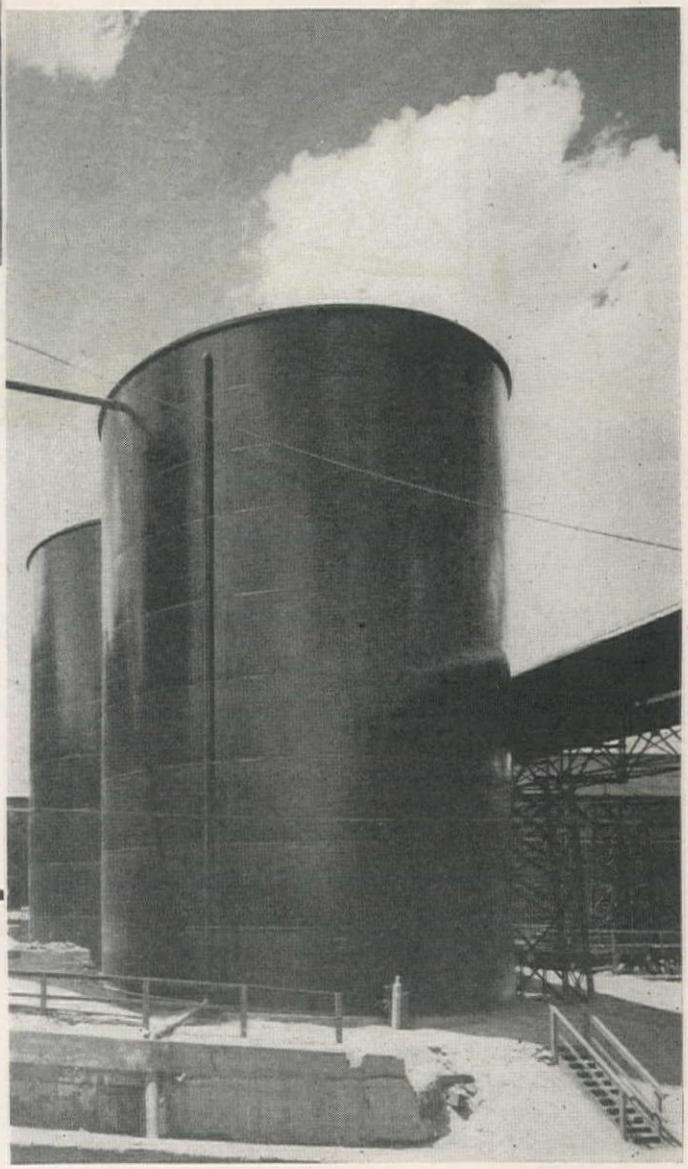
BARBER · GREENE COMPANY · AURORA, ILLINOIS

FOR SALE BY:

BROWN-BEVIS EQUIPMENT CO., Los Angeles 11, California; COLUMBIA EQUIPMENT CO., Spokane, Washington, Seattle, Washington, Boise, Idaho, Portland 14, Oregon; WILSON EQUIPMENT & SUPPLY CO., Cheyenne, Wyoming, Casper, Wyoming; CONTRACTORS' EQUIPMENT & SUPPLY CO., Albuquerque, New Mexico; RAY CORSON MACHINERY CO., Denver 9, Colorado; JENISON MACHINERY CO., San Francisco 7, California; WESTERN CONSTRUCTION EQUIPMENT CO., Billings, Montana, Missoula, Montana; KIMBALL EQUIPMENT COMPANY, Salt Lake City 10, Utah; STATE TRACTOR & EQUIPMENT CO., Phoenix, Arizona.



from Acid to Water



GARFIELD PLANTS USE CB&I EQUIPMENT

In one plant, it's acid—in another, water. At both plants, it's C B & I-built equipment that is relied upon to handle vital processing or storage assignments. The 13-ft. diam. by 7-ft. high tank shown above is a receiver for the concentrated sulphuric acid produced in an acid recovery plant in Garfield, Utah. The two 45-ft. diam. by 66-ft. high tanks shown at the right will supply water for a new anode casting plant now under construction at Garfield.

Expansion is the normal thing in the West. To keep pace with that growth, we have recently built a new plant in Salt Lake City to make our full line of products. Whether you handle acid, water, ammonia, white liquor, or almost any other material, we can supply the Horton tank you need quickly and economically.

STEEL PLATE STRUCTURES BUILT BY CB&I

Elevated Tanks	Hortonspheroids	Reservoirs
Flat-Bottom Tanks	Marx Savealls	Vapordomes
Hemispheroids	Pressure Vessels	Vaporspheres
Hortonspheres	Refinery Towers	Waterspheres

CHICAGO BRIDGE & IRON COMPANY

Atlanta 3.....2183 Healey Building	Detroit 26.....Lafayette Building	Philadelphia 3.....1700 Walnut Street Building
Birmingham 1.....1598 North Fiftieth Street	Houston 2.....National Standard Building	Salt Lake City 1..1555 First Security Bank Building
Boston 10.....201 Devonshire Street	Havana.....402 Abreu Building	San Francisco 11....1213—22 Battery St. Building
Chicago 4.....McCormick Building	Los Angeles 14..1544 General Petroleum Building	Seattle 1.....1355 Henry Building
Cleveland 15.....Guildhall Building	New York 6.....165 Broadway Building	Tulsa 3.....Hunt Building

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

WESTERN CONSTRUCTION NEWS
WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER
October 15, 1949 Vol. 24, No. 10

The Cities of the West

MUNICIPALITIES and their problems are the theme of this issue of *Western Construction News*. The table on page 61 demonstrates the remarkable growth of some 32 typical Western cities. Never before in history has a region so large geographically experienced such fabulous expansion. Half of the nation's area is included in this region whose cities have averaged 31% growth in the last 8 years.

And this growth is not unsound. The people are working; farms and mines and factories are producing; transportation systems are crowded; construction is booming. All of these are favorable facts, but naturally the last-named is of most interest to *Western Construction News* and its thousands of readers.

The construction is not an unusual or artificial matter. Every new family that comes to the West needs a house to live in. It needs water, electricity, gas, telephone, sewers. It must have a road to connect it to the world. Its children need a school and a church to attend. There must be factories to supply it with furniture and other equipment. Its market must stock so much more food, which means that more land must be irrigated and farmed.

As more and more families come, and the city grows, new sources of water and power must be found. Streets must be made safe and useful. Sewage must be disposed of, garbage burnt. Rapid transportation must be provided; flood-endangered areas must be protected; recreational facilities must be provided, and so on and on and on.

In the provision of these facilities, and their management, operation, and maintenance, there is need and opportunity for an almost unlimited number of civil engineers and construction men. "Municipal engineering" was an almost unknown science in the West until very recently, except in a very few of the largest communities. Suddenly in scores and scores of towns the recent growth has made scientific attention to the details of municipal government necessary. Specialist engineers in all branches are finding adequate opportunity to use their talents in Western cities these days. Contractors of every specialty and every size are busy with jobs which vary from paving a single city block to the construction of great dams, water supply facilities, and power systems.

It is obviously impossible to include in the pages of a single issue of *Western Construction News* information on all the projects now under way in Western cities, but we have striven to select a few typical examples of municipal problems and the way various Western communities are meeting them.

Sewage disposal plants, one of the greatest needs in the West today, are occupying the time and attention of many engineers and contractors, and works of this kind in California, Colorado, and Washington are discussed. Two pertinent articles deal with the almost fantastically intricate problem of handling traffic. The location of municipal airports is outlined by an expert in that field. Street lighting, water supply, storm drain construction, the removal of an unsightly downtown hill, are other matters presented to our readers.

And finally, in tribute to the scores of well-trained, competent, conscientious city engineers striving to the limit of their ability to cope with the avalanche-like influx of population and the problems it has brought, brief biographies of five typical men in this field are presented. To these five, and the many others like them, unlimited praise, honor, and respect is due for their masterful efforts and monumental accomplishments. They've a tough job to do and they do it remarkably well.

The President Says "Whoa!"

EVEN PRESIDENT TRUMAN is disgusted with certain policies of the Bureau of Reclamation, if his recent messages on the Weber Basin project in Utah, the Vermejo project in New Mexico, and the Central Valley project in California, are to be believed.

The President "reluctantly" approved the Weber project and vetoed the Vermejo, but attached to his approval of the first a strong protest to the Senate covering the same points for which he vetoed the second. His disapproval in each case was based on the tendency of the Bureau to seek non-reimbursable funds from sources not approved by Congress, extension of the period of repayment beyond the legal period, and the failure to consult with other interested agencies as it was instructed to do in accord with the Flood Control bill of 1944.

Specifically, the President, who in the past has gone along rather docilely with Interior Department proposals, objected to extension of repayment to 60 years in the Weber case and 74 years in Vermejo; forcefully pointed out that in both cases the Bureau had failed to discuss with or refer flood control proposals to the Corps of Engineers, which is responsible for and trained in this work, or agricultural and irrigation features with the Department of Agriculture; criticized the Bureau for assigning huge proportions of the cost to recreational development and sediment control (both to be non-reimbursable) without Congress having amended the Reclamation law to permit such cost allocations; and finally, in the Weber case, declared that he would not request any appropriations until "it is known as surely as possible what is going to be done, how much it will cost, and how much is going to be repaid and when."

In a separate action, the President on Aug. 15 tentatively accepted from Interior Secretary Krug the "comprehensive development" program for water resources of California's Central Valley, but again put in qualifying paragraphs. He said of the report, it does "not contain sufficient information with respect to engineering and economic feasibility to justify approval as a comprehensive valley plan."

We can only say "Good for Harry!" He is going to call a halt to the extravagant and lightly-considered programs of the Bureau. In this matter we stand squarely with what the President indicates in his messages: that every acre of land in the West that can be brought into production through irrigation should be so developed, providing it can be done with true engineering and economic feasibility. The supply of water to desert land just to provide work for an army of bureaucrats, and at a cost which cannot possibly be repaid by the value of the crops which may be grown, is to be heartily condemned. To protest against such illogical planning and uneconomic construction is not being untrue to the West, it is rather being loyal to this great Empire. No unit incapable of holding its own financially ought to be encouraged.

"Good for Harry."

DON'T *Handicap* YOUR HORSEPOWER

A Motor Grader with ALL-WHEEL STEER *is twice as maneuverable* as one with front steer only

Short radius curves and sharp corners are no problem. Making a ditch cut around the corner shown in the picture above is easy for the A-W operator—impossible with any other grader.

Austin-Western "88-H," "99-H" and Master "99" Power Graders travel quickly and easily to places inaccessible to ordinary graders, maneuver around obstructions such as culverts, bridges or poles, grade sharp reverse curves, and move the heaviest windrows farther and faster with no interference from front axle, frame or scarifier. All-Wheel Steer saves time on every job, makes it possible to do more jobs—faster, easier and cheaper, under all ground and road conditions every month in the year.

AUSTIN-WESTERN COMPANY • AURORA, ILLINOIS, U.S.A.

Using All-Wheel Steer to offset the front and rear trucks enables the A-W machine to do superb finishing on any slope. In the picture above, the grader is finishing an inslope, working up from the ditch, leaving no tire marks to mar the surface.

Offsetting the grader through All-Wheel Steer neutralizes side thrust. In the photo above, the rear drivers push behind the "toe" of the blade, the front drivers pull ahead of the "heel." All wheels stay clear of the heavy windrow.

Ditches too wet, or too muddy, to furnish traction for ordinary graders are handled easily by the A-W machine as in the photo above. Rear Steer puts the back wheels up where the "going is good"—*but only Rear Steer can do it.*

ARIZONA—SHRIVER MACHINERY COMPANY.....*Phoenix*
CALIFORNIA—EDWARD R. BACON COMPANY.....*San Francisco 10*
CALIFORNIA—SMITH BOOTH USHER COMPANY.....*Los Angeles 54*
COLORADO—LIBERTY TRUCKS & PARTS COMPANY.....*Denver 1*
IDAHO—COLUMBIA EQUIPMENT COMPANY.....*Boise*
MONTANA—WESTERN CONSTRUCTION EQUIPMENT CO.....*Billings*
MONTANA—WESTERN CONSTRUCTION EQUIPMENT CO.....*Missoula*
NEVADA—C. D. ROEDER EQUIPMENT COMPANY.....*Reno*
NEW MEXICO—N. C. RIBBLE COMPANY.....*Albuquerque*
OREGON—COLUMBIA EQUIPMENT COMPANY.....*Portland 14*
UTAH—WESTERN MACHINERY COMPANY.....*Salt Lake City 13*
WASHINGTON—COLUMBIA EQUIPMENT COMPANY.....*Seattle*
WYOMING—WILSON EQUIPMENT & SUPPLY COMPANY.....*Cheyenne*

POPULATION GROWTH OF TYPICAL WESTERN CITIES

CITY	1930 pop.	1940 pop.	1948 pop.	% increase 1940-48	CITY	1930 pop.	1940 pop.	1948 pop.	% increase 1940-48
Los Angeles	1,238,048	1,504,277	1,921,200	28	Pueblo	50,096	52,162	62,200	19
San Francisco	634,394	634,536	785,900	24	Salem	26,266	30,908	51,500	66
Seattle	365,583	368,302	502,500	36	Tucson	32,434	36,818	50,000	36
Portland	301,815	305,394	407,100	32	Albuquerque	26,570	35,449	46,000	28
Oakland	284,063	302,163	402,800	33	Great Falls	28,822	29,928	42,300	41
Denver	287,861	322,412	365,500	13	Klamath Falls	16,093	16,497	38,400	133
San Antonio	231,542	253,854	360,300	42	Eugene	18,901	20,838	37,900	82
San Diego	147,995	203,341	310,800	53	Cheyenne	17,361	22,474	36,000	60
Long Beach	142,032	164,271	256,400	56	Boise	21,544	26,130	31,300	20
Tulsa	141,258	142,157	181,100	27	Casper	16,619	17,964	27,300	52
Salt Lake City	140,267	149,934	170,200	13	Reno	18,529	21,317	26,200	23
Spokane	115,514	122,001	157,800	29	Provo	14,766	18,071	23,600	31
Sacramento	93,750	105,958	123,700	17	Roswell	11,173	13,482	21,200	57
El Paso	102,421	96,810	120,600	25	Idaho Falls	9,429	15,024	18,100	20
Phoenix	48,118	65,414	90,000	37	Las Vegas, Nev.	5,165	8,422	17,500	103
Fresno	52,513	60,685	75,200	24	Grand Junction	10,247	12,479	15,100	21

Problems in Municipal Engineering Created by 30% Population Growth

PEOPLE REPRESENT a major factor in appraising future construction activity. They are the force which creates the demand for public works needed to provide transportation, water supply, power and sanitation, as well as being a direct measure of all types of building activity. Secondary effects of population on construction extend to the needs for flood control, recreational facilities and industrial development.

When people occupy a region such as the West with rugged physical characteristics, including long distances between logical places for settlement, high mountains, wide deserts and deficiencies in water supply, engineering skill and construction efforts must be focused on such projects as bridges, aqueducts, highways, storage reservoirs and other facilities usually placed under the general classification of "public works." Such developments, which are extremely costly per capita in this region must precede, and cannot follow, any substantial growth in population. Only after these fundamentals of modern civilization have been provided, has the scene been set for the next stage in regional growth.

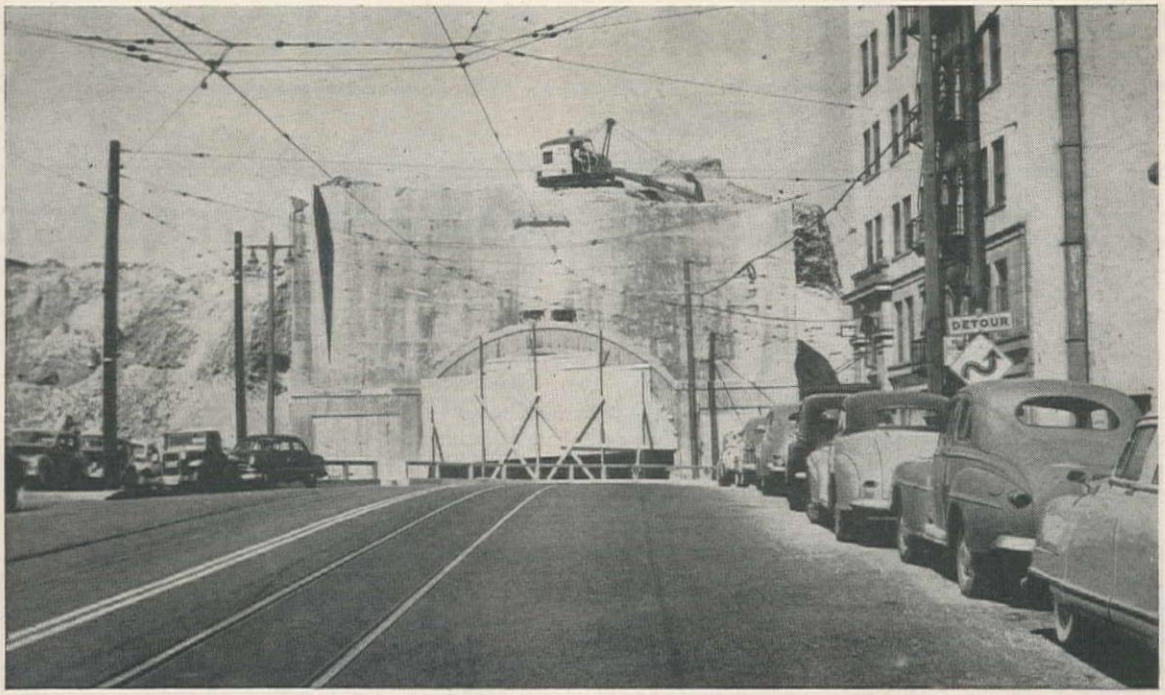
For the first four decades of the century the West was occupied in developing its facilities for modern living. During these years the population growth in Western cities may have averaged about 10% per decade, which exceeded the rate of urban growth in many sections of the country but did not introduce severe municipal problems. Engineering efforts remained intent on supplying basic needs for communities. Municipal engineering, as it was known in the East, was needed in a relatively few locations.

During the last decade the regional development of the West has been passing through a distinct second stage. Municipal growth for typical Western urban areas, according to U. S. Census figures, shows an average growth of about 30% since 1940 (see above). Now, for the first time many small Western towns are confronted with municipal problems. The medium size communities of the 1930's have found their modest programs for civic development completely inadequate, and are struggling to develop new long-range plans. And the few large metropolitan areas, which had been of sufficient size to require formal municipal engineering efforts in line with a fixed rate of growth, have suddenly been overwhelmed by population increases completely outstripping any program for meeting normal expansion. Overnight, almost, towns have become cities.

Today, the West represents a region where municipal engineering will receive its severest test during the next few years to provide these fast-growing communities with adequate facilities for modern urban living. Further, the increase in population has created the need for further re-evaluation of the basic requirements for large-scale public work in all its many phases.

The West has completed two stages in its development, which are of significance to engineers and contractors, and is entering the third. First came the pioneering years of construction to provide facilities which would permit the growth of the region. Second, there has been witnessed during the past ten years the amazing increase in population made possible by these facilities and introducing major problems in municipal engineering throughout the region. Third, in the immediate years to come, there will be a two-fold responsibility in meeting the problems of urban development and at the same time providing the expansion in public works which will be demanded at a direct result of the record immigration of the 1940's.

Growing up as it has with these expanding communities, and keeping pace with them in reporting their activities, *Western Construction News* presents in this issue a few of the problems being faced by Western municipalities, and the methods they have adopted to solve them.



WORK STARTS on the south end of old Broadway Tunnel, which was removed as part of the project that removed Moore Hill. The populated district precluded the use of blasting to remove the concrete of this famous structure first opened in 1901.

Removing a Million Cubic Yard Hilltop for—

Hollywood Parkway Grading Project

Landscape feature of downtown Los Angeles removed by shovel-and-truck operation — Old Broadway tunnel concrete demolished by hydraulic pressure equipment

By
THOMAS A. DICKINSON
Los Angeles, Calif.

FAITH ALONE may move a mountain, a poet once wrote; but, as a regiment of sidewalk superintendents in downtown Los Angeles can attest, modern construction equipment is an excellent accessory when it's necessary to move a hill.

Evidence to substantiate this conclusion is being convincingly provided for the unofficial supervisors by Guy F. Atkinson Co. of Long Beach, Calif., in conformity with the terms of a $914,158 contract issued last January—wherein the California State Department of Public Works, Division of Highways, specifies the removal of Fort Moore Hill from a location near Los Angeles' civic center to a less-conspicuous site adjacent to Bishop's Road, some three miles distant.

Purpose of the project is to provide reasonably-level terrain for the great Hollywood Parkway, which is currently in the intermediate stage of construction. Almost a million cubic yards of earth will be relocated when excavation operations are complete, and Fort Moore Hill will be a gently-sloping mound — whereon a small monument may eventually recall the hill's significance in California history.

One hundred years ago

Fort Moore Hill got its name from an army outpost, for which its peak was selected as a strategic location by Lt. William H. Emory of General Stephen W. Kearny's staff. The fort, in turn, was named in memory of Capt. Benjamin D. Moore of the First United States Dragoons, who was killed by a lance thrust in the bloody battle of San Pascual in 1846. Dedicated on July 4, 1847, it had a 400-ft. breastwork with bastion for six cannons in barbette and housed a garrison of 100 men.

Soon after the California gold rush in 1849, Fort Moore was abandoned and its facilities were reconstructed for use as a gallows with which the City of Los Angeles terminated the activities of many early-day horse thieves and bandits. Then, as responsibility for capital punishment was assumed by the state, the fort served as a terminal station for pony express riders until the pony express system was forced to go out of business—after which Fort Moore Hill became a choice residential district with ornate houses such as the old Banning home dominating downtown Los Angeles.

In recent years, the once proud homes of the wealthy have become a collection of tottering old structures, while all around the base of the hill some of the most modern office buildings in the United States have sprung up; and, for this reason, its "decapitation" is being mourned by no more than a group of old-timers who still believe an ancient legend which identifies the hill as a hiding place for a fortune in stolen gold.

Pirate's gold?

"As a matter of fact," smiles R. A. Collins, resident engineer in charge of the hill-removal project for the state, "we could probably level Fort Moore Hill with free manual labor, if we had enough time and could grant digging permits to all the citizens who think they know where to find a cache of gold. It's still possible that their legend has some basis in fact, but a careful analysis of local history makes it seem very improbable. We've removed more than 100,000 cu. yd. of the hill so far without

finding even a small deposit of low-grade gold ore."

Workers on the project experienced a flurry of excitement when they recently uncovered a shaft of unidentifiable origin, which extended more than 50 ft. into the earth, but no long-dead pirate's treasure could be found. Supervisors believe the tunnel was dug by some energetic citizen who wanted to find a fortune, but some of the more hopeful employees are still keeping their eyes on the tunnel-site — hoping that part of the original opening has caved in and concealed the legendary gold at a greater depth.

Meanwhile, the most valuable contents of the hill appear to be large deposits of soft shale rock, lying in thin strata with a vertical south-to-north tilt of about 20 deg. at depths ranging from 75 to 90 ft. This rock is being stockpiled, and may eventually be sold to ceramic manufacturers for use as raw materials in the production of sewer pipe, etc.

Also being stockpiled is a 27-ft. thick topsoil layer of granular earth. This will be used as a subbase material on sections of the Hollywood Freeway.

Progress in excavating Fort Moore Hill has thus far been hampered by a number of problems, among which the following are of major importance:

(1) All streets in downtown Los Angeles carry such a large volume of traffic that none of them could be completely closed for construction work. This necessitated the use of alternate streets before various operations could begin.

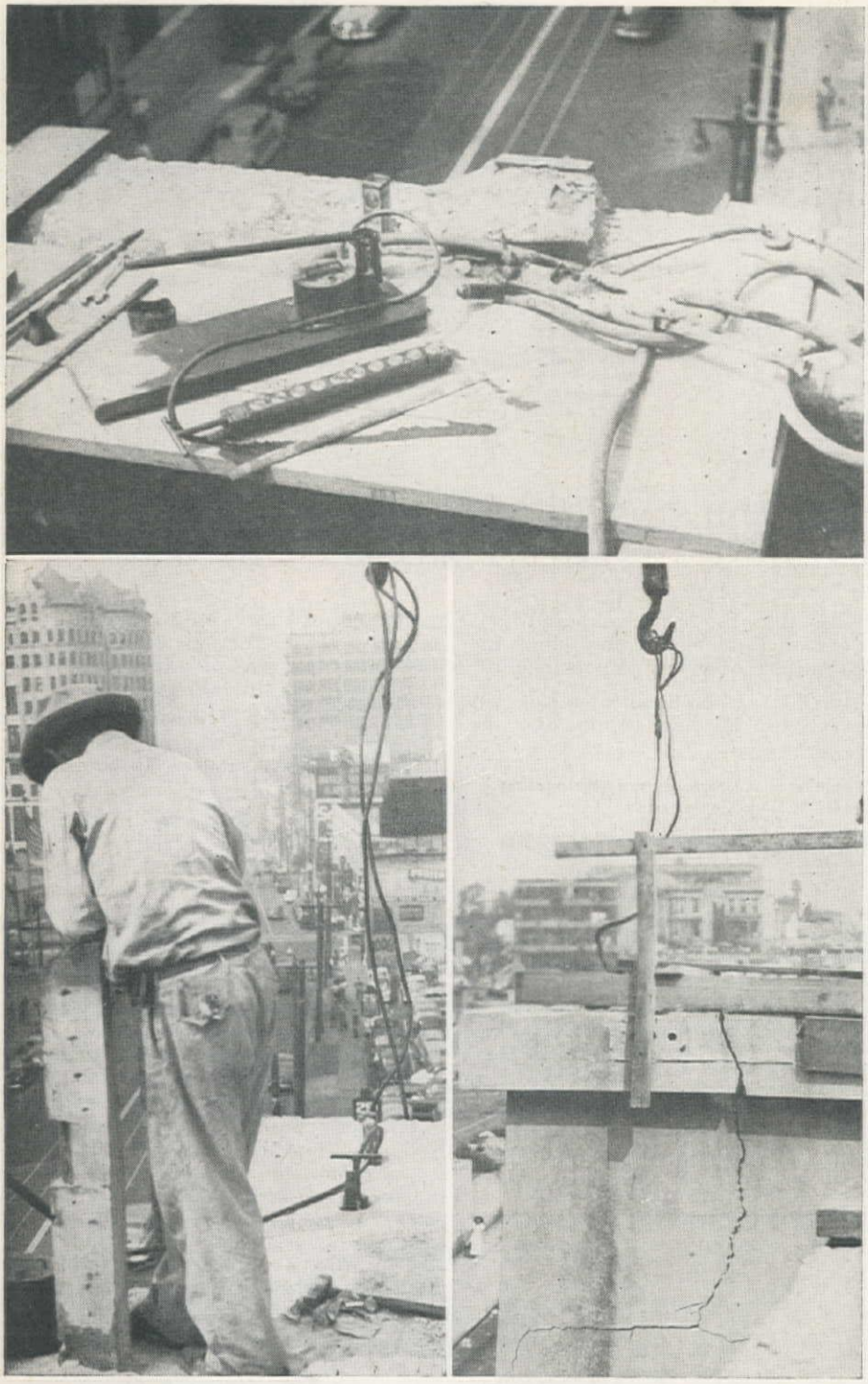
DETOUR ROUTE for vehicles normally using Broadway tunnel prevented interference of downtown traffic with the leveling project. Los Angeles City Hall in the background, at left.

FORT MOORE HILL from the air, showing the general vicinity of the removal project, together with location of Hollywood Parkway and intersecting streets in Civic Center area.

(2) Fort Moore Hill is in a heavily-populated district where considerable damage could be caused by landslides, blasting, etc. This necessitated the use of special equipment as well as the most tedious excavation techniques.

(3) A double-ceiling tunnel penetrated the base of Fort Moore Hill. This tunnel was originally constructed with a single ceiling at a cost of $85,747 and opened for traffic on August 26, 1901. Then, because of unsatisfactory structural features, including a 6% grade, it was reconstructed as a sort of tunnel within a tunnel at a cost of $184,000, in 1910 and 1911 by Lynn Atkinson, Sr., and company. Lynn is the brother of Guy F. Atkinson, whose company now has the job of obliterating Fort Moore Hill and the tunnel. In addition to providing work hazards for project construction men, this tunnel necessitated the preparation of a paved detour to shunt its traffic around the base of Fort Moore Hill before it could safely be destroyed.

Although the hill removal contract is being handled by the State Division of Highways, it is a cooperative project with state, county, and city budgets sharing financial responsibility because the work being performed will benefit all three governmental divisions. A three-party agreement, arranged prior to the award of the contract, called for exchange of properties in addition to the removal of buildings and provided that the state should pay for that portion of grading, Broadway tunnel removal, and new bridge construction within the freeway area while the city and county would equally share the cost of excavation work and grading the remaining Fort Moore Hill area. In addition, the city will pay the cost of building a relocated segment of North Broadway. All told, this will require an estimated expenditure of $248,000 in city funds while the county pays $156,000 and the state shoulders the remainder of the financial burden.



HYDRAULIC PRESSURE unit for demolishing concrete at Broadway tunnel portal. The Roc-Jak (top) includes ten pistons which are expanded in a 3½-in. hole previously drilled by jackhammers. The hand-operated Roc-Jak, (lower left) produces pressures up to 150 tons in a 2-ft. hole, and breaks off a whole corner section of concrete portal wall (lower right).

Making way for progress

The grading of Fort Moore Hill was required to provide for that portion of Hollywood Parkway between Hill and Spring streets, together with connecting city streets, and a proposed civic center area adjacent to the freeway.

When the present Broadway detour route has served its purpose, North Broadway traffic in the vicinity of the old tunnel will be carried over Hollywood Parkway by two reinforced concrete box girder bridges with adjoining retaining walls. This overcrossing will have two 58½-ft. spans with suitable piers and abutments—providing a clear roadway width of 60 ft. between curbs, two 8-ft. sidewalks, and two 4-ft. planting troughs. The inlet ramp overcrossing will consist of one 34-ft. clear span supported by reinforced concrete abutments.

Instead of running in a straight line, as it did through the old Fort Moore Hill tunnel, the new segment of North Broadway will follow a sweeping curve route from Sunset Boulevard to a point beyond the present southern foot of the hill. It will have a 19-ft. center strip for a double-track streetcar line, paved with a 5-in. layer of Portland cement concrete laid on ballast and surfaced with 2 in. of asphaltic concrete. A 13½-ft. lane on each side of the streetcar path will be paved with 8 in. of asphaltic concrete laid on a 12-in. course of untreated rock base, and beyond these lanes 7-ft. wide parking areas will be paved with 8-in. layers of Portland cement concrete on 1-ft. thick base of untreated rock.

Quantities and personnel

Engineering quantity estimates for the the project include more than 875,000 cu. yd. of excavation for grading and 4,500 cu. yd. of structural excavation. Structural backfill will total 2,200 cu. yd., the same as the placing of select materials. About 9,400 sq. yd. of subgrade will be prepared, while the placement of untreated rock base will total 4,700 tons, plantmix surfacing will exceed 1,250 tons, and asphalt concrete will amount to 2,876 tons.

Work is being accomplished on a 24-hr. schedule, although major operations are confined to the hours of darkness (6 p. m. to 7 a. m., daily) so as to minimize interference with already-congested traffic in downtown Los Angeles. Vice President D. Root is in charge of operations for Atkinson; W. T. Colwell is his project manager and E. M. Raimer is superintendent. General supervision for the state is being provided by G. T. McCoy, State Highway Engineer, and S. V. Cortelyou, Assistant State Highway Engineer for District VII; W. L. Fahey, district engineer, and A. D. Griffin, district engineer in charge of administration.

Because of the areas of limited access, together with the need to get a large amount of work done with minimum quantities of equipment, a Bucyrus-Erie 120B electric shovel is being used in conjunction with tractors and bulldozers for a considerable portion of the excavation operations. The shovel has a 6-cu. yd. bucket, and is provided with 2,300 volts of current for comparatively noiseless operation by a special substation erected on the excavation site by the Los Angeles Department of Power and Light.

Efficiency of the shovel and auxiliary units is such that it can maintain constant operations each night for a haul-away fleet of twelve Peterbilt Hall-Scott (18-wheeled) tractor-trailers.

Special rock-breaking tool

In the removal of some 11,650 cu. yd. of brick and concrete masonry from the old Broadway tunnel, a Duncan Hydraulic Roc-Jak, first described in *Western Construction News* for December, 1946, has satisfactorily eliminated the need for blasting operations. This tool is used in conjunction with a jackhammer, and is said to enable one man to do the work of six crewmen with conventional pneumatic breakers. The jackhammer is first used to produce 3½-in. holes to depths of about two feet, then the cylindrical body of the Roc-Jak is inserted in each hole so that hydraulic pressure can be applied by a sequence of ten horizontal pistons in a single direction. Pressures of more than 150 tons are built up for the pistons with a small hand pump, and their application is such that huge

chunks of masonry can be cleanly sheared at right angles to each point of thrust. Material segments thus produced range from 800 lb. to more than eight tons in weight, and more than 50 cu. yd. of gravity-cast concrete have been removed from the tunnel by a crew of two men in a single eight-hour shift.

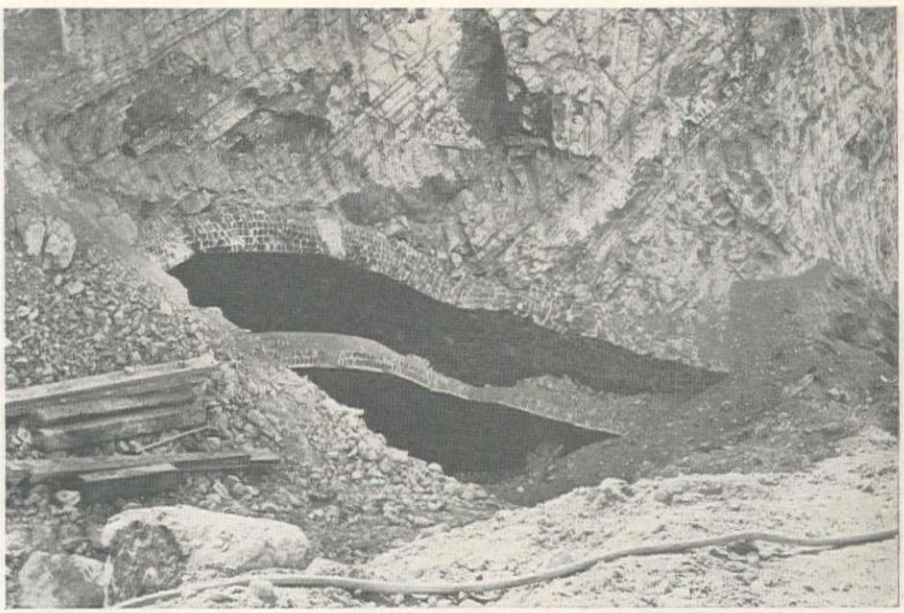
Where there is danger of damage to nearby property or persons, ruptured fragments of tunnel masonry are attached to the hoisting cable of a crane so that each can be safely lifted and moved to a disposal area.

Streets relocated

An unintentional start on the excavation of Fort Moore Hill was made in 1948 under another contract, when a detour for Spring St. was laid out during the construction of the Spring St. overcrossing for Hollywood Parkway. However, that has had no material effect on work taking place at this time.

Excavation for the current hill-removal project began early this year when Atkinson personnel cut across the slope about 25 ft. above Spring St., leaving a berm for later construction of a detour to carry automobile traffic and Broadway streetcar lines around the hill during demolition of the tunnel. Then, starting at the north end of the project again, the electric shovel was used to cut another berm across the hill about 25 ft. above the first cut.

Completion of the two cuts brought excavation to the point where it was necessary to build the Broadway detour and close the tunnel. The detour provided a road 40 ft. wide about 125 ft. east of the tunnel, and it was paved with four inches of plantmix surfacing laid on the best of granular material from the excavation. Temporary street car tracks were laid by Los Angeles Transit Lines.



BRICK ARCHES of original (1901) and modified cross-sections of Broadway Tunnel (1916) as demolition approached the north portal surprised engineers with their strength.

As soon as the detour was in use, Atkinson equipment was again moved to the north end of the hill so that excavation could be continued from the top back toward the north portal of the tunnel, and the electric shovel soon began breaking into the tunnel's double-roof arches. Then, with a small portion of the portal knocked down, excavation equipment was moved up and across the north face on the top of the hill at the edge of Hill Street and a southerly cut was made (50 ft. wide and 25 to 30 ft. deep) alongside Hill St. and as far south as California St.

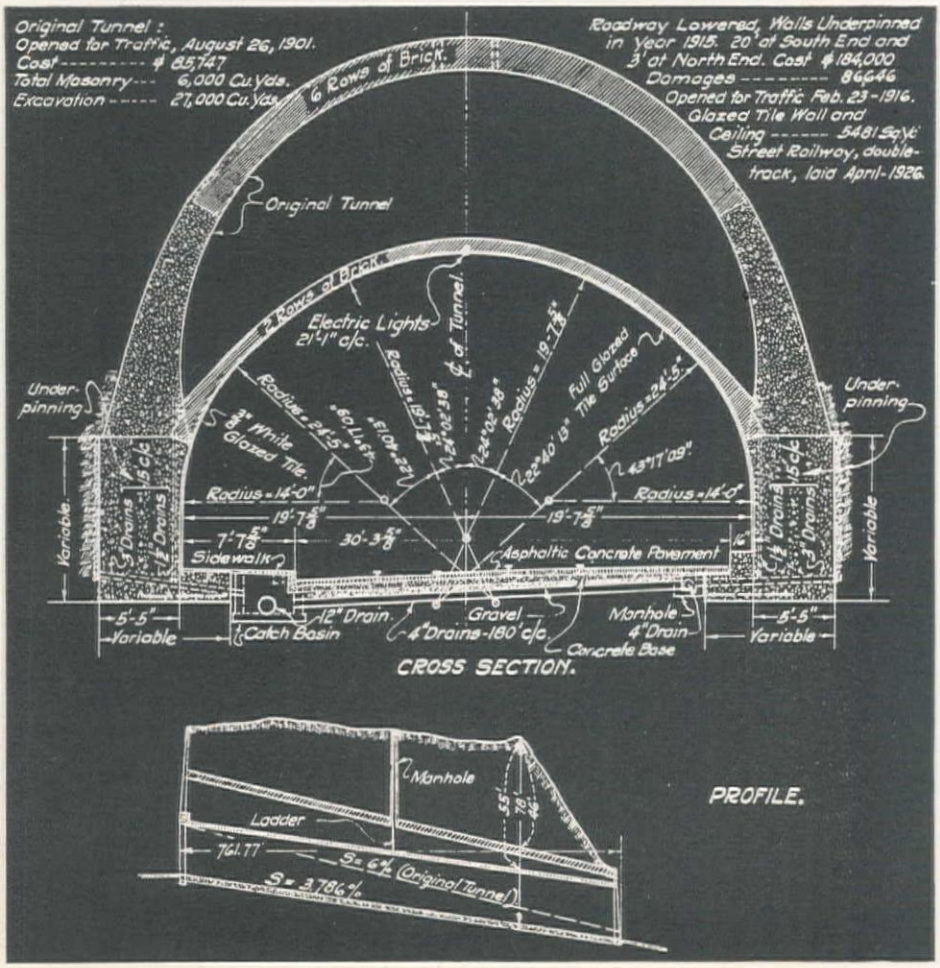
No more excavation east of the Broadway detour will be possible until the bridge for permanent Broadway traffic is in actual use. Meantime, all portions of the hill west of the detour are in the process of being cut to a depth of 40 to 50 ft. below the level of the detour and Broadway tunnel is being systematically demolished.

Breaking tunnel from top

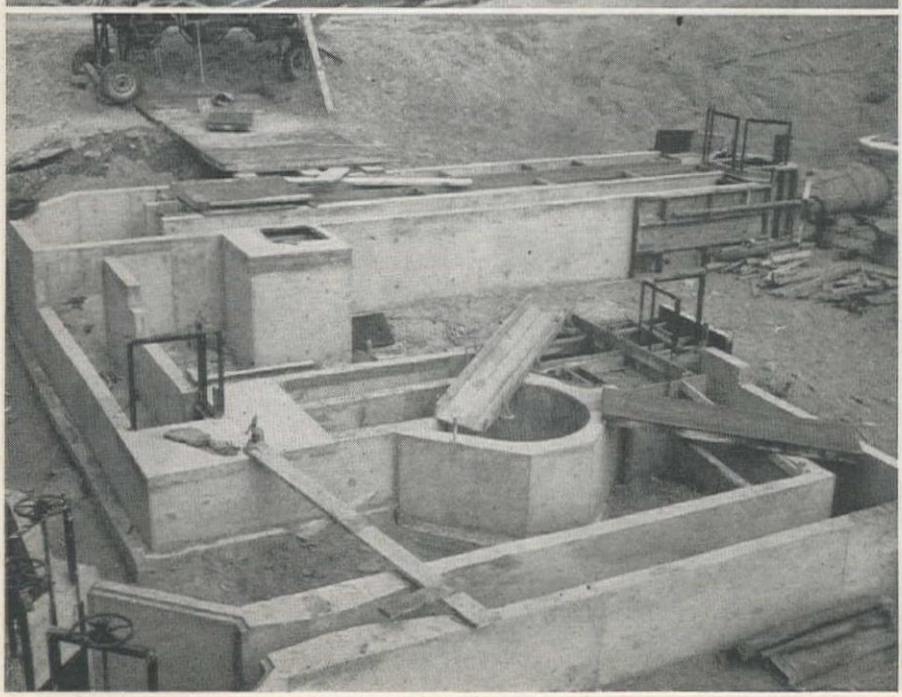
Masonry at the top of the tunnel is being removed, as previously suggested; but, unless current plans are altered, pavement and other constituents at the bottom of the tunnel may simply be covered up, serving as partial foundation footings for new bridge and street components.

Although most of the old Broadway tunnel was made without steel reinforcing and without many types of modern structural materials or equipment, project engineers aver that it was structurally sound up to the day demolition work began. Extent of the tunnel's strength, in fact, provided them with something of a surprise, since they assumed in the beginning that most of the upper masonry could be caved in with the power shovel. However, thanks to the aforementioned Roc-Jak, work has not been materially delayed and there is every reason to believe that the project will be completed on or before the November, 1950, deadline specified in Atkinson's contract.

REDUCTION of grade from original 6% to 3.78% was the feature of the 1916 improvement which retained the brick arch design, and underpinned the original arch footings.



Pumps Buried, Pipes Sunk, to Build Bremerton Sewage Treatment System



ONE of the rare places where construction of the Bremerton interceptors and Manette sewage treatment plant did not involve a battle with swift 10-knot currents or placing structures underground. At top, standard sized plywood forms save time and money on forming flumes and chambers near building. Center, completed pour in foreground on diversion gates, Parshall flume, comminutor and grit chambers. Building incloses digestor and settling tanks. Bottom, closeup of intake facilities.

Construction of new sewage treatment plant involves timing against tides for beach trenching and submarine pipe jointing—Army surplus "ducks" used to advantage in hauling pipe that is laid from barges

By LLOYD THORPE
Seattle, Wash.

A PRINCIPAL consideration which led the Navy Department years ago to establish the Puget Sound Navy Yard at Bremerton, Wash., was undoubtedly the fact that it was a snug harbor tucked safely behind narrow and tortuous channels but with plenty of water depth to permit easy passage and anchorage for the largest of ocean-going craft. However, the war-born boom of industry in the region, along with a steady population growth, caused a considerable bursting at the seams and these same secluded waters, which are fine from the standpoint of Naval strategy, began to present a considerable problem in the way of pent-up sewage.

In 1946 the Washington State Pollution Control Commission directed the City of Bremerton to rectify the pollution problem. Sewage was accumulating in portions of the several nearby closed salt water bays in amounts enough to cause complaints, and the Commission posted the region as unsanitary for swimming and unsafe from the standpoint of eating fish and shellfish originating in these waters. The City of Bremerton retained the Seattle firm of James W. Carey-H. W. Kramer & Associates, consulting engineers specializing in sewage treatment installations, to work out an answer to the problem along with B. S. Severance, Bremerton City Engineer.

Eighteen outfalls proved too many

Like many other cities, the City of Bremerton had a sewer system which had simply grown up with the city. Discharge of sewage was without treatment into salt water. The outfalls had gradually increased to 18 in number and the problem was further complicated by the fact that the city had leaped across Port Washington Narrows, a small strait with heavy currents, to engulf the com-

dispose of
from a population of 35,000
s industrial wastes from the
ard. To collect the sewage into
ak line within the city, which is
ly, was deemed impossible. The best solution was determined to be the projection of a pressure main along the beaches, intercepting the outfalls, and leading the sewage to a sewage treatment plant by means of a number of pump stations.

The overall job of putting all Bremerton sewage under treatment was split into two projects. The first half, around which the present discussion revolves, was completed this September. It consisted of construction of a pressure main forming roughly the letter "H" along the two beaches, with the cross bar consisting of a 1500-ft. submarine line across the Narrows to tie the two segments together. The treatment plant is being located near the northern end of the East beach main.

Tides dictate working time

Although construction of the pressure mains along the beaches provided an easy means of tapping existing outfalls, and also eliminated many problems since there were virtually no existing structures to contend with, the contractor nevertheless had other problems, but these were dealt with ingeniously.

Malaspina & Napoli Co. of Seattle undertook construction of the beach sewer lines on a contract price of $236,-700. The contractor was only able to work three or four hours at a time and had to work at whatever time during the night or day was dictated by the tides which in these waters ebb and flow over a range running up to about 16 ft. maximum elevation.

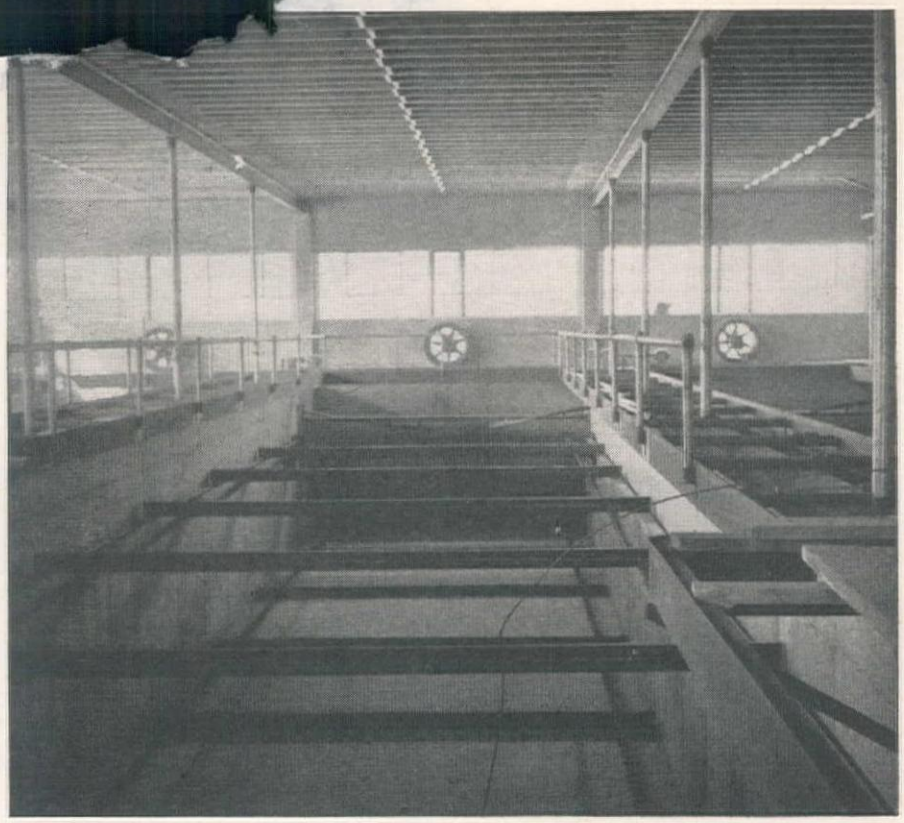
The lines could only be constructed during very low tide, but since shovels, bulldozers and other heavy equipment were engaged, this turned out to be a game of tag and leapfrog for the contractor. To avoid loss of precious time in moving heavy equipment on and off the beach the contractor used portable ramps on which he could spot his equipment safely above water to wait out the high tides.

"Ducks" haul pipe

Excavation of a 30-in. deep trench along the beach involved no problems. The pipe laid ranged in size from 8 up to 20 in. maximum. It was cement-asbestos type as manufactured by Johns-Manville, the selection being made after much laboratory testing. Resistance to salt-water exposure was an important consideration.

Surplus Army amphibian "ducks" were used to very good advantage by the contractor to haul pipe to installation sites. As many as 20 full lengths were hauled in single loads.

By constructing a submarine line to tie the two beach mains together, the single sewage treatment plant plan was determined to serve both shores. Studies indicated the feasibility of pumping sewage across the 1500-ft. wide waterway, which has a depth of about 50 ft. at high water with relatively easy taper of the bottom to both shores. Soundings and test bores led to the decision to use cast iron cement lined pipe with 16-in. inside diameter, incorporating the Usiflex joint.



CLOSEUP VIEW of clean interior showing settling tanks and the system of endless belt scrapers used to draw off solids. On the far wall can be seen three of the plant's draw-off fans in the common building and tank walls.

Pipe sections bolted under water

Henry Finch, diver, who has been laying pipe since 1902 contracted for laying of the submarine line at $53,539. The job called for excavating a 3-ft. deep trench and bolting the pipe sections under water. The principal problem was that of contending with the strong current which runs through the Narrows at 8 to 10 knots. This restricted the contractor to work periods of only 1½ to 3 hours per tide, but he was only able to lay pipe at high slack tide.

Two barges were used for the submarine work. Both were stoutly anchored to shore with 1,800-ft. long cables in addition to 5-ton anchors. They were winched into position by means of sighting points on land. A dragline on one barge excavated the trench, using side casting. Tidal action and current took care of the backfill.

Pipe laying was handled from the diving barge. The method used was to bolt two 12-ft. lengths together on the barge deck and then lower the 24-ft. section to the divers in the underwater trench. They used air-operated socket wrenches to tighten the Everdur bolting material. Force applied in tightening the bolts was controlled by a slip clutch. The total length of pipe laid in the submarine line was 1,283 ft., measured between the expansion joints placed on either side of the crossing.

On both the beach lines and the submarine line, testing for leaks was accomplished by introducing Aniline dyes. Leaks could easily be detected by color emitted, even though the pipe was covered.

Pump stations below ground

The Hoagland-Findlay Engineering Co. of Long Beach, California, executed the contracts for both the sewage treatment plant and six pump stations serving Unit I, at contract costs of $258,600 for the treatment plant and $116,800 for the pump stations.

Pump stations are all below ground and in most cases, where they are at street dead ends, the top of the station is finished even with the pavement. All stations are dry pit type, rectangular in shape, with a center partition to separate wet well from pump and control room. All are automatically controlled by means of float wells and alarm signals. Where flows are small Chicago Pump Co. Flush-Keen pumps as well as pneumatic ejector-type pumps are used. Costs of the individual stations ranged from $13,000 to $20,000 each, including appurtenances, the spread being due to capacity considerations and alternation work required to collect sewage from adjacent manholes.

Sewage plant designed for economy

The James W. Carey-H. W. Kramer organization designed the sewage treatment plant, combining economical construction and efficient, automatic operation with pleasing exterior architecture. The plant is of the primary type, de-

signed for a flow of 3,500,000 gal. p day. All operations are under cover a a portion of the roof over the sett tanks also serves as a floor for the ch rine room, office, laboratory and con rol room.

In designing the structure Carey-Kramer effected important economies by providing for common wall usage throughout, and by standardizing, so that the contractor was able to re-use his 4 x 8-ft. plywood forms innumerable times. The two digesters are rectangular in shape and one side serves as a building wall and also as a side for the settling tanks.

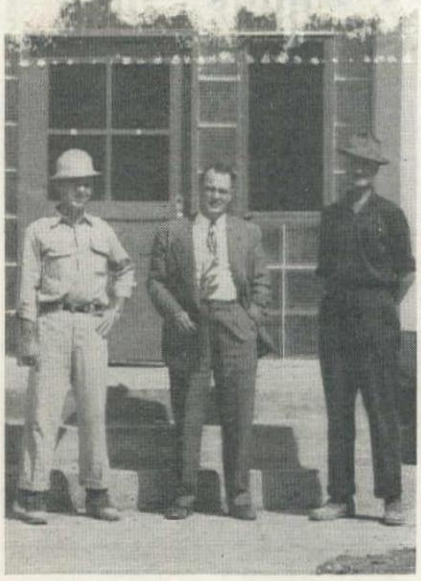
In operation the pumping stations deliver sewage to a grit chamber equipped with semi-automatic means for discharging grit. A Chicago Pump Co. comminutor then delivers the sewage to a Parshall flume and then to settling tanks, of which there are three, equipped with American Well Works sludge collecting mechanism as well as helical type automatic skimmers by the same manufacturer. Effluent is then discharged to deep water in the Narrows.

Sludge is pumped automatically from hoppers to digesters by means of electrically-controlled hydraulic valves. These valves are operated by a system of automatic cycling time clocks which start the pumps and open the individual valves for a predetermined time.

Digester gas is drawn off and used to heat both the sludge and the building. The heating coils are vertical type and hung from the roof to permit removal without entering the digester. Large ventilating fans are used to draw off any odors or gases which may accumulate in the building.

Total cost of the sewage treatment plant, for construction and appurtenances, was $258,600.

Unit II of Bremerton's overall program, for which bids were opened in September, will cost approximately $525,000 according to the engineer's estimate. It will comprise about 6,000 ft. of 20-in. pressure sewer main, three pump stations, and another sewage treatment plant, similar in design but somewhat larger. When Unit II is completed the City of Bremerton will have a complete sewerage system treating all of the city's domestic sewage as well as the wastes of the big Puget Sound Navy Yard. It will have met fully, through modern engineering and construction, the pollution problems arising out of a rapidly expanding population along the shores of confined waters chosen by Uncle Sam's seafighters for security reasons.



KEY MEN on the job are, l. to r., JACK STODDARD, Supt. for Hoagland-Findlay Engr. Co., contractors; H. W. KRAMER, Partner, Carey-Kramer & Associates, consulting engineers; and HOWARD GORST, Inspector.

CAST IRON PIPE is lowered with great care in Port Washington Narrows for the submarine part of the line. Both barges were stoutly anchored to shore with 1,800-ft. long cables in addition to anchors.

First Road to Remote British Columbia Town to Be Built

AFTER MANY years of isolation the little town of Atlin in far northern British Columbia is at last being connected with the highway system of the continent.

Financed jointly by the Dominion and provincial governments the Royal Canadian Engineers are building a 52-mi. road link between Atlin and Jake's Corner at Mile 864.5 on the Alaska Highway.

British Columbia put up $200,000 for the job at the last session and Ottawa voted $250,000. Work is under direction of Brig. A. B. Connelly, head of the northwest highway system, and will provide training for army engineers in rough territory.

Atlin's only access to the outside world now is by boat or plane, or tractor train in winter. Part of the new highway (25 mi.) lies in British Columbia, the other 27 mi. in Yukon territory, making it a joint project between the two governments.

EN[illegible]S and [illegible]niversity of British Col[illegible]a have for the past year been building a 3-ac. working hydraulic model of the entire tidal system of the Fraser River. The model, which is 400 by 300 ft., is on a horizontal scale of one foot to 600 ft., and a vertical scale of one foot to 70 ft. It will be used for study in connection with training of the Fraser River system.

Complete with a huge tidal basin in which to reproduce all the many currents and sand waves to which the river is subject, the model includes the upper limit of tidal influence at Sumas and also Pitt Lake.

Visitors to the project can recognize the river as far as Haney. At that point Prof. E. S. Pretious of UBC's civil engineering department, who is in charge of the project, has changed the river to fit what he terms his "limited amount of space."

To fit the 3-ac. area, the Fraser has been bent back on itself at Haney and the Pitt River and Pitt Lake are also wedged into the area. Main purpose of the model, which won't be finished until this time next year, is to study the problems of channel regulation in the Fraser and to try to improve navigation on the river.

The huge project was asked for by Canada's Department of Public Works which has the task of keeping the Fraser open for navigation. The tricky experiment was promptly handed over to the National Research Council of Canada, with whom the University of British Columbia is cooperating in building the model.

Already an 7 x 8-ft. working "pilot" model has been constructed in the UBC hydraulics laboratory. "This model of a model helps us with the problem of setting up the tidal vanes on the real model to duplicate exactly the tides moving up the Fraser," explains Prof. Pretious.

The first purpose of the model is to aid navigation on the Fraser. "It has nothing to do with flood control. We want to train the river by a system of jetties, dikes and groins set in such a way that the river will silt up where we want it," says Prof. Pretious. Later, there "might" be experiments with flood control and irrigation.

Institute Staff Enlarged

IN FURTHERANCE of a planned program of increasing highway safety, the organized motor carrier industry of the West, the Western Highway Institute, has retained a highway engineer to advise and assist trucking interests in problems of highway design and traffic density. He is **E. L. Mills** of the California Division of Highways, and formerly engineer with the Public Roads Administration. Since its inception in 1947, the Institute has retained **R. A. Allen**, former Nevada highway engineer, as consultant, and he will continue in that capacity.

Concrete for Woodstave at Denver

Modern 90-in. pre-cast concrete line 10.5 mi. long to replace wood pipe, some 40 years old, and increase raw-water supply delivered to treatment plant

By HENRY HOUGH
Denver, Colorado

TO REPLACE two sections of wood-stave pipe — one almost forty years old—on a main supply line into the city, the Denver Board of Water Commissioners is completing the installation of a 90-in. pre-cast concrete conduit. This 10.5 mi. improvement will also increase the capacity of the aqueduct delivering raw water from the South Platte River to Marston Lake, which is the immediate supply for the treatment plant on the south side of the Denver metropolitan area.

Denver's water supply originates in the mountains on both sides of the Continental Divide, and a $23,000,000 bond issue was voted in 1947 for a five-year program of modernization and expansion. The current project, which will cost about $3,895,000, is the replacement job referred to as Conduit No. 20. This particular section of the improvement program involves the replacing of a 48-in. wood-stave line laid in 1911 and another section of 66-in. line installed in 1924. In addition, the work involves a 2,840-ft. length of tunnel. There will still remain in service after the current work is finished, about 1¾ miles of 60-in. wood pipe laid in 1910-1911 at the upper end of the conduit, which will be replaced sometime later.

Tunnel by force account

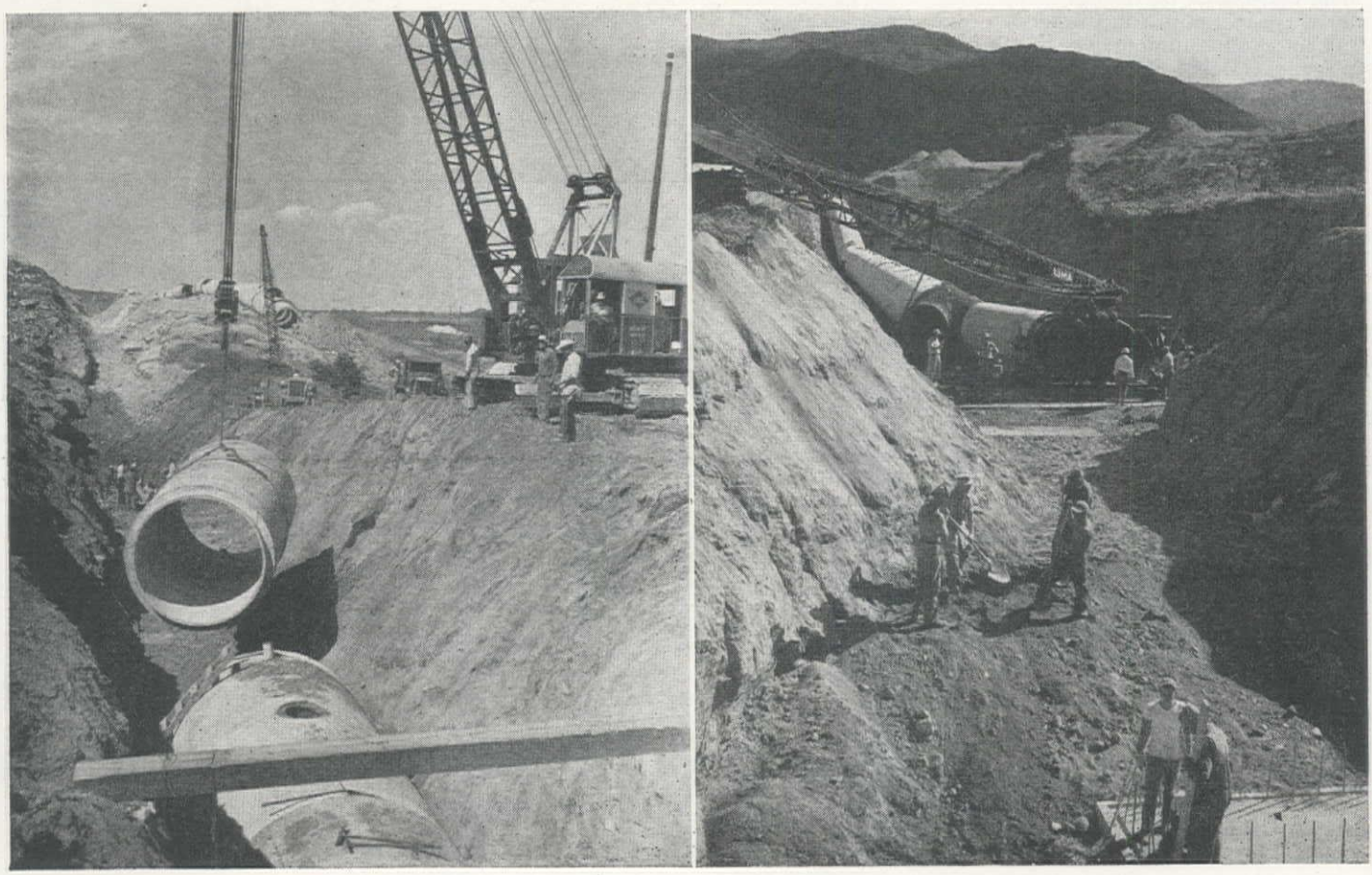
A major engineering feature of the current replacement job is the 2,840-ft. tunnel with a lining of reinforced concrete. The original call for bids included the tunnel project, but the Water Board decided to do the tunnel job themselves. Contractors feared bad ground and submitted bids which were rejected. The Board's geologist advised that tunneling conditions would not be severe, and since a tunnel crew from two other tunnels was ready, it was decided that the city would undertake this feature of the project. Drilling of the tunnel, now completed, confirmed the opinion of the geologist.

H. R. Oliver is engineer in charge of construction and M. L. Sowell was superintendent on the tunnel job. Three shifts were employed and the tunnel was driven from one portal since ample time was available. The tunnel was in shale most of the way, and although reasonably stable it slacks on exposure to air and required gunite. The tunnel was driven 10 ft. in diameter before lining and the finished conduit when lined will be 96 in.

Pipe manufactured in Denver

Lock Joint Pipe Co. has the pipeline contract and is manufacturing the pipe at a plant located in South Denver at West Harvard and Delaware Streets. Frank Squires, job manager, is supervising the manufacturing operations. Roscoe Downs, superintendent for the sub-contractor, is supervising the installation, which includes the delivery of the pipe from the manufacturing yard to the job site.

About 280,000 sacks of cement and 50,000 cu. yd. of sand and gravel are required in the manufacture of the pipe. About 5,000 tons of reinforcing steel are going into the job. Each section of pipe weighs 22 tons. Operations are carried out with machine shop precision in spite of the quantities of material handled. About 10 cu. yd. of concrete go into each of the 22-ton sections of pipes. Reinforcing rods of ½, ⅝ and 23/32-in. sizes are used in the double-cage assembly. Forming and pouring take one



TWENTY-TWO TON section of Lock Joint pipe moved from depression in excavated material to trench. In the background the pipe is shown in this depression, where it was placed from trailer trucks. The berm was left wide enough for the crawler crane to operate. Wye (right) provides for emergency diversion of full flow of line.

TUNNEL BIDS were considered too high and the Commissioners elected to drive the 3,000-ft. bore with their own forces. Operations indicated that the geologist's opinion was correct.

day, the second day the forms are stripped and the pipe is steam cured. The third day the pipe is painted with waterglass and is ready to be moved to the job.

Low-head specifications

Pipe strength, based on the amount and spacing of the steel reinforcing, varies with the head, of course, and most of the pipe on this job is designed for low head service.

Specifications called for steel-cylinder reinforced concrete pipe. The reinforcement consists of a watertight steel cylinder with steel joint rings welded at each end, and a surrounding cage of reinforcing steel. Lock Joint's patented rubber and steel expansion joint is used between the pipes. The sealing element is a gasket of blended natural and synthetic rubbers, which is tightly compressed between the steel joint rings when the pipes are pushed together. This provides a water-tight, permanent seal. After the pipes are laid, the openings at the joint both inside and outside the pipe are filled with mortar.

Truck-trailer transportation

After curing, the sections of pipe are pushed onto a loading dock by bulldozer, whence it is rolled onto a flat-bed semi-trailer which is used to transport pipe to the job, where it is placed in a depression in the excavated material along the trench. This material had been cast into a windrow far enough back from the side of the trench to allow a crawler crane to operate on the intervening berm in handling the pipe. The moving time from plant to the right-of-way, including unloading the pipe, averaged about 1 hr. and 15 min.

Excavation of 403,000 cu. yd. of trench material is being handled on a subcontract by Gordon-Bressi & Bevanda, a joint venture of Denver's David A. Gordon Construction Co., and the well-known California firm of Bressi & Bevanda. Most of the excavation is handled by dragline and scrapers. Some of the cuts were 25 ft. deep. The excavating crew is followed by another which prepares the finished grade. Next, pipe is laid and the trench backfilled with a 4-ft. minimum cover.

Blow-off valves are installed at low points in the line. At every high point a standpipe or airvalve is provided. At one point a "Y" allows for complete diversion of the flow in the line, if necessary.

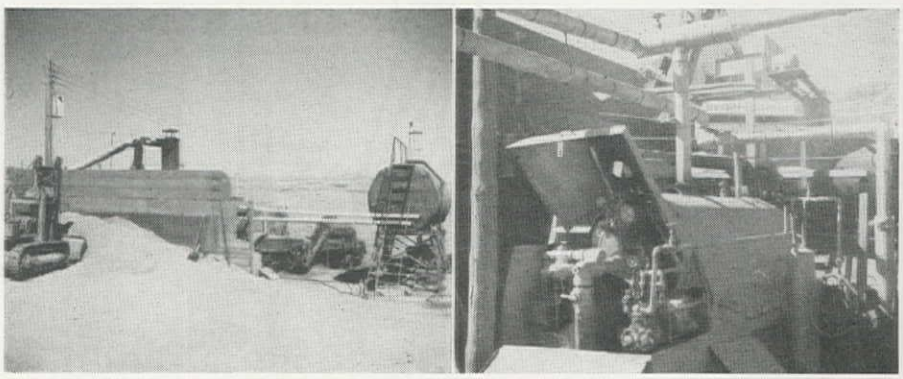
Special right-of-way provisions

Right-of-way restrictions imposed more than the usual problems because the new line traverses valuable farm land. Stipulations provide that the ground surface must be restored, surplus dirt removed, and no damage can be done to trees or buildings. Payments must be made for crop damage as well as for ingress and egress. It is necessary to spread out surplus material so that top soil can be saved and earth unsuitable for cultivation can be hauled away. No trees may be planted nor can any buildings be erected on the 100-ft. right-of-way.

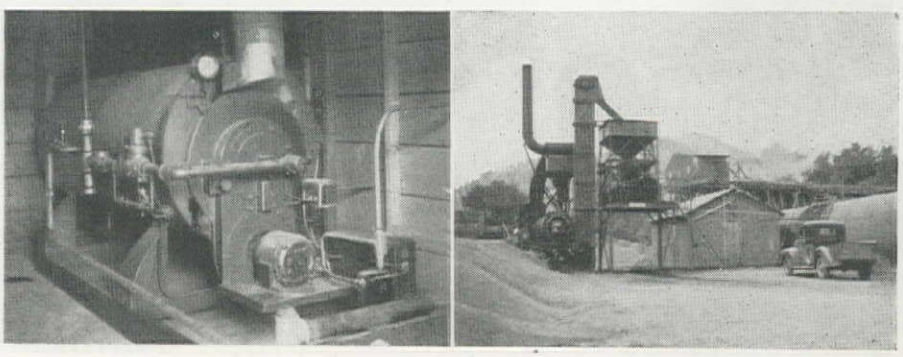
Nothing very dramatic occurs in this replacement project although it represents an aggregate cost of nearly $4,000,000 in the $23,000,000 program. The people of Denver scarcely know the job is being done and few have ever heard of Conduit No. 20. However, the Marston Lake plant would be "starved for raw material" if it weren't for such projects as Conduit No. 20, not to mention the old wood stave lines it replaces and supplements.

Quick, Clean, City Asphalt Plants

ELECTRICALLY powered and burning natural gas, the asphalt plant of Casper, Wyo., in the heart of a great petroleum area, is shown producing 24 tons per hr. of ¾-in. minus mix. The Barber-Greene model SM 830 840 pugmill and dryer (right) handles 12,000 cu. ft. of gas per hr., for $3 a day, to dry and preheat aggregate to 325 deg. F., making possible 4 extra tons per hr. Lines are steam heated by Wm. Bros 27-hp. boiler. Electricity costs 50¢ per day.



FAST WORK is done at the Boulder, Colo., plant, where only 1½ hr. preparation is required to produce 1-in. minus mix at 30 tons per hr. from a cold plant. A Cyclotherm 40-hp. automatic boiler (left) is up to pressure in 6 min. Three men and a superintendent turn out 1,000 lb. of mix every 50 sec. with the ⅓-cu. yd. Hetherington & Berner pugmill.



Reconstruction Advancing on War-Torn Philippines Roads

SUBSTANTIAL PROGRESS has been made in the reconstruction of war-damaged streets and highways in the Philippines, the Bureau of Public Roads has reported.

Approximately 100 mi. of roadway and more than a score of bridges have been rebuilt or repaired at a cost of around $6,000,000. The United States Government contributed $5,225,000 to assist the Philippines Republic in financing these projects.

Work has been completed on the Quezon and Santa Mesa Boulevards and most of the other main thoroughfares in Manila. The two boulevards, which carry the bulk of the city's traffic, were reconstructed as six-lane divided highways. Widening and repair work is under way on less important streets which were not damaged seriously during the war but deteriorated because of lack of maintenance and the increased use of heavy vehicles since the war.

A similar street improvement program, calling for a total expenditure of $779,100 has been started in Cebu City, on Cebu Island. This is the second largest city in the Philippines.

Two major bridge projects in Manila, the Quezon bridge and the Jones bridge across the Pasig River, are under construction.

Thirty-six projects, consisting of 16 road and 20 bridge jobs, were completed during the past fiscal year at a cost of $3,868,300. These were in addition to 9 projects completed in the preceding year. At the end of the 1949 fiscal year on June 30, there were 75 projects under construction and 28 that had been approved for contract or force account, with construction scheduled to start at an early date. American contractors are eligible to bid on contract offerings, but most of the construction work so far has been let to Philippine contractors.

The completed projects and those under construction are part of a program of 320 road and bridge projects planned under provisions of the Rehabilitation Act of 1946, which authorized an appropriation of $40,000,000 for highway construction in the Philippines.

Out of the 320 projects recommended as desirable, a total of 304 have been definitely programmed. The 304 projects provide for the reconstruction or repair of 355 mi. of roads and streets and 224 bridges totaling 19.6 mi. in length. The estimated cost of these projects is $48,647,787. Of this amount, the United States Government will contribute $33,736,000.

The Federal Government also is supplying a portion of the funds for the reconstruction of 226 small bridges scattered throughout the Islands. This work is being done by the Philippine Bureau of Public Works.

As a further aid to the Philippine Bureau of Public Works in its highway program, the U. S. Bureau of Public Roads has purchased and stocked reinforcing steel costing $286,685 and road-building equipment valued at $107,249. The Federal agency also purchased and set up a 3,000-lb. hot-mix plant for use on bituminous paving jobs in and near Manila.

One of the most important phases of the program has been the development of a physical research laboratory to test road materials and to train Philippine personnel in research methods. The laboratory was established and equipped under the direction of Public Roads engineers assigned to the division office in Manila.

Considerable effort has been directed toward an over-all training program for Philippine engineers. Training in materials-testing procedures has been given in the laboratory to a number of engineers from provincial offices and in the field to Philippine engineers hired by the U. S. Bureau of Public Roads as inspectors.

The need for highways of modern design in the Philippines and for trained engineers to build them is reflected in the fact that motor vehicle registrations have increased more than 50 per cent since the war. At present approximately 85,700 motor vehicles are registered in the Islands, as compared with a prewar peak registration of 56,000.

In addition to the large increase in the number of vehicles registered, the average motor vehicle in the Philippines is on the road a great deal more than its counterpart in the United States. The Manila metropolitan area has a total registration of about 55,000 vehicles, but traffic counts show that several streets in Manila carry as many as 40,000 vehicles per day.

Unless unforeseen delays occur, all projects in the current highway program will be under contract by next June 30. There are 74 bridge projects and 4 roadway projects still to be designed. The estimated cost of these projects is approximately $10,000,000. The last of the roadway projects should be under construction by Dec. 1.

Tidal Wave Formation to Be Reported In Advance to Pacific Island Areas

PACIFIC and Alaska installations of the Civil Aeronautics Administration have been made part of a system for detecting and warning of seismic sea waves in the Pacific Ocean area, according to D. W. Rentzel, Administrator of Civil Aeronautics. The CAA is cooperating with the Coast and Geodetic Survey and Military services in this far-flung program of observation and communication by which shores in the path of such waves can be forewarned and take steps to avoid possible destruction.

Seismic sea waves, commonly known as tidal waves, result from undersea earthquakes. These waves are relatively low in height and of great length, and are not easily detected by aircraft and ships at sea or by normal eyesight observation. They may attain speeds of more than 400 mi. per hr., and cause terrific damage when they roll up unexpectedly on islands or the shoreline of mainlands. Special instruments employed by strategically located tide gauge stations are designed to screen the normal rise and fall of sea water and detect a sustained rise which may be a sea wave.

The Honolulu magnetic and seismological observatory is the focal point of the detection and warning system. When seismic or earthquake disturbances are observed on the instruments of the observatories at Fairbanks and Sitka, Alaska; Tucson, Ariz.; and Berkeley, Calif., this information is forwarded immediately to the observatory at Honolulu where an analysis is made to determine the epicenter of the disturbance and the possibility of seismic sea waves. Tide Gauge stations in the Alaska area and on islands throughout the Pacific Ocean area are alerted to make continuous observations of their instruments. Once a sea wave is detected, all areas are warned to prepare for the possible consequences.

The CAA maintains continuous communications channels between Anchorage, Alaska, and Honolulu, and between Honolulu, Wake, Midway, Canton, and Palmyra Island, which are now available for this detection and warning service. These facilities, together with those operated by the military services, form an integrated network by which the inhabitants of the Pacific Islands may be warned and protected from disastrous effects of sea waves such as that experienced by Honolulu a few years ago.

Tacoma Requests License For Cowlitz Projects

THE CITY of Tacoma, Wash., has asked the Federal Power Commission to authorize issuance of a license for construction of a hydroelectric project on the Cowlitz River in southwestern Washington.

The license application, filed by the City through its Light Division, Department of Public Utilities, outlines plans for two dams. One, to be built near the town of Mossyrock, about 510 ft. high above bedrock would create a reservoir with usable storage of 823,620 ac. ft.

The second dam, which the City proposes to construct near Mayfield, would be about 240 ft. high above bedrock and would form a reservoir providing usable storage of approximately 21,000 ac. ft. A proposed powerhouse at this site would house three 55,000-hp. turbines.

A Broad Approach to the Municipal Problem of—

Parking and Terminal Facilities

DOWNTOWN AREA in the West's largest city illustrates parking problems, both on and off-street where there is a vertical concentration of daytime population, with a constant flow of business traffic and a peak rush hour of office workers.

THE PAST 25 years have witnessed a most phenomenal growth in motor transportation, a growth possibly not equaled by any other phenomenon in our lifetime. Automobile manufacturers have progressively produced motor vehicles of greater speed and comfort until most of us accept an automobile as a daily necessity. Truck manufacturers have increased the carrying capacity and speed of their vehicles until about forty-five per cent of the nation's goods and supplies are now transported by truck, over all or a part of the distance shipped.

One item that has not kept pace with the motor age is the urban highway and street system. Laid out, with few exceptions, for horse-drawn vehicle operation, these arteries for travel have been strangled by the increased demand to move and park more and more motor vehicles capable of transporting a higher volume of people and goods than is permitted by the physical characteristics of these "horse and buggy" streets. Parallel parking, double parking, and diagonal parking all contribute to the congestion of the streets. The irony of the whole situation is that people expect to park

By

R. W. JAMES

Urban Engineer

Bureau of Public Roads

U. S. Department of Commerce

Denver, Colo.

vehicles in an area set aside essentially for travel movement, two distinct operations that are, to say the least, not entirely compatible.

Parking raises taxes

The motor age has given a greater freedom and latitude of operation that has directly resulted in a phenomenal growth of suburban areas around the city. To keep pace with the suburban growth and to combat the congested conditions on streets in the central business area, shopping centers have been established at varying distances from the original "downtown" area. The whole suburban movement has resulted in depreciating values at alarming rates in central business areas. Added to the depreciation of high tax value structures is the increased expense of expanding necessary services to these new areas. In order to solve the dilemma, city officials have resorted to many types of new taxes and have increased residential property taxes at an alarming rate and how, as taxpayers, we do howl and cast imprecations at these city officials! A large part of the trouble is our attempt to park and move vehicles in the same space at the same time.

Construction and use of high capacity traffic facilities, such as freeways and expressways will only add to the difficulties in the central business areas, especially at points of traffic interchange, unless provision is made for proper terminal facilities. Money will not be wisely spent if traffic seeking egress from express facilities cannot be rapidly siphoned off at these termini.

The logical solution

If then city streets are needed for **movement** of traffic, the most logical solution to the problem would be to park the automobiles in **off street** park-

ing areas and provide proper terminal facilities for loading, unloading, and storage of trucks. Again, the trouble with the whole situation is that, as more parking facilities are provided, more automobiles wish to park, due partly to the failure of most mass transportation facilities to expand in amount, convenience, and comfort.

Dark as the picture is, there is some ray of hope. That hope is in an aroused public opinion demanding a solution for the problem. And there is a solution, possibly two solutions, one physical, the other educational. The physical solution consists of establishing the location and extent of off-street parking and terminal facilities required to cover any expected expansion of demand. A survey of existing facilities will establish present use. An interview survey will establish present demand. Consultation with city planners and interested individuals will give an indication of the future trends, useful in forecasting future demands.

Off-street parking

A direct interview type of parking study has been used in more than 50 cities in which each driver who parks in the central business district is questioned as to his ultimate destination (as distinguished from where his car is parked) his trip purpose and the origin of the trip. The location of the parking is recorded together with the time of arrival and departure. From the latter can be determined the length of time parked and turnover in use of space. This type of study summarizes for each block the basic elements for planning parking relief: availability of space, use of space and demand for space. An interesting side light has developed in some of the studies made to date. Owners and employees of a business establishment have a tendency to park their personal cars immediately in front of these establishments, especially in restricted areas.

Interviews can also be obtained in off-street parking lots and garages to determine present usage characteristics with respect to trip purpose, length of time parked, turnover and location of demand of present users in comparison with the available supply of parking spaces.

A land use study of the area as it now exists is then made, supplemented by a study for projected future development. This projected future development study requires careful field and office work to accurately screen all available information. A study of existing city ordinances and state laws will need to be made to determine the need for legal sanction of any proposals.

The cost of street parking

The study of existing land use can be made from available city zoning and cultural maps and from field investigations to determine the extent and value of present improvements and the feasibility of converting some of these areas to parking uses. Again, we face the dilemma that the maximum demand for parking space is usually in the areas of highest property values.

Certain we are that the parking problem in a business district cannot be solved by parking at the curb. Examine, if you please, the cost of creating curb parking space. Adequate high type city paving usually costs about $4.00 per sq. yd. Parallel parking requires a strip of paving 8 ft. wide and reduces the capacity of the adjacent traffic lane by about 40 per cent; hence, we have the 8-ft. width, plus 40 per cent, of, say, a 10-ft. width, making 12 ft. of pavement, or in a 100-ft. length of street, 133⅓ sq. yd. of paving costing about $535, or $107 per car space. For 45-deg. angle parking a parking width of 18 ft. is required with an additional width of 17 ft., occupied 40 per cent of the time as maneuvering area, or about $1,100 per hundred feet of street length, or $122 per car space. Adequate off-street parking lots can be surfaced for about 75¢ per sq. yd., or $20 per car space. Comparative cost of pavement, in many cases, represents only a small portion of the cost of producing adequate curb parking in the business area. If we are to produce streets wide enough to provide for both standing and moving vehicles, in some cases we would have nearly all street and very limited area for business.

There is not a great deal of background information available to serve as a guide in providing adequate parking facilities. Studies of requirements are now being made by many groups and gradually a fund of this information is being collected.

Figures must be used very judiciously, however, with due regard to city individuality. As an example, in Philadelphia studies showed that only 6 per cent of the home-to-work and work-to-home movement took place by private automobile whereas the Denver study revealed that there was 40 per cent of this movement.

Off-street parking, then, is the solution now generally accepted. Centrally located parking lots, fringe parking lots with shuttle-bus service, parking garages, provision for basement parking space, underground parking areas all have their place, efficiency, and unit cost of service.

Municipal parking lots

Some cities have successfully prohibited parking on some of the streets in the central business districts. Some cities have installed meters in off street parking lots, using the revenue obtained for upkeep and, in some cases, for the creation of a fund for purchase of other lots and meters as the need arises.

The layout of a parking lot of efficient size usually allows about 240 sq. ft. per car space. Assuming an initial expenditure of $48,000 on a 60 x 125-ft. lot, parking 32 cars per day for 300 days, will require a payment of 45¢ per space per day just to meet expenses and amortize the investment in 30 years. If the turnover is one and one-half cars per day per space this charge would be 30¢ per car space per day and if the turnover is two cars per space per day the charge would be 25¢. In larger communities rare indeed is the case where a lot 60 x 125 ft. can be adequately developed for $48,000, including cost of land. Since there will be decreasing patronage with increasing parking charges, the solution to the problem may require multi-story garages caring for more cars at increased investment but decreased unit costs.

Multi-story parking garages, historically, have led a rather checkered existence. There are a few cases where such ventures have operated successfully without bankruptcy and hence depreciation of overall investment. The examples that are most pointed to as a successful type have been subsidized by either private or public funds.

In-building parking

Businessmen are keenly aware of the need for customer parking if they are to continue in business in downtown areas. This interest is evidenced by the increasing demands for parking garages built by department stores, banks, hotels, and office building owners, either in conjunction with or immediately adjacent

INDUSTRIAL PLANTS, such as this large cannery, provide special seasonal problems of peak parking on streets, public lots, or areas established by the company for workers' convenience.

to their establishments. Established smaller businesses cannot afford to provide adequate customer parking space.

The ideal setup, of course, would be for every building to provide adequate parking space for its occupants and customers. Unfortunately, in most cities this has not been a requirement in building up our business areas and the cost of requiring such an improvement now would be prohibitive. A possible solution would be municipal assistance in the development of parking lots or garages in the form of land acquisition by condemnation where necessary, lease to private operation, or municipal operation. Still another solution would be financing these necessary off-street parking facilities by private funds, either purely voluntary or subscribed by an improvement district procedure.

The general public is aroused to our parking needs. Collation of the facts, passage of needed legal sanctions, presentation of the whole matter in a public educational program, and finally securing the necessary financial assistance will implement the program. A solution of the parking problem is very necessary if the functional efficiency of our cities is to be preserved. It is a community problem needing the support and action of every citizen in every walk of life.

Truck terminals

As mentioned in the beginning, it has been estimated that approximately 45 per cent of the nation's goods are moved by truck. Prohibit truck operation into or out of a community and many of its daily wants would not be supplied. Everyone is familiar with large trucks parked against curbs and dock strips, partially blocking city streets, and smaller trucks double parked, rendering one lane useless for moving traffic. This condition is not one of the trucker's choice but a condition forced on him by lack of facilities for delivery and pickup of needed commodities. Many cities have sought to alleviate the condition by providing truck loading zones at curbs. Usually these zones are too small and are quickly crowded during delivery hours with the result that, in order to save time and make deliveries promptly, the overflow is taken up by double parking. Making the loading zone longer will take away needed curb parking spaces. So the poor city official has tried to satisfy both requirements by balancing between loading zone and parking demand with the result that neither is adequately satisfied.

While parking use of street space for private automobiles may be interpreted as a public but extravagant service, the use of street space for loading and unloading of trucks is more extravagant from the standpoint of street efficiency and the type of pavement furnished. In addition, the actual fact is that the **private** concerns are using **public** facilities for **private** gains and are thereby rendering these **public** facilities unavailable for the use intended.

As with auto parking, provision must be made off the main thoroughfare for proper and adequate space and facilities for the loading and unloading of trucks. Many cities now have zoning ordinances requiring loading docks and truck standing space in all commercial buildings sufficient in area to care for the needs of the establishments. Usually these zoning ordinances apply only to new construction; in a few instances the ordinance does provide that within a specified period of time the old buildings shall install such areas. Enforcement of these ordinances has been lax in some cases, entirely lacking in some others, and, in too few instances, properly enforced.

Properly then, the solution of loading and unloading space in commercial areas is a problem for the individual establishment, as much so as providing space for display of goods. Enforcement of this principle, difficult as it no doubt is, will solve this part of the problem.

Long distance hauling docks

Large over-the-road shipper's trucks present still another problem of terminal facilities. Usually these trucks are loaded with goods consigned to various concerns in a city or several cities. It is a highly inefficient operation if such trucks are expected to deliver directly to the consignee. In larger cities it has been found more efficient to establish a terminal where the big trucks can load and unload. Individual consignments can then be delivered by smaller trucks to the commercial establishment's loading dock.

The larger trucking companies are gradually working out their problem with the assistance of competent public officials. Chief among the problems to be solved is a proper location that will provide a terminal near the desired center of operations and yet a location that will require as little travel as possible over congested city streets.

The major problem for public officials is to provide adequate terminal facilities for the small operator who has barely enough money to operate his vehicle successfully; true, his dockage business could be handled by a larger trucking concern but usually such operation would not be profitable for it, and if dockage could be provided at the larger company's docks the fees would ordinarily be such that he could not operate.

Another problem for city officials in smaller communities is that of providing a truck terminal which will serve all trucking companies as well as individuals. Many of the large over-the-road trucks operate around the clock and arrive in the small cities when the establishment of the consignee is locked up. There should be some facility provided, similar to a railroad freight depot, where these consignments can be left in a safe place to be picked up by the consignee at his convenience.

These last two problems can be solved by construction and operation of a truck terminal under a quasi-public body with either public endowment or public guaranteed funds. Such terminals can be made self-supporting and self-liquidating by a charge against the truckers for dockage fee. It almost goes without saying that the creation of such a quasi-public body will need legal sanction by proper statute in order to operate.

Planning the proper location of truck terminals is a very necessary part of arterial street planning in any community, whether the terminal is to be built by private or quasi-public funds. Proper location with respect to adequate traffic ways will promote the efficiency of the terminal and help relieve the traffic congestion.

Mass transportation terminals

Another subject must be included in any discussion of the urban transportation problem; that subject is mass transportation. The wide variance between the number of people moved by mass transit facilities for the home-to-work and work-to-home movement was previously noted. There should be little question in anyone's mind that mass transit can furnish a more efficient means of caring for this movement than can the private automobile. Provision can and has been made for mass transit vehicles to operate over arterial facilities. Proper terminal facilities in the central business area and convenient loading facilities in the suburban areas will render mass transit more desirable, provided, of course, that such mass transit furnishes the proper equipment.

Inter-city busses must have centrally located terminals for the convenience of their passengers. These terminals should be so located that the minimum travel over congested city streets is required. Some cities operate quasi-public bus terminals, others have privately-owned terminals. Either type will be successful if properly planned and located.

Proper planning and efficient use of motor truck terminals, inter- and intra-city mass transit facilities and automobile parking are all a part of the highway engineer's job in planning arterial street improvements for any city. The details of such planning will vary with the size of the city, the physical makeup of the city, and the desires developed by the locale. It would be foolish even to attempt to offer a yardstick for a solution of all these problems. Time and space will not permit of such detailed discussion. Proper collection and collation of all the facts will indicate the best and most economical solution.

Plans Ready for $1,400,000 Agricultural Fair Building

PLANS for a $1,400,000 California State Agricultural fair building were made public recently with the announcement that the architectural firm of Wurdeman and Becket had been awarded the contract for the large project, to be located on Anaheim-Telegraph Road near Maywood, adjacent to the new Santa Ana Freeway. The new buildings, primarily designed to provide facilities for the Great Western Livestock show staged annually by the 48th District Agricultural Association, and available for other community events, will eventually cover more than 30 acres and include provision for 10 acres of open-air shed, stall, and permanent exhibit buildings, a community building, four restaurants, and an administration unit.

Lighting to Save Lives in Seattle

WITH A LIFT of 30 ft., this hydraulically-operated truck platform is used for installation and maintenance.

Pedestrian fatalities in traffic accidents at night result in a long-range program to install adequate lighting at danger zones on streets carrying 75% of the city's traffic

DURING THE PAST 14 years the lives of 625 **pedestrians** have been snuffed out in night traffic accidents on Seattle streets.

J. W. A. Bollong, Seattle's Traffic Engineer, whose traffic experience dates back more than a quarter century, says that 40% of these lives could have been saved by modern traffic safety lighting. He backs up his assertion with statistical studies made in his own and many other cities.

Aroused to this needless waste of life by a campaign which Bollong himself spearheaded, Seattle citizens in a recent election voted 4-to-1 in favor of a $4,000,000 bond issue to install modern lighting over the danger zones. Work has now started on a plan, which, over a period of years, will provide approximately 1,300 lighting units on 333.7 mi. of city arterials. These streets carry 75% of the city's traffic and comprise 20% of the total mileage of streets and avenues.

Early day street lighting was placed at intersections as a deterrent to crime and to permit reading of street signs. Horsepower in the flesh involved no traffic hazards at 5-mi. speeds. This pioneer lighting gave way in the 1920's to ornamental lighting with a Chamber of Commerce flavor. It was good enough for Model T traffic at 20 mi. an hour. From the lighting standpoint, however, it was poorly placed, threw most of its light to the sky, and has been found totally inadequate to move present day heavy traffic at higher speeds with safety.

In addition to serving traffic, it is known from statistical studies, that modernized lighting will also provide an effective curb on crimes of violence.

Modern requirements

In striving for night safety on city streets the problem is to provide properly distributed illumination, of sufficient intensity to produce the visibility required for safe, comfortable and convenient use. This will be met in Seattle by the installation of pendant type luminaires mounted 25 to 30 ft. above the roadway. The objective sought is to place more light on the pavement, to silhouette pedestrians and other objects, to create greater pavement brightness, and to reduce glare.

The latter point is of particular importance. It will be accomplished by use of proper control devices in the luminaire itself, such as shielding of the light source, diffusing glassware, and in mounting at heights which offer minimum interference with the observer's line of vision.

Seattle will use mercury vapor type aluminum lamps. The level to be aimed at will be a uniform distribution of 1.0 foot-candle on the pavement. Several types of luminaires will be used, placement depending on street widths, side or center of street mounting, and other factors. Both 16,000 and 21,000-lumen sizes will be used, depending on intensity of illumination desired, with such heavier intensity being allotted to the areas of proven extra hazard.

Installation schedule

Preceding installation, a comprehensive study of traffic flow on all major Seattle streets was made. Another study pinpointed both the scene of accident concentrations and time of occurrence according to hour. These combined data permitted a realistic analysis of the en-

tire arterial system and the establishment of priority ratings according to zones of greatest danger.

The installation scheme follows this priority schedule: The worst spots are corrected first; for practical purposes, however, in order to set up economical work units, danger spots will be extended sufficiently into areas of less hazard to make an efficient package for contract. Thus the work will be proceeding simultaneously in numerous areas. Four installation contractors, Van S. McKenny, Donald W. Close Co., C. B. Campbell Co., Inc., and Herbert Moss Co., are presently engaged. Several test areas are already in operation and have met with public approval. The piecemeal contracting system will eventually tie together the entire 333.7 mi. to be lighted.

The pendant luminaires will be placed on 100 to 125-ft. centers, staggered. Exceptions will be on exceptionally wide expressways where standards will be placed opposite each other for more effective illumination, and in cases where extra intensity is believed to be needed.

Suspension in the majority of cases will be by means of upsweep bracket arms 6 to 16 ft. long, on existing poles. Where poles do not exist at approximately proper spacing, new standards will be installed. Most of the electrical distribution will be by overhead system, but exceptions will be made along parkways and elsewhere to harmonize with prevailing methods. Where the electrical system is underground, cable, generally of the neoprene sheath type, insulated with latex, from 8 gauge to 12 gauge, will be used.

The installations do not require major excavation, and where same is necessary it is being done by hand because the existence of so many utilities underground usually permits little opportunity for the use of powered equipment.

Winding ladders, truck mounted and operated both by hand and power winches, are used in the installation work. Also used are hydraulically operated platforms, mounted on trucks, and activated by power take-offs on truck motors. These platforms may be lifted to heights up to 30 ft. This special working platform equipment is manufactured by the American Coach & Body Co. of Cleveland, O., and Oakland, Calif.

Port of Tacoma Quick Freeze Plant Has Eight Inches of Glass Insulation

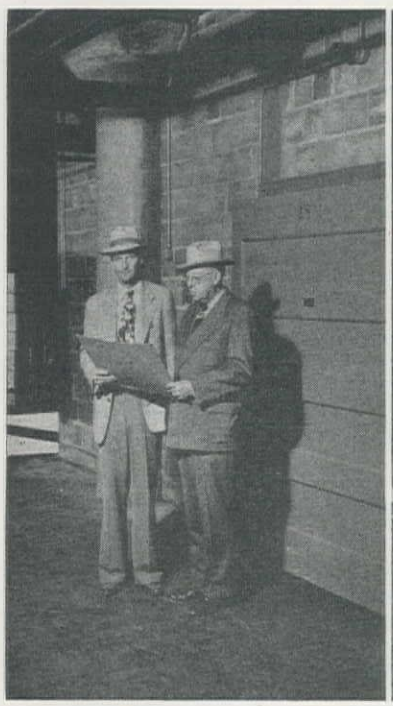
THE PORT OF TACOMA's four-story addition to its cold storage plant, now in full operation, has made it possible to quick freeze and store the fruits and vegetables of growers within a 100-mile radius of the plant.

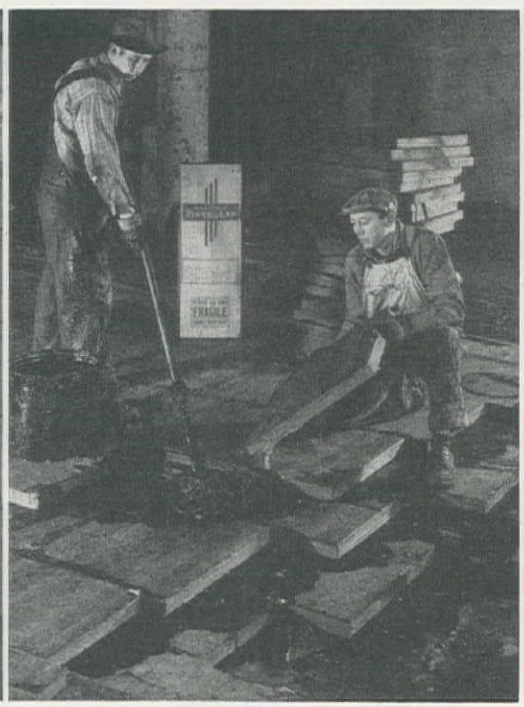
The four-story addition, 130 x 130 ft., provides over 50,000 sq. ft. of floor space. Two compressors and a direct expansion ammonia system are installed. These can be operated in conjunction with five compressors in the older part of the plant. Nearly 1,000,000 bd. ft. of Fiberglas insulation are employed to insulate wall and floor areas, and the roof.

The first floor of the addition is divided into three rooms, each equipped with spiral fin coils, with high pressure fans and air ducts, where temperatures of minus 20 deg. F., can be maintained. Wall areas of the rooms are insulated with eight inches of asphalt-enclosed Fiberglas board, faced with Hex wire and Portland cement plaster. The floor areas are insulated with eight inches of Fiberglas board, over which a 3-in. reinforced concrete wearing slab has been poured.

The three upper floors are also each divided into three rooms, similarly insulated, and are equipped with pipe coils hung from the ceilings. Temperatures on these floors can be maintained at minus 10 deg. F.

DIRECTING the project were James Purvis (left) of Construction Engineers and Contractors, and George W. Osgood, chief engineer for the Port of Tacoma. View at right shows laying Fiberglas board to provide an 8-in. insulation topped by a 3-in. reinforced concrete wearing surface.





Test of insulation

As a test of the operating efficiency, when the addition was ready to start operating, temperatures were brought down to minus 20 deg. F., on the first floor, and minus 10 deg. F., on the three upper floors. The cooling equipment was then shut off for 24 hr. During this 24-hr. period the temperature rise was not more than one to two and a half degrees in any room. Outside temperatures averaged 68 to 79 deg. F.

G. W. Osgood, chief engineer for the Port of Tacoma, served as chief engineer on the construction of the addition. The engineer-architects were Smith and Murray, Tacoma. The general contractor was Construction Engineers and Contractors, Tacoma. Fiberglas insulation was installed by Cork Insulation Co., Seattle.

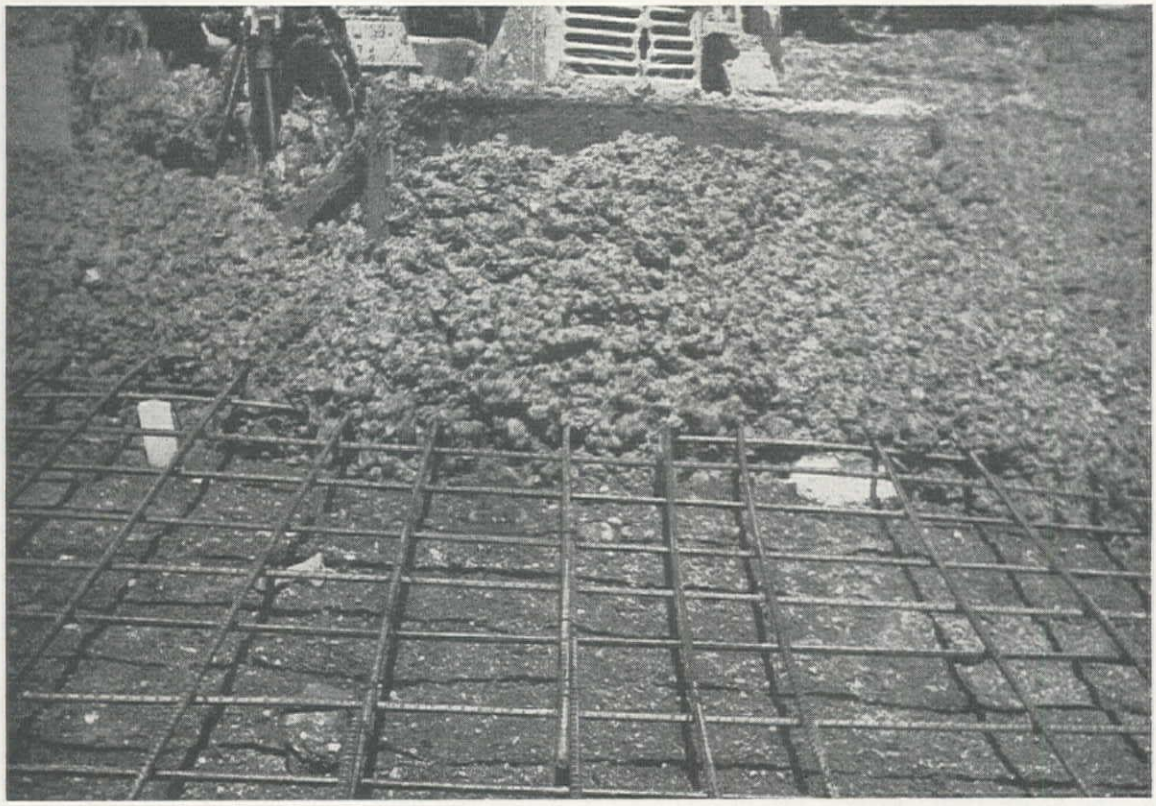
Second Unit Completed for Water Treatment Plant

DEDICATION ceremonies on August 31 marked the completion of the $4,000,000 second unit addition to the Metropolitan Water District's softening and filtration plant located 30 mi. east of the city near La Verne. The original unit of the plant was placed in operation in June, 1941. The new plant is designed to have a capacity of 620 second feet, four times the capacity of the original unit. On January 23, 1948, the Board of Directors awarded a contract for the construction of the addition to the L. E. Dixon Co., San Gabriel, Calif., for $2,592,400. Work on the plant has been under the direction of Robert B. Diemer, Chief Operation and Maintenance Engineer of the District. Design engineering was under the direction of Robert A. Skinner, while construction engineer in charge was Henry J. Mills. W. S. Squires was Project Manager for the Dixon Co., and Roy S. Knapp was Superintendent.

Los Angeles Airport Grading

EARTHWORK on the large Los Angeles airport extension is now about 85% complete, under a $3,363,731 contract to joint venturers Ball-Harms & Parker. Under the direction of Colonel Clarence Young, the airport's General Manager, the contract which was let this Jan. 10 is nearing completion over 100 days ahead of schedule.

Concrete Spread With Bulldozers



Contractor on Denver sewage treatment plant uses bulldozers to place thick-mix reinforced slab on 150-ft. diameter settling basins—Heavy coating of grease and careful washdown only concessions in unusual and effective use of equipment

"LET'S POUR it with dozers," said Job Superintendent Buck Andersen as he figured different methods of laying down a 10-in. thick concrete slab for a settling basin 150 ft. in diameter. There were several problems in the $1,447,000 contract for additions and alterations to Denver's existing sewage treatment plant, but the one of biggest concern to Thomas Bate & Sons, Denver and Houston contractors, was how to spread out the 565 cu. yd. of concrete to be placed in the bottom slabs of the big tanks.

The two 85-ft. diameter digestion tanks had already been completed with ease, for it was relatively simple to handle the concrete for these slabs with crane and bottom-dump bucket, with the regular crews in the usual style. But the job superintendent realized that the 150-ft. settling basins could not be handled in this manner, and it took some serious figuring to find a practical method of placing these slabs. Nobody had heard of using bulldozers before on a large scale concrete operation, and with no previous job experience the whole slab presented a gamble.

Bulldozers had to float

The earth had been bladed to grade, the outside circular footing with a part of the vertical reinforcing steel was in place, and the steel mesh for the slab had been set. According to the specifications, the concrete was very stiff, between a 1- and 1½-in. slump mix, and the slab that had to be poured was thick. There was no way of knowing whether or not a bulldozer would float on fresh concrete, even with a stiff mix and a thick slab to cushion the reinforcing steel. It was a calculated risk, and the rewards in time and expenses saved justified the experiment in using bulldozers to spread concrete instead of earth. The contractor's bulldozers available in the yard all had weights and track areas that indicated a track pressure of 5 to 6 psi., about the same or heavier than the pressure under the human foot. The chances for success appeared good and the decision was made to "pour it with dozers."

With superintendents and engineers on deck, the first step was to spout the transit mix over the footing and partly completed wall form, a distance of 4 ft. Next, the bulldozer was lifted with sling and crane into the tank and onto the concrete pad just poured. With more transit mix trucks and a larger concrete pad, two more bulldozers were lifted into the tank. These additional rigs, spreading and churning at open throttle, could spread all the transit mix that could be hauled by ten 5-cu. yd. mixers. As the catskinners got used to operating in a new medium, the pressure for more action made the scene of operations at the settling basin alive with activity. As many as five transit mix trucks at one time were dumping the thick mix over the wall forms, continually enlarging and thickening the ring of concrete around the circumference of the tank, while the TD-9, D-2, and Cletrac spread the pad more and more toward the center of the slab.

Two shifts, two slabs

The entire pour took a crew of 14 men and ten trucks from the Colorado Pre-Mix Concrete Co., and at the end of an 8½-hr. day shift, the 565-cu. yd. slab had been poured, spread, and backbladed to the required subgrade. This had been done without disturbing the ½-in. round reinforcing bars, meshed on 10-in. centers and placed approximately in the center of the 10-in. slab.

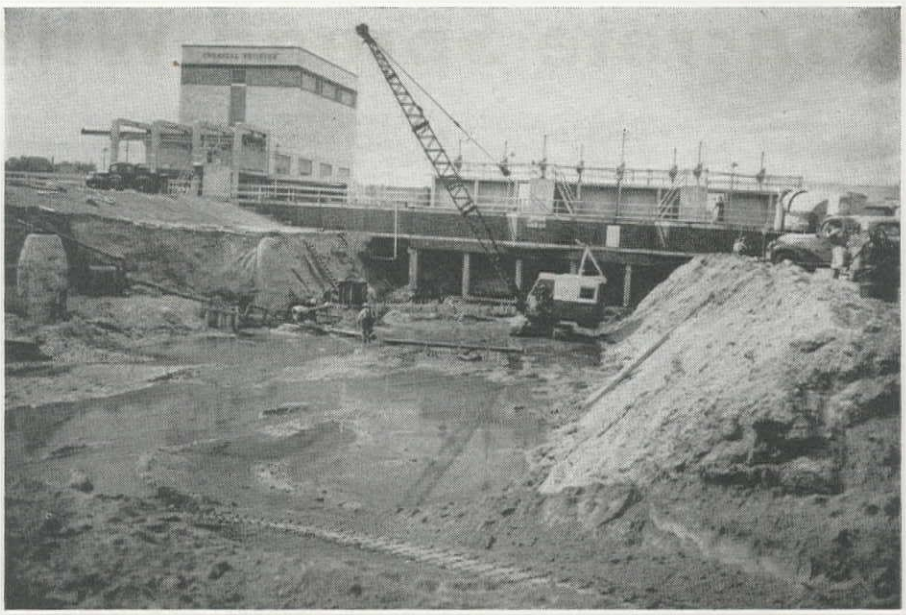
The slab on the first settling basin had been an outstanding success, and fifteen days later the method was repeated for the second basin. The slab was spread with a TD-9 and a D-6, finished by backblading, and the entire operation completed during one shift without any tractor lugs touching or moving the reinforcing bars. In two days, 1,130 cu. yd. in two slabs had been placed. Any lug marks left on the top of the slab from bulldozer tracks were left to set, instead of being smoothed out, since they would add to the bond needed for the

2-in. topping of mortar to be added at a later date. The mortar will be given a knife-edge finish to exact grade in the conventional manner, using the clarifier equipment as a screed after it has been installed.

Concrete hosed off

Careful inspection and plenty of grease went into the preparation of the bulldozers for the spreading operations. The tracks had to be in perfect adjustment. All areas of the bulldozers likely to come in contact with the concrete were given a coating of heavy grease before being lowered onto the slab. Immediately after completing each slab, the rigs were hosed down thoroughly and cleaned with great care. Special attention was given to cleaning the frames, near the push springs, and within a short time without too much effort each piece of equipment was in as good shape as it was before the pour.

Black and Veatch, of Kansas City, Mo., design engineers for the original plant built two decades ago, are consulting engineers for Denver on the present addition and alteration work. The plant was originally built with full room for the enlargement now in progress, and space is now being reserved for an additional two settling basins that the city anticipates will be required in a few more years. Located at 51st Ave. and Marion St., on the north edge of Denver along the South Platte River, the original structures of the plant lie in attractive surroundings with well-kept lawns. The new buildings will resemble the original ones, retaining the same pleasing architectural design. The new digestors and settling basins are duplicates of the original structures, and the walls of the new tanks will be finished with the same kind of face brick as that originally used. Approximately 35% of the $1,447,000 contract will be completed Oct. 15.



SUMMER RISE in ground water soaks excavation site for the digestors. The Lima's tracks are not on sleds, but rest on the smooth rocks and coarse gravel prevalent on the job. The style of the chemical building, shown here, is being continued on all new structures above ground.

Completion in May, 1950, of the additions and alterations to Denver's existing plant will greatly increase the city's treatment capacity, at the same time salvaging more dried sludge and methane gas. Being constructed under the contract are four sludge drying beds, two digestion tanks and control building, two settling basins with a distribution structure and sludge collecting equipment, a new pumphouse for the sludge pump, over-flow structure, grit removal tank, mixing basins, blower house for the aeration basin compressor, supernatant liquor settling tank, and enlargement of the administration building. The connecting flumes between structures are all box sections. The contract includes 29,000 cu. yd. excavation, 25,000 cu. yd. common fill, 8,000 cu. yd. concrete, and 32,000 sq. ft. face tile.

A rise in ground water in the early summer caused some difficulties in the excavation for the digestors, and pumping is still required in many instances to keep the infiltrated water level to a minimum. For the entire job there were three 6-in., one 4-in., and two 3-in. pumps required at full capacity.

The entire project is under the supervision of Terry J. Owens, City Engineer, and Charles A. Davis, City Sanitary Engineer. Frederick C. Amos is Resident Engineer. Field work for the contractor is under the direction of Kris Nielsen, General Superintendent, and Buck Andersen, Job Superintendent. Bert Wilson is the contractor's Office Engineer.

Subcontractors on the project include Denver Plumbing & Heating Co., and the Sturgeon Electric Co., Denver. Link-Belt Co. is supplying the grit removal equipment, including a straight line drag collector, fine and coarse cleaning screens, and sludge collector for the settling basins. Pacific Flush Tank Co. is supplying the floating covers for the digestors, and the sludge heaters.

Economy Form stamped steel form walls were used to pour the tank walls of the digestors and basins. These walls vary in thickness from 12 to 20 in.

CONCRETE PAD rapidly takes shape as transit-mix is spouted over circular footing and spread around circumference of slab. Entire slab of 565 cu. yd. was poured and spread in little over one shift, using a crew of 14 men and a strong battery of transit-mix trucks. No special supports were needed on the reinforcing steel as equipment floated on the thick mix.

Stanford Research Institute Schedules Smog Conference

NATION-WIDE scientific activity in the field of air pollution has grown to such magnitude that a National Symposium on Air Pollution, presented by the Stanford Research Institute in cooperation with the Calif. Institute of Technology, the University of Calif., and the University of Southern Calif., will be held on November 10 and 11, it was announced recently. The symposium will be held at the Huntington Hotel in Pasadena, Calif.

Street Improvements for Kalispell

Montana town boomed by Hungry Horse Dam project paves six-track railroad crossing of Main Street—Highway work by Montana Highway Department is extensive in vicinity of major reclamation project

By
W. E. WHEELER
Kalispell, Mont.

KALISPELL, Montana, is centrally situated in the broad Flathead Valley north of Flathead Lake. This lake, with a surface area of 189 sq. mi. is the second largest fresh water lake west of the Mississippi, exceeded only by Lake Tahoe with a surface area of less than 10 sq. mi. greater.

Before the war. Kalispell was a quiet town of approximately 8,500 people, whose livelihood was dependent upon agriculture and lumbering.

With authorization of Hungry Horse dam in 1944, and with an appropriation of $2,500,000 being made in 1947 for the initiation of construction by the Bureau of Reclamation, the community realized that the dam was to become a reality and that a sizeable payroll would be available to provide the needed impetus for expansion of retail business and allied services. It was assumed that the prosperity created by the Hungry Horse Dam project would continue after the dam is completed, as the Act of June 1944 also authorized the construction of the Kalispell irrigation project, comprising approximately 44,0000 ac. of irrigable, fertile lands.

Expansion taxes streets

With this expanding economy in view, new business ventures were opened up on North Main Street, "across the tracks" from the old established business district. Main street is also a portion of U. S. Highway 93, which extends from the Canadian Border to Yuma, Ariz. on the Mexican border.

The old surfacing on North Main Street had not been designed to carry heavy through and local traffic of the magnitude which developed with the coming of Hungry Horse Dam and the postwar tourist travel. Consequently, poor drainage, the fact that only the middle of the street was oil-surfaced, and that there were no curbs or gutters, made North Main virtually a road block in early spring when the frost was leaving the ground.

U. S., State, City cooperate

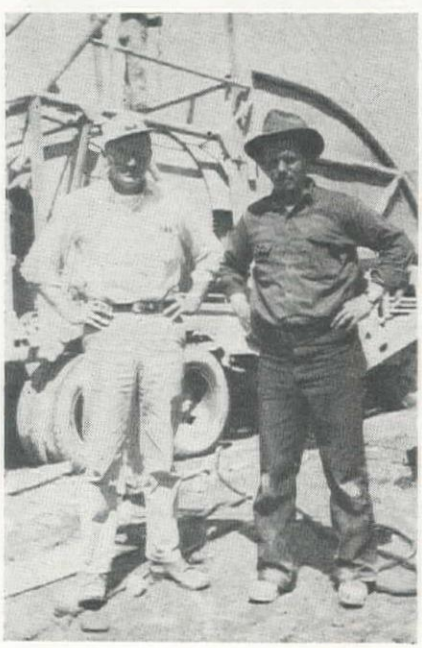
To correct this impossible situation, a contract was awarded to Kirkpatrick Bros. of Kalispell, on their bid of $69,047 to pave and construct curbs and walks for a distance of 0.243 mi. The work was performed under the direction of the Montana Highway Dept. as this is a link in the State and Federal Highway systems. The Federal government is paying 57%, the State 18% and the city 25% of the cost. The city's portion will be in turn assessed to the property owners by means of a special tax.

Kirkpatrick started operations May 16 and the job was completed Sept. 1. The first two weeks of work found the contractor scarifying, ripping and removing excess dirt and the old oil road surface from the west ⅔ of the street for a two-block distance, extending from U. S. No. 2 on the north to the railroad tracks on the south. Two-way traffic was permitted on the east portion of the street until it was necessary to close this also in order to continue with the excavation work.

Railroad crossing job

While work was going forward on this section, the railroad crossing was getting special treatment. Six tracks (four switching) of the Great Northern Railway cross the street at right angles in a 150-ft. section of the street. Kalispell is on a branch line, which meets the main line at Columbia Falls, 16 mi. to the northeast, and extends to the west 25 miles to the small lumbering town of Marion. The principal trackage is thus used for sidings and warehouse unloading purposes.

STREET PROJECT was directed by WM. J. HEBERT, project engineer, state highway department, left, and TED KIRKPATRICK, superintendent for Kirkpatrick Bros., contractors.



Continuous lengths of welded 115-lb. rails from 75 to 100 ft. in length replaced the old rails. The wheel trough was formed by welding the head of another rail to the inside edge of the first. This will prevent spalling of the concrete and will facilitate the removal of dirt, snow, and ice in the winter. The roadbed for each track was excavated approximately 24 in. below top of rail. The rails were laid and spiked on treated ties and placed on the excavated roadbed. Ballast of 1½-in. river gravel was then placed on the top of the ties. The entire rail and tie assembly was raised to finished grade with the ballast being worked under and around the ties. The ties and rails were then encased in concrete leaving the rails flush with the street surface. Each set of rails was thus formed in alternate operations.

Concrete placed in panels

Steel forms were used in alternate panels for forming the lateral street paving panels. The forms were keyed horizontally to prevent settlement between the adjacent blocks, no reinforcing dowels being used at the joints.

The portion of the streets north of the tracks is 62 ft. wide from curb to curb. The concrete is placed on 12-in. of compacted gravel and sand sub-base in continuous panels 12 ft. 4 in. wide. The finished paving is 10 in. thick, being thickened to 11 in. at the joints. This gives increased shear strength in lieu of the reinforcing dowels often used in such joints.

A 2-cu. yd. Mixermobile placed between the form panels discharged directly on the gravel-sand base. A gasoline motor actuated screed leveled and tamped the concrete mix. Gravel and sand in batch size were dumped from trucks into the loading hopper. The mix consisted of 6½ sacks of cement to the cubic yard. Darex air entraining agent was used to increase workability.

Ted Kirkpatrick was the job superintendent for Kirkpatrick Brothers. Wm. J. Hebert was Project Engineer, representing the State Highway Department. Ray Spurzem is District Engineer and Fred Wells is the Resident Engineer in the Kalispell District.

Other projects in area

The North Main Street project is the smallest of four projects being completed in the immediate vicinity of Kalispell this summer at a total cost of $972,000.

S. Birch and Sons of Great Falls completed their $377,468 contract for grading and surfacing 6.82 mi. of No. 2 Highway beginning near Kila 6 mi. west of Kalispell. This contract involved considerable heavy rock work in limestone

PAVING OPERATIONS were centered around a 2-cu. yd. Mixermobile (top) which was charged from trucks backing up ramps and unloading directly into hopper. The mixer was operated between the form panels and discharged directly onto sand base. Screeding (center) and finishing (bottom) included marking contraction joints with folded insert of building paper.

and the building of fills across deep swamps, which accounts for the sizeable expenditure on their project. The grading and rock work was accomplished last summer and fall, with the oiling being done this June.

The Union Const. Co. of Great Falls has just completed their $294,846 contract for constructing approximately eight miles of U. S. 93 between Kalispell and Somers. This portion was completely rebuilt by widening, realigning, and laying of rock and sand sub-base for heavy traffic. For most of the distance the road is constructed across clay and low lying alkali flats where good drainage is essential. All excavation, sub-base and the gravel-sand base course were completed last fall. The laying of the oil mat was completed the forepart of August this year.

Last of the major highway projects to be completed is that of resurfacing 14.5 mi. of State Highway 35 from the junction at U. S. 2 to Bigfork. The F. and S. Const. Co. (Finlen & Sheridan) of Butte had this contract in the amount of $230,692. Grading, spreading gravel and laying of the oil mat was all accomplished during the months of May through August.

Trans-Mountain Diversion Predicted by Sec. Krug

PREDICTIONS that water from the Pacific Northwest will be used as far south as San Diego and as far east as Denver were made by Secretary of the Interior, Julius Krug, in a letter to U. S. Representative Stockman of Oregon. The letter stated that the Bureau of Reclamation has barely begun its study of the proposed transfer of water and that little data are yet available.

In the letter, Krug wrote, "The idea was conceived primarily to utilize the excess flows of the Pacific coastal streams such as the Rogue and Umpqua Rivers, and if necessary, the Columbia River, diverting them southward to areas in need of additional irrigation and municipal water supplies. Whatever course such a diversion may take, other watersheds will need to be crossed enroute and possibilities exist for picking up additional excess flows in these intermediate watersheds."

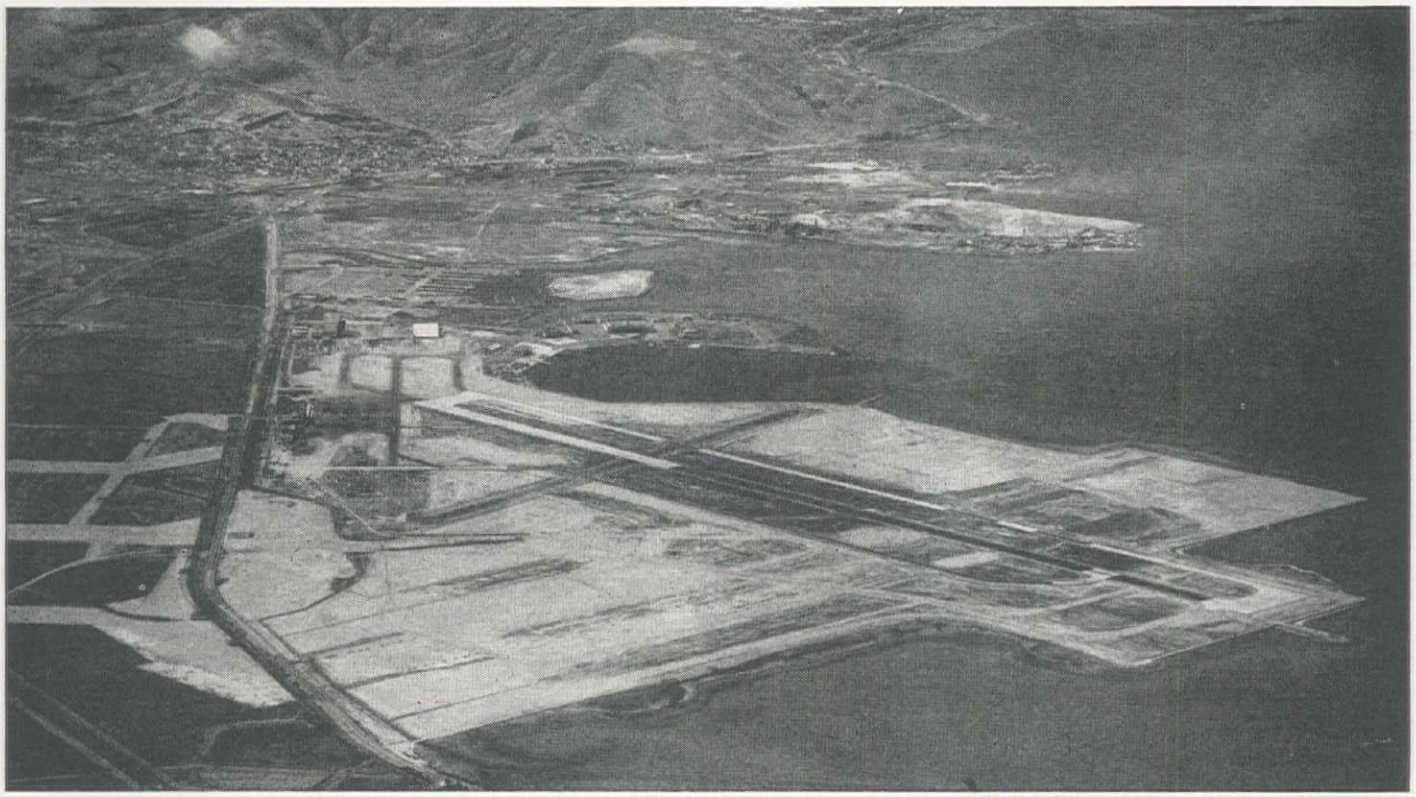
Emphasized in the letter were the facts that the Bureau of Reclamation is interested only in utilizing water which would not be needed in the Columbia and Willamette Basins, and that studies are in the earliest stages and designed only to determine whether such diversion plans might be feasible from an engineering and economic standpoint.

Extension of Gas Pipeline Approved for Colorado

COLORADO Interstate Gas Co., of Colorado Springs, Colo., has received Federal Power Commission authorization to construct additional facilities designed to increase the daily capacity of the company's natural gas transmission system by 62,000,000 cu. ft. per day. Estimated cost of the project is $4,328,930.

The expansion program involves an increase to 181,000,000 cu. ft. in the daily capacity of the company's pipeline connecting the Hugoton Field, Kans. and Denver, Colo. The program includes construction of 38 mi. of 20-in. main line loop on the Hugoton pipeline in the vicinity of Denver; installation of three 1,200-hp. compressor units at the Lakin station at the Hugoton Field; and construction of a new 8,400-hp. compressor station on the Hugoton pipeline near the town of Kit Carson, Colo.

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



SAN FRANCISCO is proceeding with construction of a municipal airport on the shore of San Francisco Bay, 14 miles and one hour's time from the heart of the city. A freeway passes the site and winds along the shore toward the city.

Airport Location— Arbitrary Action the Worst Method

In order to really serve the public, airports must be located in easily accessible areas, and only after cooperative consultation by flyers, engineers, economists and airline customers, otherwise waste, lost time and inconvenience result

By
R. W. F. SCHMIDT
Manager
Tucson Airport Authority
Tucson, Ariz.

FOR MORE YEARS than this writer cares to remember, he has been proclaiming the existence of three prime factors which must be considered in the development of the airport, be it a site or a system: Aeronautical, Economic, and Engineering. Each of these factors is a field of research in itself, but the deft blending of each with the others in harmony and balance is a specialized field, too loosely called airport engineering. When the Gods Who Fly dominated the selection and improvement of landing fields, mortal man was afraid to give voice to an opinion, and even today the spectre of one of these hardy characters standing in the background thoughtfully chewing his cud overwhelms the novice practitioner of airport development.

Then along came the engineer, and none too civil was he as he discovered the new heifer called "airports" in the pasture next, jumping fences and trampling flowers in anxiety to get into greener fields and demonstrate its virility. For awhile he charged up and down, snorting at the Gods, hunting the elusive decimal point and bawling at any who would listen, but now he repents as he looks wistfully at the ruined turf and nervously observes the tweedy shape of the economist leaning on the toprail awaiting his turn. None of these representatives of the factors involved likes to recognize the need or value of the other, though each has frequently attempted to pass himself off as a triple-threat man.

The Fly-Boy has never been able to reconcile the ideal with the practical and for a couple of decades he got by with nebulous references and generalizations which mere groundlings couldn't challenge. Then airports began to cost money, and the contractors, material suppliers, and equipment manufacturers sensed a sizable business potential, a fact best illustrated in that the first federal appropriation for a national system of airports not identified with relief—DLAND 1940—had no topside support in C.A.A., got little encouragement from aviation sources, and was opposed by W.P.A. brass, but nonetheless was ably lobbied into being by A.R.B.A. and A.G.C.

Engineers and the bureaus

It was inevitable that the engineers would follow this cue, and in the space of a few months there were so many design discoveries and dire predictions that it got so a body was afraid to step outside his house, what with the evils of repetition of load and saturated bases lurking about. After quite a heyday during which period Uncle Sam's money was copiously employed to dredge up drowned theories, it has become apparent to the engineer that there are no formulae nor are there convenient hand books replete with graphs and tables with which he may calculate and compute the impact and effect of airport site selection and design upon operating utility, revenue productivity, and public acceptability. The slip-stick may have been giving some right answers, but certain questions cannot be asked of

that medium, and it is interesting to note the concern of the engineer as it dawns upon him that he is taking the rap for high airport costs and inefficient installations.

Visible evidence of this concern may be seen in the attacks on the airport engineering design standards of the C.A.A. by various civil engineering groups. The early C.A.A. and predecessor Bureau of Air Commerce airport development personnel were sired by Fly-Boys and damned (sic) by civil engineers, but after barrages of exhortations from the temples of the mighty, the government men slowly yielded to more cautious and more costly criteria. Now they find themselves charged with ultra-conservatism by the high priests who drove them to refuge, which trick is known as the smokescreen of the accusing finger, a dodge often used to cover mistakes and one not employed exclusively in engineering circles.

Airports MUST be accessible

Site selection, originally controlled by land cost, has in turn been controlled by aircraft performance, by estimates of construction cost, by engineering design standards, by public opinion, and by a combination of all five. Although a few persons in every city or town still vigorously resist progress in one form or another, an air-transportation-conscious public is now demanding (1) close-in airports or (2) ready access to airports by surface means, and the importance of public opinion in this phase of airport development must be recognized. Distance from town in miles proper is unimportant—the time in minutes is the yardstick. But all time is not to be measured to the center of the business district, for economic and geographical influences, the type of operation emphasized, and the number of other permanent airports serving a like need all affect the directional flow of surface traffic. It often happens that an airport supported by one community is of more value to the citizens of other communities.

When airline patronage and the operation of personal aircraft became big business, the highway planners began to pay some attention to the cries of airport users, but as is so often true after being awakened from a sound sleep, the reaction brought some erroneous conclusions. For airports already a long way removed from downtown areas, there was immediate talk of freeway construction to the heart of the city. Granting that cities with a highly developed mass transportation system focusing on a concentrated business and hotel center such as Chicago's Loop do need such development to accelerate the flow of traffic between one or more airports and the nerve center, studies of the origin and destination show that the great majority of passengers do not start or stop their trips there.

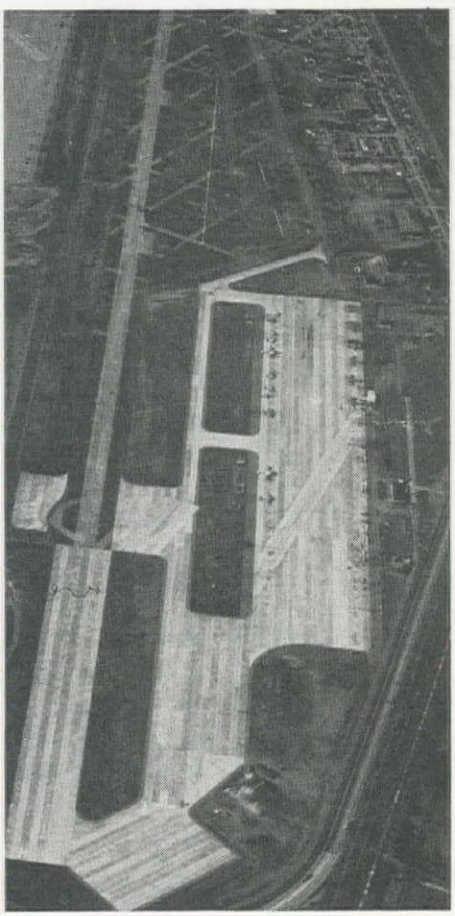
While ostensibly coming from or going to downtown, they are coming from the suburbs and beyond and they are going to similar places. It can be shown that periphery highways and mass transportation services are generally of more importance than freeways to down town, and while the volume of traffic on any one such periphery may not justify construction to freeway standards, the public convenience and necessity will be better served by such secondary coverage.

Multiple runways a false premise

A lot of idols have been smashed and more are to be broken as the airport moves into proper relationship with community existence. One, on the aviation side, is a vestige of the General Land Office subdivision influence and it dies a gallant death, for in the process of obtaining quarter-sections and sections support is inherently given to the three and four runway alignment layouts. Multi-alignment landing strips hark back to the days when nearly all approaches and take-offs were made over trees or wires, fields were short, gradients were variable and often too much so, aircraft had no brakes, engines weren't reliable, propellers weren't efficient, and sensitivity to wind direction and velocity was made more acute by these conditions.

Without the much-heralded crosswind landing gear, however, it has already been well established that one alignment airports can handle the majority of situations, and that at most two will do the job for all types of aircraft and operation. Save and except, then, for parallel alignments to handle large volume or for super-terminals where unorthodox treatment is employed, site selection has become less exacting as to area required and the number of runway alignments to be located thereon.

SEATTLE is abandoning close-in Boeing Field, shown here, in favor of a magnificent municipal field several miles further from the city. Castered landing gear removed objections to single runway.



Realty values not injured

On the lay side, a once popular fallacy has been put to rest—that airports adversely affect real estate values. A year or so ago it was believed necessary to conduct surveys and compile statistics to prove that they didn't, but the research so quickly and completely refuted the arguments that its continuation would have been asinine. It is quite true that some people prefer not to live in the vicinity of an airport, frequently because of unfounded fears of falling aircraft or because of noise, but for every one who actually moves away or refuses to live in such proximity, five can be found who'll take his place.

Although occasionally claimed in airport nuisance suits and in opposing airport development, there is no case on record where the bona fide sale of real estate has been for less than the prevailing market for otherwise acceptable property in the same trade area, and the decline in value, if any, has not been caused by the presence of an airport per se. In fact, the contrary is true; property values usually rise faster near an airport, and if immediately adjacent, becomes almost priceless if the airport owner seeks to buy!

Public ownership is important

Airports which purport to serve a community or to round out a metropolitan area plan, as apart from airports identified with privately owned recreational areas or remotely situated industries, should be publicly owned if for no other reason than to insure their perpetuity. Any airport worth operating privately while serving a reasonable public need is worthy of public ownership. The proof of this statement is seen in the steady increase in the number of public or municipal airports and the decrease of private or so-called "commercial" airports from an all-time high of 3,020 to 2,758, as of July 1st. This decline, which continues, is not because of public competition with private enterprise, but represents conflict of the laws of economics.

Except where land values are low, it is not possible to produce enough revenue from aviation activity alone to pay for the seventy-five to ninety per cent of non-revenue producing area. Engaging in other activity requires more capital, increases overhead, and brings about higher values and taxes. The private airport owner soon finds it more profitable to sell, lease, or use his land for higher revenues, or he may find that, lacking capital and power of eminent domain to expand or protect his investment, he is stalemated.

Municipalities need help

Public ownership, however necessary, has not been correctly vested. The average municipality has no business owning, much less attempting to operate, an airport because the typical municipal airport serves a much greater trade than

generally contained within the corporate limits. The typical municipal airport is usually outside those limits, situated well beyond the effective police and fire protection of the city government, often having its independent water and sewer plants, and otherwise creating situations of inefficiency, duplication, and unnecessarily high cost. The load should be shifted to a larger beast of burden—to the county, to a special tax assessment district, to an airport authority, or to the state, so that initial and capital costs as well as any operating deficits are spread over the greatest practicable area.

While assumption of the responsibility of ownership by a larger subdivision of government may not reduce original costs, it is certain to have marked effect on subsequent operation and maintenance, particularly if more than one airport is owned by the instrumentality. Obviously both maintenance personnel and equipment can be consolidated unless distance between sites is prohibitive cost-wise.

Private enterprise has its place, too

Private enterprise need not be eliminated from the operational phase of public facilities, however. At Tucson a private non-profit corporation of local business men has completed its first year of operating a so-called white elephant war facility, a prewar municipal airport expanded in some respects beyond all normal needs and left completely deficient in other aspects. While too early to predict unqualified success, the venture has definitely accomplished more than was expected of it and gives promise of being worthy of trial elsewhere.

Private corporations exacting a profit from operation of public facilities have also established themselves as possible solutions to operational demands. Private management of public airports does have one advantage—flexibility. Ability to take quick action when required. It is not, however, a solution to be deliberately sought unless it has been demonstrated that public management has failed or is incapable. Failure and inability do not necessarily add up to incompetence, but may exist because government is inescapably bound by law and tradition to procedure or custom which can't keep pace with air-age events.

"One-purpose" airports—phooey!

While it is newsworthy today to expound upon the philosophy of single purpose airports, that is, for scheduled air carrier, air freight, personal flying, and perhaps training, most of that kind of talk is the result of sealed-brain thinking. While exclusion of certain types of operation on a limited number of airports is probably necessary for reasons of air traffic, restricted ground space, and, of course the limitations of the airport itself with respect to runway length, bearing capacity, and navigational aids, in general the airport large enough to accommodate the scheduled air carrier—trunk or feeder—is going to have to provide for everyone else.

The air carrier airport is usually the most active and best equipped, and the other types of operation are going to avail themselves of these facilities if possible. Notwithstanding propaganda put out by certain personal aircraft manufacturers and the uses to which flying farmers, contractors, and salesmen put their aircraft, all of them prefer the dustless, mudless, and lighted airport to the hayfield.

Duplication of all desirable facilities at secondary and tertiary airports is possible only in metropolitan areas of considerable size and wealth, and in time a number of relatively poor fields which have thus far been able to survive, and even prosper, will pass into oblivion.

Professional airport management

The greatest single error made in airport site selection and design is the neglect of management. Very few airport managers have had a hand in the selection of new sites; in fact, few new airports have had managers until just before the dedicatory services.

Operation of an airport is a business, and it is fundamental that business must be managed. It doesn't seem reasonable to saddle management with a plant about which it has had little or nothing to say, yet that is being done by local and federal governments, aided and abetted by engineers, contractors, material suppliers, and equipment manufacturers. Some day the expenditure of public funds for individual airport development will be withheld until a plan for management is presented as a prerequisite. Until that day, we can expect more waste of our money and a continuation of the muddled thinking which prohibits optimum utilization of public airports and air transportation.

The usual style of planning

It is true that very serious study has been put forth in planning airline terminal facilities and it is also true that in a few instances this study has been extended to cover all operational, revenue, and maintenance phases of the entire airport. Percentage-wise, however, these cases are in the minority and may even be said to be isolated.

While uninterrupted flow of passengers, baggage, mail, and express through a terminal is important, such items as transitory storage, pickup, and disposal of waste-paper and garbage are treated too lightly. A catch basin is designed so that it defies maintenance and windows are placed so that one man can't clean them. A cashier's desk is placed in an obscure corner and seats for waiting passengers are unceremoniously dumped in a blinding glare or in drafts. Elaborate precaution is taken to provide for a couple of airline limousines or a half dozen taxis, but three hundred private cars are swept into a sump by lettering "car parking" across an area on the map unsuited for any other use.

Airport location and design are significant only when they serve the proper ends—operating utility, revenue productivity, and public acceptability in their fullest implications. The answers cannot come from any one man or from any single profession or from any lone segment of the aviation industry. They can come only from careful consideration of the respective needs and views of all concerned. The proof of this is that quite a few sites well located from an aeronautical point of view and meticulously designed to high engineering standards aren't thriving while airports less acceptable on these premises but offering more of the tangibles in convenience and service are competing successfully.

Reclamation Projects To Be Advertised Soon

INVITATIONS TO BID will be issued by the Bureau of Reclamation on a number of large and interesting projects in the next few days. The anticipated date of advertisement and brief description of the work follow:

About Oct. 19: Construction of 9.6 mi. of concrete-lined Wellton-Mohawk canal about 12 mi. east of Yuma, Ariz., also relocation of about 4.5 mi. of county road; building and installing equipment in the Coolidge Substation at Coolidge, Ariz.; relocation of 6 mi. of county roads at Medicine Creek Reservoir, near Cambridge, Nebr.

About Oct. 27: Construction of a weir type measuring control near Alcova, Wyo.; and installation of electrical and mechanical equipment and hydraulic machinery in Anderson Ranch powerplant and switchyard 20 mi. east of Mountain Home, Idaho.

About Oct. 31: Enlargement of 4.6 mi. of Fire Mountain canal on the north fork of the Gunnison River, near Somerset, Colo.; and construction of roads, parking areas and recreational facilities at Enders Reservoir, near Enders, Nebr.

In addition to the above projects, upon which advertisement dates are established, the following jobs are contemplated within the next two months: Keyhole Dam, an earthfill structure 109 ft. high and 3,300 ft. long, on the Belle Fourche River 18 mi. northeast of Moorcroft, Wyo.; Tecolote Tunnel, 7 ft. in diameter and 6.4 mi. long from Cachuma Dam to near Goleta, Calif.; 10 mi. of 48-in. reinforced concrete pipe from Tecolote Tunnel outlet to Santa Barbara, Calif.; relocation of 19 mi. of single track railroad at Trenton damsite, near Trenton, Nebr.; and installation of motors, pumps, etc., in Granby Pumping Plant, also towers and equipment at Granby Switchyard, 6 mi. from Grand Lake, Colo.

Canals to be constructed within the next two months include: 18 mi. of the Delta-Mendota canal near Firebaugh, Calif., and the 5,800-ft. Firebaugh Wasteway; 17 mi. of the Friant-Kern canal near McFarland, Calif.; 15.5-mi. of the West canal near Quincy, Wash.; 13 mi. of the East Low canal and 3.3 mi. of the Weber Wasteway, 5 mi. east of Moses Lake, Wash.; 8 mi. of the Superior canal, near Superior, Nebr.; and 5 mi. of the Poudre Supply canal from Horsetooth Reservoir, Colo.

Portraits of Five City Engineers

Representative of the highly-competent, well-trained engineers to whom has been entrusted construction in the West's great cities, these men do their job well

Lewiston, Ida.

WILLIAM P. HUGHES, City Engineer of Lewiston, Idaho, is a man who believes that much is to be gained for himself and his city, and much is to be shared with engineers the world over, through active participation in professional activities. While extremely active in such time-consuming work, he has for twenty-five years directed engineering and construction of public works projects in Lewiston, valued at more than $5,000,000, in an efficient and effective manner.

Hughes was born in Los Gatos, Calif., and attended both the University of Washington and the University of California. For the first 15 years after college he engaged in a wide variety of engineering activities, including surveys on the railroad tunnel under Seattle, railroad work in California, valuation work on railroads for the Interstate Commerce Commission, and a hitch in the U. S. Engineers during World War I, locating railroads. He was chief engineer of the Klamath Development Co., Klamath Falls, Ore., and for four years was a locating engineer with the Idaho Highway Department.

In 1923, however, he assumed the position he has held ever since, as City Engineer of Lewiston. His work, as is usual with such positions, has included all phases of engineering, but one of his recent achievements, and one of which he is very proud, is completion of a million and a half dollar municipal airport. The Administration Building, to cost $150,000, is still to come.

But with the work, he has found time to belong to and take active part in the activities of all these organizations: Past president, Northwest Section of A.W.W.A. (by which he was awarded the George Warren Fuller Award for distinguished service in the water supply field); Past-president, Spokane Section, A.S.C.E.; Idaho Public Employees' Association; Idaho Public Health Association, (first president and now on the Board of Directors); University of Idaho Research Council (Advisory Board); A.R.B.A.; Idaho Safety Council; American Military Engineers; International City Managers' Association.

He is Secretary-Treasurer and Past President of the Pacific Northwest Sewage Works Association (and holder of its Kenneth Allen Award for distinguished service in the field of sewage treatment works); Vice-president of the Northwest Aviation Council; for 12 years a member of the Idaho State Board of Engineering Examiners; Past President and now Chairman of the Legislative Committee of the Idaho Society of Engineers; and Idaho Chairman of the American Public Works Association.

Hughes is one of the busiest city engineers in the West, one of the finest, and one of the happiest.

HUGHES

Fresno, Calif.

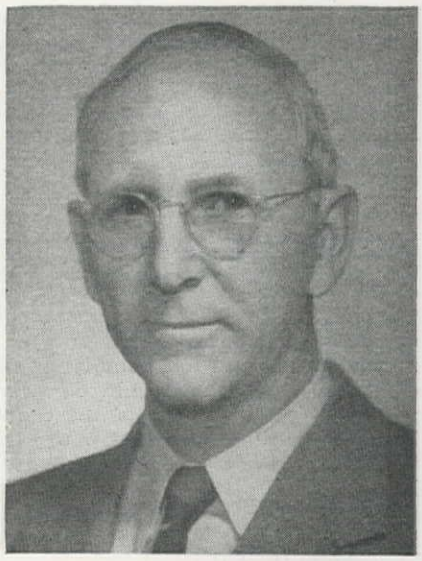
A. SEGEL, City Engineer of Fresno, Calif., has been a resident of that city ever since World War I, from which he emerged with the rank of Lieutenant in the Coast Artillery.

Graduating from Kansas State College in Civil Engineering in 1912, he spent several years prior to the War in various engineering capacities in Illinois and Iowa, but with the close of hostilities he recognized Fresno as the spot for him to settle and "make his mark."

Although his career in the Central California metropolis has necessarily brought him into contact with various types of engineering design and construction, his specialties throughout have been paving and sewage disposal. His first position in his adopted city was that of office engineer with the County of Fresno, during a period when a five million dollar highway program was under construction by that office. Following completion of that program he became office engineer for the City of Fresno, during the years 1921 to 1923, when an extensive paving and sewer program was under way there.

From 1924 to 1944, Segel established his own consulting engineer practice in Fresno, which included acting in a City Engineer capacity for various San Joaquin valley municipalities. Highlights of the period were design of several sewage disposal plants, two highway-railroad grade separation structures, many subdivision layouts, and engineering for road improvement districts, including bridges and mountain highways. Again highways and sewerage dominated his activities.

In 1944 he became City Engineer and Deputy Commissioner of Public Works, and it is difficult to think of a man better fitted to carry to successful conclusion the responsibilities which the rapid growth of that city have put on the office. During his incumbency the city has installed a sewage disposal plant costing seven hundred thousand dollars, airport improvements valued at $125,000 and approximately 71 miles of sanitary sewer.



SEGEL

Currently being constructed under Segel's direction is a 48-in. interceptor sewer, contract price $568,600, and planned for early installation are about two million dollars' worth of additional sanitary trunk lines and interceptors. Street widening, a city-wide storm drain program, and the lining of canals at the Municipal Farm are all projects for early development.

With a great capacity for hard work, and training and experience in the very lines for which Fresno has the greatest need, Segel is truly a well-placed engineer, and one of which his city can be justly proud.

Tucson, Ariz.

GLENTON G. SYKES, City Engineer of Tucson, Ariz. since June, 1944, as might be expected in view of the critical water situation in and around his city, has a background richly filled with experience in the field of water conservation and use.

His earliest engineering work, during the summer vacation of 1920, was in this field, when he was employed as a junior irrigation engineer in the vicinity of

SYKES

Tucson. Then his first major job after school was in the same field, for he was a junior engineer at Bright Angel gaging station on the Colorado River at Grand Canyon for one year. Then for two years, at Andrade, Calif., he was an assistant irrigation engineer in charge of diversions for irrigation from the Colorado, and worked on design, estimates, and construction of flood levee and canal systems on the Colorado delta.

His next assignment, four years with the Tucson city engineer, continued to feature water works, but also brought in some of the other types of work he would later need to be familiar with. While with the city, he designed and supervised construction of two large storm sewers, and two vehicular subways having a combined cost of $500,000. Steel, timber and concrete bridges, retaining walls, a 100,000-gal. water storage tank, sanitary sewers, and other structures were included in this period of his employment.

A period of three years in private practice, mostly devoted to water supply problems, was followed by a 10-year period with the U. S. Forest Service, first directing flood control and erosion control work in the Silver City, N. Mex., watershed; then as a member of the research staff of the Park Creek Branch of the Forest Influence Station; then as Forest Service representative on the Pecos flood control survey; and finally as hydrologic engineer on the Santa Maria flood control survey near Santa Barbara, Calif.

For two years during the war he was with the Corps of Engineers in charge of construction of two airfields and a modification center near Tucson, and at the conclusion of the war was retained by the City of Tucson to make a study of the flood situation in the city. This was followed by his appointment as City Engineer.

While it is true that as City Engineer his work embraces street construction, assessment collection and other activities, all of which he performs well, the matter of water, in both of its phases, supply and control, is by far the most important part of the job. It is difficult to imagine a man better qualified or with more adequate experience to serve as City Engineer of Tucson, which has both problems in large measure, than Glenton G. Sykes.

San Diego, Calif.

A. K. FOGG, City Engineer of San Diego, Calif., arrived at that position by a somewhat different route than most of his colleagues in other Western cities. He is always spoken of as "Captain Fogg," in respect for his 31 years of active service in the U. S. Navy, Civil Engineer Corps.

The Captain was born in Lowell, Ill., and graduated from the University of Illinois in civil engineering in 1915. Following two years with the Illinois State Highway Department, he entered the Navy in 1917, with the rank of Lieutenant (j.g.). He retired as Captain on Feb. 1, 1948, having served in all intervening ranks on design, construction and maintenance of Navy public works and utilities at Portsmouth, N. H., Key West, Fla., Washington, D. C., Great Lakes, Ill., Balboa, C. Z., Norfolk, Va., Seattle, Wash., Mare Island and San Diego, Calif.

During his last Navy assignment, as Public Works officer of the 12th Naval District in San Diego, from 1942 to retirement, he had charge of design and construction of the Navy wartime program in Southern California, Arizona, and New Mexico, amounting to approximately $330,000,000. Perhaps his most impressive achievement in that period was directing the construction of the San Diego Aqueduct.

In his city work, he has built a $2,500,000 sewage disposal plant, airport runways valued at $550,000, and sewer lines, $1,500,000, and each year street work amounts to approximately $1,000,000.

Capt. Fogg is demonstrating most effectively that training and experience gained in the military service can be turned successfully to civilian achievement.

FOGG

Portland, Ore.

BEN S. MORROW, City Engineer of Portland, Ore., has spent 40 years, almost his entire working career, in the employ of that city. Born in Walla Walla, Wash., and a graduate of Stanford University in California, his work has since 1909 been exclusively in the Public Works Department of Oregon's greatest city.

From 1909 until 1925 he served as Assistant Engineer in the Municipal Water Bureau, and from 1925 to date as Engineer and General Manager of the Bureau. Then in 1939, he was also made City Engineer, with full responsibility for all construction and engineering by

MORROW

the city. The largest single portion of that responsibility is a $12,000,000 interceptor sewer and sewage treatment works now under construction. Contamination of the waters of the Willamette River by the raw sewage of the cities along its course reached such proportions that the Oregon Sanitary Commission urged all these cities to undertake treatment and disposal projects. The largest proposed project is naturally that planned for the city of Portland, based on the $12 million bond issue of May, 1944, and now continuing in full force. With his forty years of experience, it can truly be said there's nothing about Portland Ben Morrow doesn't know.

Alaska Works Plan Approved

THE PRESIDENT has signed a bill which authorizes public works in Alaska in the amount of $70,000,000. Projects which may be undertaken through this authorization include schools, hospitals, harbor facilities, roads, bridges, libraries, university buildings, streets, firehouses, and other types of public buildings. The authorization was not definite as to specific projects, and to date no actual appropriations have been made to implement the authorizing measure. No appropriations are expected during the present session of Congress.

Pre-Stressed Concrete Tanks a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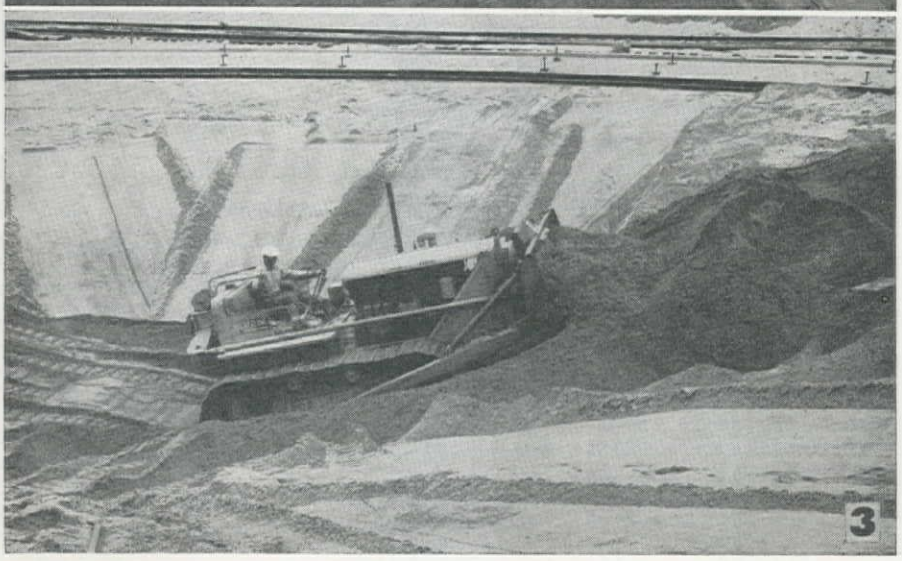
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Los Angeles constructing nation's largest high-rate activated sludge plant for treatment of sewage—Outstanding feature of the $41,-000,000 construction is pre-stressing of 18 circular concrete digestion tanks

FOR SHEER MAMMOTH size, the Hyperion Sewage Treatmen Plant is first and foremost among th projects undertaken by a Western cit for waste disposal. The pressure of in creased population, common to all prin cipal cities in the West, virtually ex ploded in Los Angeles during the pas decade, and forced construction of a $4 million treatment plant for which th preparation involved 14,000,000 cu. yc of sand excavation along the shore o the Pacific Ocean.

The new Hyperion plant is first i many of its features. It will be th largest high-rate activated sludge plan in the United States, having a peak dr weather flow of 350 m.g.d. and serving a estimated 3 million population. Its 110 ft. diameter digestion tanks, arranged i 3 batteries of 6 tanks each, comprise th largest sludge digestion system in th West, and are the first large-scale West ern examples of the Preload system o pre-stressed concrete.

Creation of the massive batteries o digestion tanks has been carried out b Pacific Bridge Co., San Francisco, on $3,989,000 contract that is nearing com pletion, except for installation of me chanical equipment and final testing Construction of each 2½-million gallo tank involved unusual equipment an new rigs, developed by the contracto and his organization specifically for th contract at Hyperion. Here, step by ste is the construction record of the bigges digestion tanks ever built in the West!

1. Forms are being placed for the di gestor footings that support tank wall initially 20½ in. thick. Recently lai tracks for the Colby gantry crane an the track crews can be seen in the back ground.

2. A Lima clamshell begins excava tion of the inverted cone section for th center of the 110-ft. diameter tanks Four cranes were used on the contract two gantry and two crawler type. Th center of the cone section is depresse about 15 ft. Excavation on the Pacifi Bridge contract alone, for the 18 diges tors and control buildings, connectin tunnels, and transformer buildin amounts to 140,000 cu. yd.

3. The conical tank bottom form take shape as bulldozers cut to rough grade This is the same type sand as was re moved from the site previously under contract to Peter Kiewit Sons' Co. an Construction Aggregates Corp. that be gan in March, 1947. Fourteen millio

Hyperion

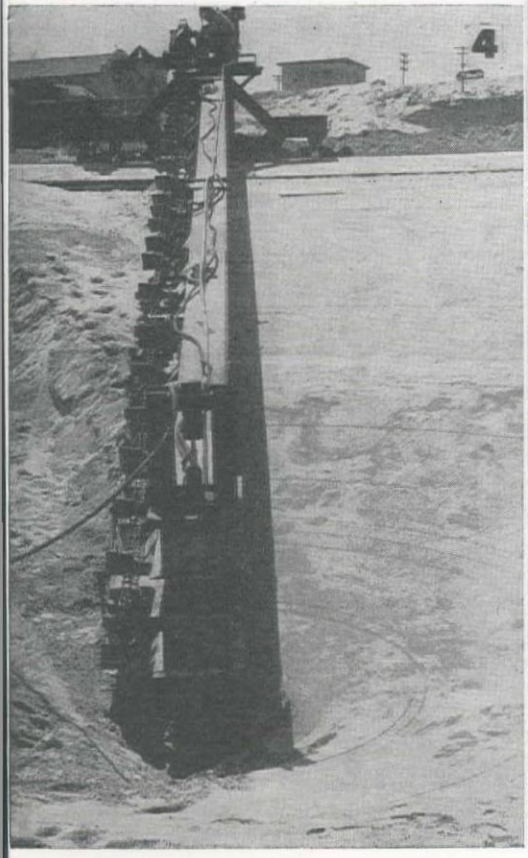
cubic yards of this material was sluiced from the Hyperion site as part of a 50,000,000 cu. yd. fill called for by the Los Angeles Shoreline Improvement Plan.

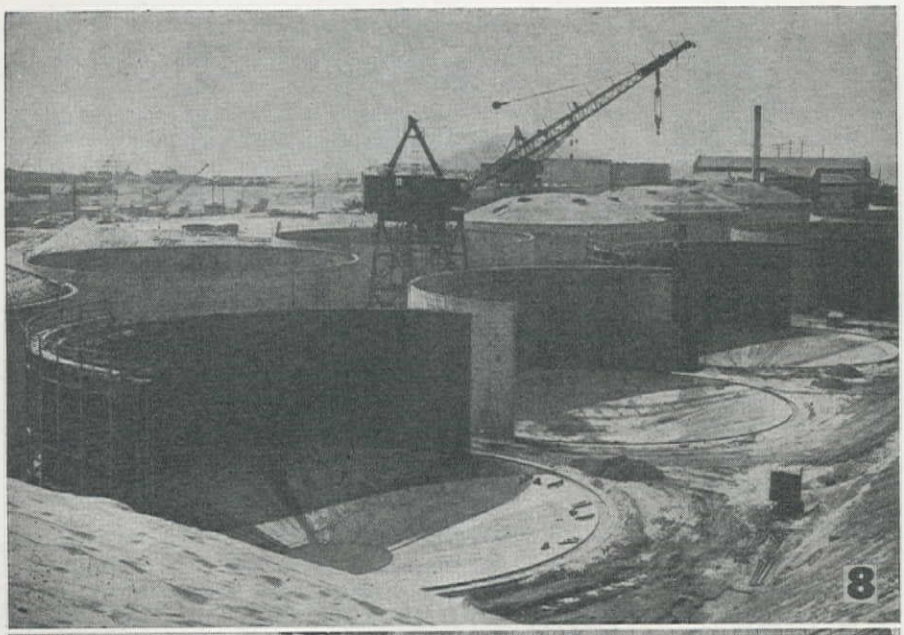
4. Cooperation and skill from the design office, field, and Alameda shops of Pacific Bridge Co. created this ingenious fine grading machine. At the low center, it revolves around a vertical pipe imbedded in a small concrete anchor. At the high perimeter of the tank, the supporting frame travels on rubber bogey wheels from the idlers of a war-salvage tank. In between, the endless chain of cutting buckets, trough, and screed are mounted upon an I-beam, salvaged from the Alameda shops. As the rig revolves, a knife-edge finish is given the sand, with slight compaction, and the excess windrowed to the outside of the ciruclar footing.

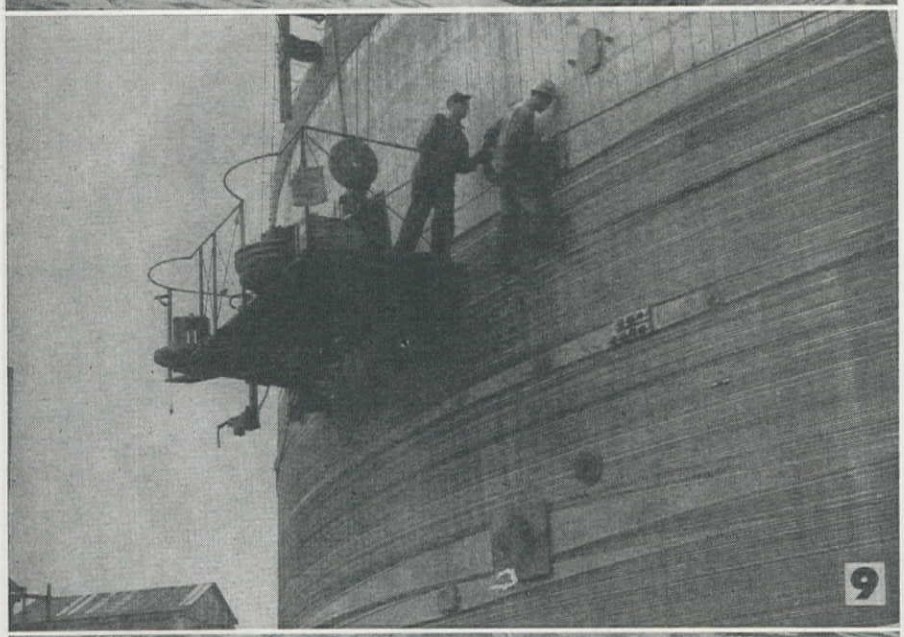
5. After fine grading, work on the main concrete slab begins with the first pour at the center of the cone. The 10-ft. strike-off bar pivots about the same anchor as was used for the fine grading machine.

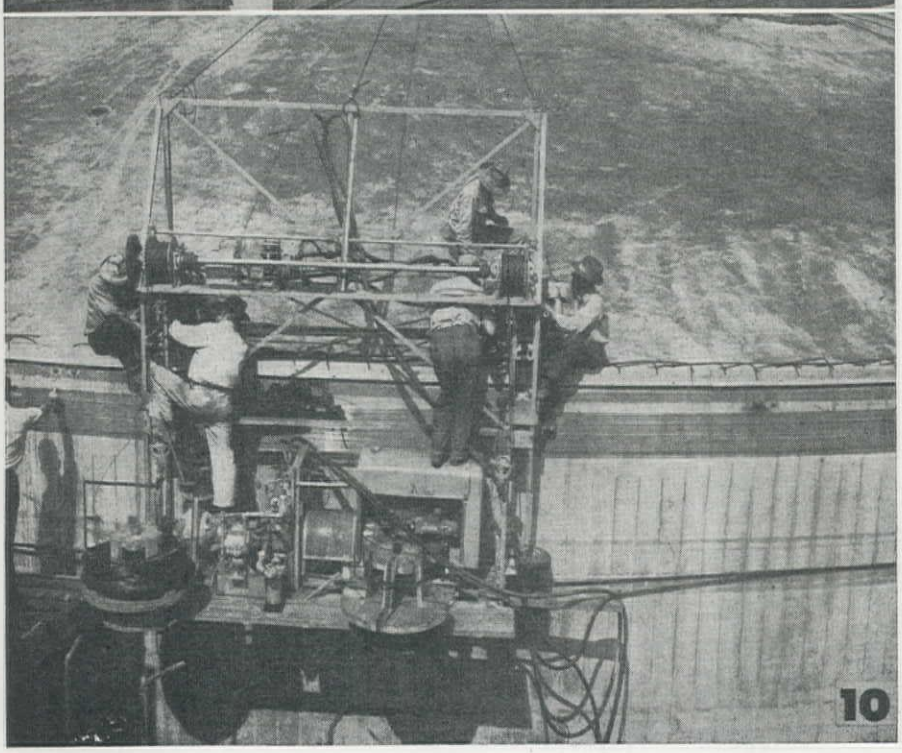
6. The original Hyperion plant in the center background, occupying only ¼ acre, is dwarfed by the giant operations on the new digestors. Four stages of construction are shown: footing forms, fine grading, first segment poured of eight in the slab, and at the right, a completed slab.

7. The 20½-in. walls are poured a quarter of a tank at a time, using wall forms shown here during assembly, for









the quarter section pour. Each form panel for the 34-ft. high walls is set by the big gantry in place on the circular wall footing, where it is secured by keyway and anchor bolts. The inside forms are placed first, then the prefabricated reinforcing steel is set in position and welded, and the similar outside forms secured. Concrete is then poured from bottom-dump buckets and elephant trunks. In the usual case of pre-stressed construction a wall thickness of 6 to 10 in. is used, however in this case a thicker wall was designed, both for a greater ease of construction and because under the circumstances the added thickness of concrete proved to be the cheapest and most satisfactory method of heat insulation. This insulation was required because the primary digestors operate at a temperature of 95° F., maintained by the live steam produced from waste engine heat elsewhere in the plant.

8. Wall forms are ready for stripping on the half-completed tank. On this job Pacific Bridge Co. poured nearly 30,000 cu. yd. of concrete and handled over 3,000,000 lb. of reinforcing steel.

9. Next step in the wall construction was the highly-developed method of pre-stressing, used by the contractor under a license agreement with the Preload Pacific Corp., an affiliate of Preload Corp. of New York and owners of the Preload patents. The wire is wound from a self-powered carriage which travels around the tank, and its tension is regulated by passing the wire through a carbaloy die smaller than the wire itself, resulting in reduced diameter and higher stresses. The wire is reduced from .162 in. to .142 in., and the actual stress is determined in place by an electronic method developed on the job. Wire spacing varies from 74 wires per vertical foot at the tank bottom to 12 per foot at the top. Where 30 to 60 wires per foot are used, two layers are applied by the carriage, and where more than 60 wires per foot are used, three layers are applied. At the top of the wall a thickened section is provided to take the thrust of the roof dome, and at this point 200 wires are applied in 2 ft.

10. The winding mechanisms were built in the contractor's Alameda shops according to Preload Corp. specifications, and then transported to the Hyperion site. As many as three of the rigs at one time were used on the 18 digestors, each one requiring two operators on the carriage during normal operations between wire splicing and anchoring. About 100 mi. of wire is needed to wrap the walls of each tank, and it is supplied to the carriage on spools carrying about a mile of wire. After each layer of wire has been applied, it is covered with a mortar coating of Jetcrete. This completes the construction operations on the digestion tank walls, with the exception of spraying cement mortar over the stops made to fill the construction access holes. The walls will soon be ready for testing for their operating head of 30½ ft.

11. Previous to the Preload wire wrapping process, work began on the reinforced concrete dome for each tank.

Falsework for the forms consists of 16 braced trusses stemmed radially in spider web fashion from a central steel support. Exact grade for the framework is controlled by a system of screw jacks at the top of the center support, so that it is an easy matter to adjust the entire setup. The outboard ends of the trusses are received and secured just below the top of the digestor wall. After the pour of the roof, the entire system of falsework is unbolted and knocked down, the forms stripped and removed, and all members hauled out from the inside of the covered tank through six holes left in the dome to accommodate equipment.

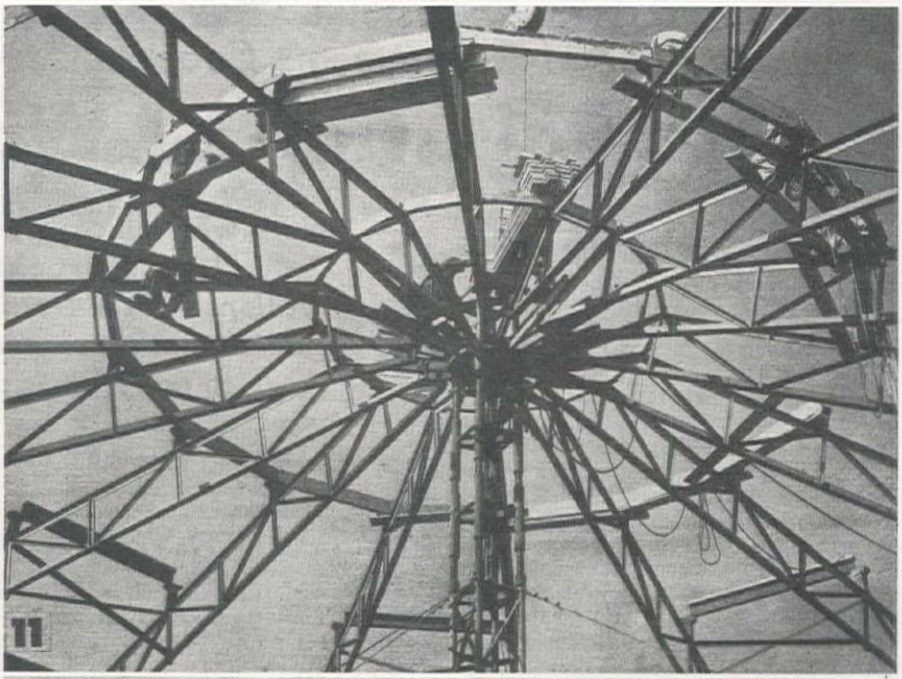
12. Digestion tanks on the largest high-rate activated sludge plant in the country near completion on the $3,989,000 Pacific Bridge Co. contract. Shown between the tanks are the connecting tunnels and the control house for this part of the batteries of digestors.

13. One of the eighteen 2½-million gallon tanks nearly ready to step off the line as a finished product before backfilling will hide it from public view. Shown in the foreground is another innovation in the construction field as used on the sands at the Hyperion treatment plant. A device to facilitate truck transport for off-the-road service, "truck tracks," manufactured and distributed by P & G Supply Co., Portland, Ore., speeded up operations in the deep beach sands on the job.

Operations of Pacific Bridge Co. were under the direction of Charles Bisordi, general superintendent, and Stan Kimball, project engineer.

The City of Los Angeles has discharged its sewers into the ocean at Hyperion since 1894, giving it a history of 55 years of discharge at the location which has been chosen as the site for the new treatment plant. In 1922, the City voted $12 million for sewer purposes, and with this money built screening plants at Hyperion, outfall sewers, and interceptors extending to the westerly end of the San Fernando Valley. Thus a pattern for sewage disposal of 200 m.g.d. for 2,400,000 persons had already been set.

The design of the Hyperion Treatment Plant is being carried on under the general direction of Lloyd Aldrich, City Engineer of Los Angeles; and Metcalf & Eddy of Boston are the consulting engineers, represented by Frank Flood and E. Sherman Chase. The project design was initiated under the direction of H. G. Smith, retired principal engineer of the sewer design division of the bureau of engineering offices, and continued under the direct charge of Merrill Butler, Deputy Engineer. G. A. Parkes is senior engineer of the Hyperion plant administrative coordination. Construction is under Ted Niederhofer, Inspector of Public Works, and the supervising inspectors are L. E. Meidroth and M. D. McMannus. Norman B. Hume worked with Senior Engineer Parkes in making the original basic designs and now is assistant waste disposal engineer under W. A. Schneider, waste disposal engineer of the bureau of sanitation.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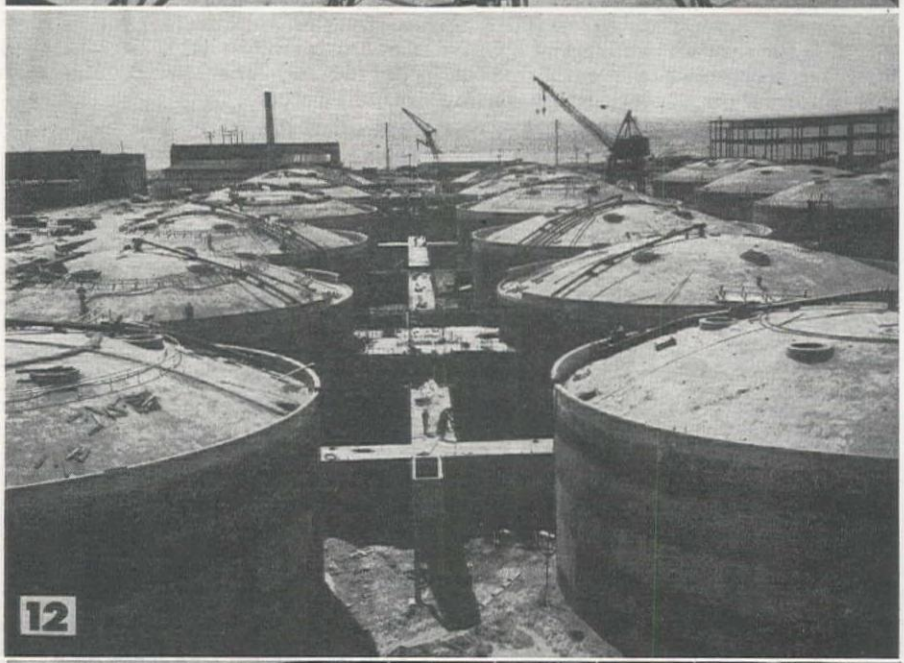
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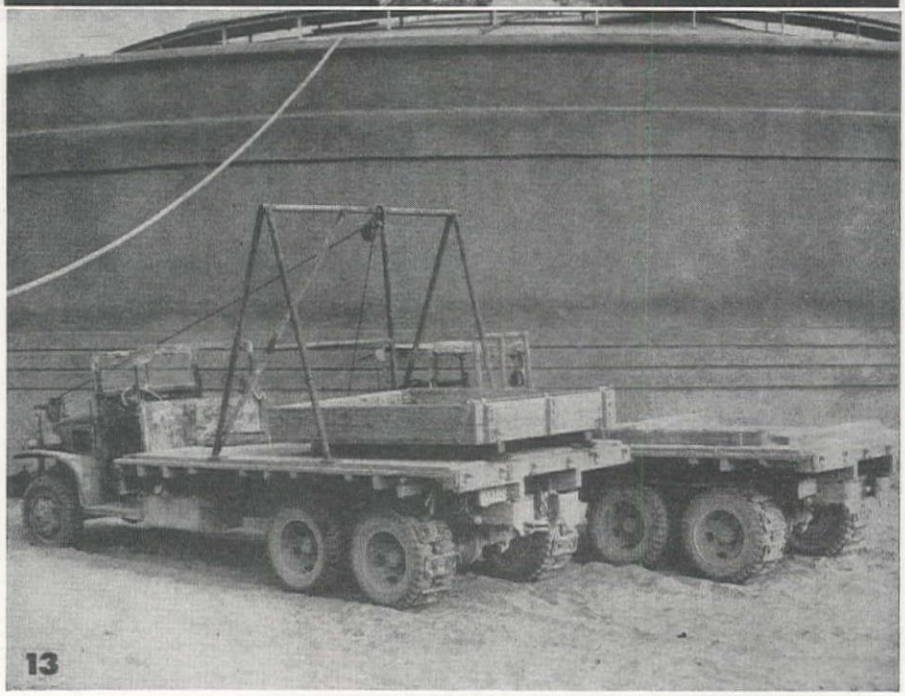

13

State and Federal Governments Cooperate to—

Abate Pollution of Water Supplies

Northwest office is first Western district of new Federal Pollution Control organization to start operations—Three Northwest states have active organizations set up to assist, and so far as possible to police their own pollution sources

By ROBERT R. HARRIS
Senior Sanitary Engineer
U. S. Public Health Service
Portland, Ore.

PUBLIC LAW 845, passed by the 80th Congress, which establishes the authority for a national program for the abatement of stream pollution requires among other things that the Surgeon General of the United States Public Health Service prepare or adopt comprehensive programs for eliminating or reducing the pollution of interstate waters or tributaries thereof and improving the sanitary condition of surface and underground waters. To prepare or adopt such comprehensive programs requires that information must be assembled on the location, strength and type of all sources of pollution along with information on existing water uses in the various streams of the nation. The gathering of this data is believed to be of primary importance to establish a base line for future planning and operation. To accomplish the gathering of this information several River Basin Offices have been established.

The general purpose of the River Basin Offices is to coordinate the Water Pollution Control program for the entire drainage area under its jurisdiction. It is planned ultimately to have 14 such offices to coordinate the program for the entire nation, and eight of them have already been set up and are in operation. Basic staffs in these offices will consist of engineers, biologists, draftsmen and clerical personnel. The number of each will depend upon the problems of the area. In addition to the River Basin Offices, which will be the operating units of the program, the U. S. Public Health Service has created a Water Pollution Control Division in Washington, D.C. to determine matters of policy and to coordinate the program for the nation. This division will receive the support and advice of a Water Pollution Control Advisory Board composed of 5 representatives of the various Government Departments or Agencies interested in the conservation and development of the water resources of the nation, and 6 members at large appointed by the President of the United States. Basic and applied research activities which are desirable and necessary to develop a successful pollution prevention and abatement program will be administered by the Public Health Service Environmental Health Center located at Cincinnati, Ohio.

Northwest office well advanced

Thanks to the splendid cooperation which has been received from the State Water Pollution Control agencies most of this information has already been assembled for the Pacific Northwest River Basin area, including Alaska. It is admitted that this tabulation of sources and extent of pollution, present water uses, etc., is not complete, but it will point out where additional field surveys by state agencies will be required to obtain complete data. For example the analysis of this data which is being made at the present time already indicates that while most municipal pollution sources are known, there is considerable lack of information on the location, strength, amount of industrial wastes being discharged into the surface and underground waters.

Most of the states have realized this deficiency but either due to lack of funds, personnel or public interest, have been unable to carry on the necessary field work to obtain the data needed. With financial aid from the Federal government, authorized in Public Law 845, all of the states in the Northwest area are already at work or are planning work to obtain more complete information on their industrial wastes.

There are of course certain other deficiencies in the original information assembled. Ultimately it is planned to establish a long-term comprehensive program for each major drainage area in the nation and for the nation as a whole. Such programs will of course have to have a certain amount of flexibility to permit proper development of water resources to the best advantage of the total citizenry of the nation.

Standards are needed

Needless to say there are many other ramifications of the program such as developing adequate standards of water quality for various water uses, classifying streams according to water uses, research to develop new methods of treatment for wastes which are at present not acceptable to presently known methods, encouraging uniform state laws and cooperative action by states, and disseminating information relating to methods for the prevention and abatement of water pollution.

Finally, it should be understood that it was the declared policy of Congress in enacting Public Law 845 to recognize, preserve and protect the primary responsibilities and rights of states in controlling water pollution, and it is upon this premise that the U. S. Public Health Service proposes to operate. The success of the program will depend upon the cooperation of all interested parties including municipalities, states, industries and the Federal government.

Washington Studies Sources

By E. F. ELDRIDGE
Director and Chief Engineer
Washington Pollution Commission
Olympia, Wash.

THE WASHINGTON Pollution Control Commission is cooperating in the preparation of comprehensive reports on municipal and industrial pollution as its part in the Northwest's participation in the Federal program, as undertaken by the U. S. Public Health Service under Public Law 845. For this purpose the State of Washington has been divided into four areas, namely:

1. That area draining to Puget Sound.
2. That area draining to the Pacific Ocean.
3. Lower Columbia River and tributaries thereto, which includes the river to the confluence with the Walla Walla River.
4. The Upper Columbia River and its tributaries, including the Walla Walla, the Snake and Yakima, etc.

These various areas have been further divided into a total of 30 drainage basins. Municipal and industrial waste surveys will be made in each of these basins, and the information thus collected will go into the finished comprehensive report. Initially a report has been prepared using information now available in each of the basins. This information, however, is considerably limited at the present time.

Only 15 per cent safe

There are in the State of Washington about 166 cities and towns having at least partial sewer systems. These sewers serve about 82.8% of the urban population of the state, which was 1,510,000 based on 1948 estimates. There are in the state 129 sewage treatment plants, ranging from septic tanks to large complete installations. Of this number, 51 are considered inadequate because of the development which occurred largely during the war years. The sewage treatment plants now considered

adequate serve only about 15.4% of the population connected to sewers.

There are a number of treatment plants now under construction in the State, which will considerably increase the percentage of the population served by plants. Some of the larger of these are Bellingham, Bremerton, Vancouver, Pullman, Chehalis, Lake City Sewer District, North Beach and Greenwood Avenue Sewer Districts. The plant eventually planned for the Lake City Sewer District will be one of the largest and most complete in this part of the country. This plant will operate by the activated sludge process, which provides the highest possible degree of treatment among known methods for the treatment of municipal sewage.

The industrial waste problem in the State is 10 to 15 times as great as that of domestic sewage. A survey is now under way to determine the extent of pollution from the 700 or more industries in the State whose processes develop an industrial waste. These industries consist of 25 pulp and paper mills, 248 dairies, 113 vegetable and fruit canneries, 116 meat packing plants, 36 mines, 7 food dehydrators, 11 breweries and 20 wineries.

Planned advances

The Commission has just received from the U. S. Public Health Service a grant of $13,473 for research work and surveys relating to industrial wastes. This money will be used in the following ways:

1. Fellowships amounting to $2,000 will be established at the University of Washington for research relating to the wastes from the metal industries and pulp and paper mills.
2. Similar fellowships of the same amount to be established at Washington State College for projects relating to similar wastes.
3. The employment of two engineers and the expense involved in completing a comprehensive survey of the industrial waste problem in the State to be conducted from the Olympia office of the Commission.

New Idaho Department Set Up

By
H. C. CLARE
Director, Public Health Engineering
Boise, Ida.

THE IDAHO Department of Public Health has for a long time recognized a need for a preventive water pollution control program. This need was presented to the Legislature in 1945. The attention of interested legislators was called to the following points which were recognized at that time as being important:

1. The Legislature was urged to establish a state policy pertaining to water pollution control and prevention.
2. It was felt that state pollution control legislation would be desirable at that time because consideration was being given on the federal level to enactment of a national water pollution control program. Considerable concern was felt about protection of state's rights in such a program. It was therefore indicated that these state's rights should be protected and at the same time it was pointed out that with state's rights go state's responsibilities.
3. An investigation of the cost of installing sewer systems, including sewage treatment plants, revealed the fact that many Idaho municipalities could not finance such installations because of limitations which had been rightfully placed on amounts of bond indebtedness which could be incurred by municipalities. This problem had been met in all but four states through the use of revenue bonds. The use of such instruments in Idaho had been made impossible through court decisions and a unique provision in the Idaho constitution. The Department therefore indicated to the Legislature the need for a constitutional amendment which would permit municipalities to issue revenue bonds.

First bills failed

The results of this consideration was the introduction of House Bill 122, which if enacted would have included a declaration of public policy of the state in relation to preserving the purity of the waters of the state and prevention and control of pollution. It would have created a Sanitary Authority as a division of the Department of Public Health, prescribed the organization's duties, powers and authority, provided for cooperation with other government agencies, and required that this division make reports of its findings and recommendations to the Governor and members of succeeding Legislatures. This bill never reached the floor. Neither did the joint resolution proposing amendment of the Constitution to legalize revenue bonds receive favorable consideration.

Industry was somewhat concerned over possibilities of water pollution control legislation and in general was opposed to its enactment at that time. The result of this concern was the organization by the State Chamber of Commerce of the "Idaho Water Utilization Committee." It should be noted that in the name of this committee and in its work that followed, use of expressions or designations containing the words "pollution," "pollution control" or "pollution prevention" was carefully avoided. The Department of Public Health during the 1945-1946 biennium worked closely with this committee supplying data and information pertaining to needs for water pollution legislation.

Again in 1947 the Department of Public Health with officers of the Idaho Municipal League urged consideration by the Legislature of a joint resolution proposing amendment of the state constitution so that municipalities could use revenue bonds for sewerage and water systems. A proposed joint resolution to this effect received favorable consideration in committee, where someone added a provision that power systems might also be financed by municipalities through revenue bonds, which killed further consideration. This legislature, however, did enact the statute which established the State Water Utilization Committee as a state agency for a period of two years.

Success in 1949

Interest of the Idaho Municipal League in this matter had during the last biennium become more intense and that organization was active in securing the passage by the 1949 Legislature of the joint resolutions. The people of Idaho will have an opportunity at the general election in 1950 to vote on the matter of amending the Constitution to legalize revenue bonds for water and sewer systems and for off-street parking facilities.

In the meantime, Federal Pollution Control legislation which had been predicted by the Department of Public Health officials for years, became effective on June 30, 1948. Passage of this Public Law 845 by the 80th Congress was the culmination of consideration over a period of fifty years of some one hundred water pollution control bills by the Federal Congress. Enactment of this Federal legislation clearly indicates, as do many other signs of the time, a national recognition of the water pollution problem. It indicates as well an interest in doing something about it. Fortunately Public Law 845, known as the Federal Water Pollution Control Act, recognizes states' rights and responsibilities. It provides for cooperation of state and federal agencies in an overall water pollution control program. It further provides that enforcement of pollution abatement procedures in any state must be carried out through and with the consent of the state water pollution agency. It places the primary responsibility of pollution control where it rightfully belongs—with the states.

In view of the fact that the State of Idaho has never established a water pollution control agency or authority, it becomes under the provisions of a Federal Act the duty of the Department of Public Health to act as the Idaho Water Pollution Agency until another agency may be established by the state legislature. No state funds are available for fundamental work which is required in further evaluating the Idaho water pollution problem, particularly pollution caused by industry. It is possible, however, that limited funds will be available through the cooperative arrangement required under the Federal Act.

Special committee

The Department of Public Health has recognized the tremendous responsi-

bility placed on it by its designation as the state water pollution agency. For that reason the department officials requested the appointment by the Governor of an advisory committee which will assist the department in establishing policies, plans and methods of procedure which are to be followed in this and related matters. This committee is made up of the following members: L. J. Peterson, Chairman, Administrative Director, Department of Public Health; H. C. Clare, Director, Public Health Engineer, Department of Public Health; Harry Elcock, District Manager, Amalgamated Sugar Co., Twin Falls, representing the Idaho State Chamber of Commerce; Dr. L. C. Cady, Director of Research, University of Idaho; W. B. Bowler, Secretary, Idaho Drillers Association; Wm. P. Hughes, City Engineer, Lewiston; T. C. Butler, Jr., Civil Engineer, Simplot Co.; Harry Marsh, Secretary, Idaho Mining Association; W. R. Jacobs, M. D.; T. B. Murray, Director, Department of Fish and Game; and Mark Kulp, State Reclamation Engineer.

At the first meeting of this Committee, it reached four conclusions:

Objectives

1. The Department of Public Health should proceed in the development of a comprehensive program pointing toward pollution control and prevention. The first phase in the development of this program should include the preparation of a base line over-all report consistent with present available data to:

a. Provide a reference point from which progress may be measured;

b. Provide a guide to needed additional data;

c. Provide a basis for the logical development for more complete programs;

d. Provide an educational document to aid in informing the public and providing information to officials concerned.

It was indicated that this phase of the program might be completed within six months. Following completion of this phase, the second or more complete program can be developed and might emphasize quantitative data secured in areas where problems are most acute.

2. In instances where the department learns of the possible development of pollution problems, it is to take immediate and active steps in cooperation with the industry concerned to see that pollution control facilities are included in the plans for the industrial development. In this connection Dr. L. C. Cady indicated that the University of Idaho is extremely interested in research work which may lead to the more complete utilization of wastes and the recovery of by-products. Dr. Cady also indicated his interest in fundamental research pertaining to environmental sanitation in its relation to water resources.

3. The Committee urgently recommended that the Department should aggressively publicize the needs for and progress of pollution control and prevention in the state. The responsibility of the public in the solution of these problems must also be emphasized. It was also recommended that the development of the comprehensive program point toward classification of streams, because industry which is so essential to the development of the state must know in advance where plants might be located and where treatment of certain degrees may be required. Classification of streams necessarily requires the consideration of the development of standards for water quality.

4. The Committee recommended that the Department proceed with the preparation of state drinking water standards as authorized by the last Legislature. It was indicated that such standards might properly include a program of voluntary certification of water works operators and a request that plans for water supply installations and extensions be submitted to the Division of Public Health Engineering for approval before such construction was started.

Oregon Program Continuous

By
CURTISS M. EVERTS, JR.
Secretary and Chief Engineer
Oregon State Sanitary Authority
Portland, Ore.

STREAM PURIFICATION is not a new program in Oregon. Sportsmen, health authorities, and other interested groups were actively engaged in a movement for clean streams more than twenty years ago. Their efforts were finally rewarded, when the people of Oregon overwhelmingly adopted a referendum water pollution control measure at the general election in November, 1938.

This law established the State Sanitary Authority and made it responsible for the development of a comprehensive program of pollution abatement in the state. The Authority consists of the State Health Officer, the Chairman of the State Fish Commission, the State Engineer, three lay members appointed by the Governor, and the State Sanitary Engineer who is secretary of the group. The adoption of rules and regulations governing stream sanitation, the establishment of stream standards, the creation of policies and procedures on stream cleanliness, and the initiation of formal action for pollution abatement are the responsibilities of this group. A staff of sanitary engineers is provided to conduct field investigations, surveys, and studies; and to carry out the Authority's policies and directions.

It was the belief of the Authority that public agencies should set an example by being the first to abate pollution. Municipalities were requested, therefore, to prepare both fiscal and engineering plans leading to the construction of needed sewage treatment works.

Portland chief offender

At the beginning of the program there were only 48 public sewage treatment plants in the state, and 21 of these were inadequate and obsolete. The municipalities as a whole resisted the Authority's efforts to obtain compliance with state water-pollution control laws until they could be assured that Portland, the largest city in the state and one of the chief offenders, would actually undertake the removal of its share of the pollution from the Willamette River by constructing an adequate sewage treatment plant and the necessary interceptor sewers. In view of these facts, the Authority took immediate action to force Portland to begin its sewerage construction program.

During the World War II period, construction of treatment plants almost came to a standstill with the exception of a few units that were constructed for government housing projects or military installations. In fact, the shortage of materials and equipment and the instability of contractural labor extended almost three years beyond the end of the war, and it was not until that time that municipalities began to seriously plan and to actually construct needed sewerage works. During this war period, however, the Authority encouraged municipalities to prepare engineering plans and to lay aside surplus municipal income so that it could be applied to the cost of treatment plant construction when materials and manpower became available. A number of communities took advantage of this opportunity to accumulate sizeable sinking funds which they are now using for that purpose, and others authorized bond issues to provide funds which could be used after the war was over.

Finally in 1944 the city of Portland authorized the issue of $12,000,000 in general obligation bonds to provide funds for the construction of intercepting sewers, pumping stations, and a sewage treatment plant. The total cost of the Portland sewerage project will probably be in excess of $14,000,000. Other cities in the state are currently engaged in preparation for a program which will eventually result in the expenditure of an additional $16,000,000 for municipal sewerage works.

Eighty-five plants in the program

In addition, the State of Oregon now has under construction necessary sewers which will eliminate pollution caused by disposal of wastes into streams near Salem and Pendleton, and appropriations have been made for the construction of the sewage treatment plant at the Boys' Training School at Woodburn.

During the postwar period from 1946

Continued on page 99

CONSTRUCTION DESIGN CHART

CXII... Bars in Spirally Reinforced Columns

By
JAMES R. GRIFFITH
Dean of Engineering
University of Portland
Portland, Ore.

THE MAXIMUM number of vertical reinforcing bars permissible in a spiral reinforced concrete column is controlled by the spacing at the lapped splices, unless butt welding of bars is resorted to. The A.C.I. Code,[1] par. 1103-b, states:

"The center-to-center spacing of bars within the periphery of the column core shall not be less than 2½ times the diameter for round bars or three times the side dimension for square bars. The clear spacing between bars shall not be less than 1½ in., or 1½ times the maximum size of the coarse aggregate used. These spacing rules also apply to adjacent pairs of bars at lapped splices. Each pair of lapped bars forming a splice may be in contact, but the minimum clear spacing between one splice and the adjacent splice should be that specified for adjacent bars."

Let the bar size, diameter of round bars and side dimension of square bars, be *"d"*. Then the minimum clear distance between adjacent pairs of bars is $1.5d$ for round bars, and $2d$ for square bars. As indicated by the above quotation from the A.C.I. Code, in addition to the minimum spacing in terms of bar diameter, the size of the aggregate must be considered. When the diameter of round bars is less than $d = 1$ in., the minimum spacing of 1.5 in. will control.

Table No. 25, in the A.C.I. Design Handbook,[2] gives the maximum number of longitudinal reinforcing bars permissible in column cores of various diameters. The accompanying chart is based on the same limitations as the A.C.I. tabular values. These assumptions are:

½-in. spiral wire

Maximum size aggregate = 1 in.

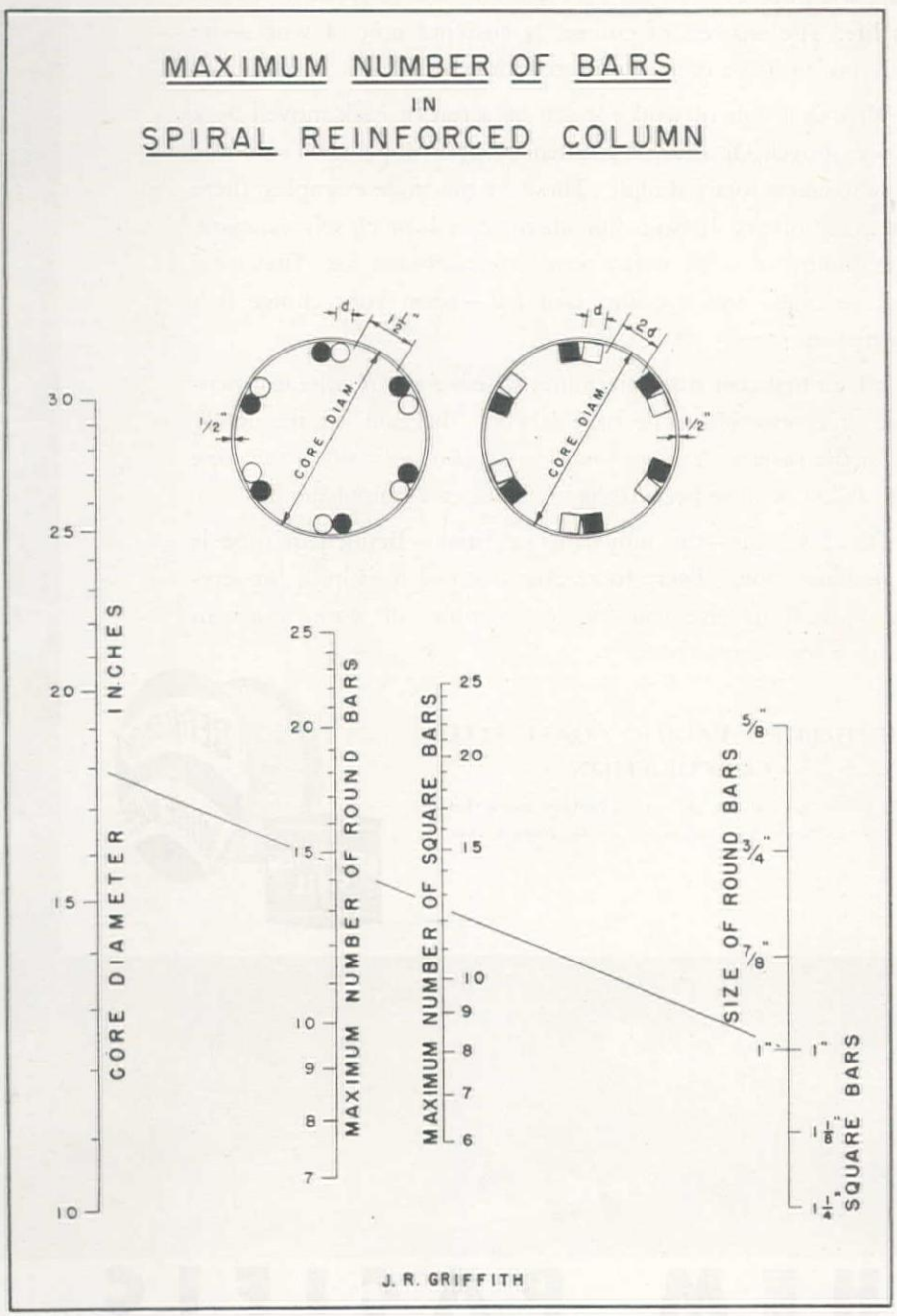
Bars at lapped splices are wired together in pairs. As will be noted on the chart, there are two separate scales for the maximum number of bars depending upon whether round or square bars are to be used. A straight line from the core diameter to the bar size, is necessary for a solution. I have drawn a solution line on the chart for an 18-in. core, and 1-in. bars. It will be noted that this solution line is applicable to both square as well as round bars. The following results will be observed on the respective scales:

Maximum number of 1-in. round bars = 15

Maximum number of 1-in. square bars = 12

If the reader will refer to table No. 25 of the A.C.I. Design Handbook, he will find identical values therein for the assumed conditions.

The economical design of reinforced concrete columns usually dictates a minimum column size with a relatively high percentage of longitudinal reinforcement. Maximum floor space is always desirable from the standpoint of the occupant, and may only be obtained by the use of minimum column sizes. The requirements of minimum bar spacing at lapped splices, frequently dictates the minimum column in contrast to the unit stress. Such a chart as herewith presented permits of a quick answer to the many questions that arise in such a problem. A solution line, if drawn from the bar size through the number of bars, will indicate the minimum size of column core which may be used.



[1] *Building Regulations for Reinf. Conc.*, Am. Conc. Inst.

[2] *Reinf. Conc. Design Handbook*, Am. Conc. Inst.

Los Angeles to Appoint Public Works Executive

THE CITY COUNCIL of Los Angeles has approved the establishment of a new position in the city government to be known as Public Works Administrator, at a salary of $15,000 per year, to exercise general executive jurisdiction over all engineering and construction agencies in the municipal government. To date, the position has not been filled, but it is anticipated that applications will be accepted soon.

Any Way You Figure It

(Slide rule, calculus, counting on your fingers)...

Bethlehem Wire Rope Means Low Cost per Unit of Work

Actually, it's as simple as 2 + 2 = 4. All you do is divide the purchase price of the rope by the total units of work it does in its life. The answer, of course, is cost per unit of work—the only *real* measure of wire rope economy.

What is a unit of work? It can be a ton of rock moved by a power shovel. Or a car of coal hauled up a slope. Or a ton-mile in oil-country rotary drilling. These are but three examples; there are many others. It isn't difficult to record, or closely estimate, the amount of work that a wire rope accounts for. That total will be high—and the unit cost *low*—when your choice is a Bethlehem rope.

It isn't first cost that determines whether a wire rope is expensive or economical. The rope labeled "Bargain" is frequently quite the reverse. You've found a bargain only when the rope cost is low with respect to the useful work accomplished.

On this basis—the only true yardstick—Bethlehem rope is a genuine "buy." Every foot, every inch of it, is built for service. . . built to give you *low* cost per unit of work. You can order it with confidence.

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Sales Offices: San Francisco, Los Angeles, Portland, Seattle, Honolulu
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Storm Drain Work at Great Falls

Three separate projects carried forward through record Montana winter will relieve conditions which have been subject of comprehensive study

By
A. J.
RICHARDSON
Assistant City Engineer
Great Falls, Mont.

NEARING COMPLETION this Fall is the $1,300,000 storm and sanitary sewer construction project in Great Falls, Montana. All that remains to be done on the two storm sewer trunks, which have been under construction during the past year, is the replacing of the street pavement taken out during the trench excavation. Completion of the West Side Sanitary Sewer, the third unit in the program, was scheduled for about the first of October.

Final acceptance of the project will culminate several years of relentless effort and planning on the part of Great Falls citizens, city officials, and engineers. This planning required much consideration and study of the existing systems of storm and sanitary sewers in the city, the character and extent of the areas they served, the extent and probable development of areas which must be served in the future, the probable volume of storm and sanitary sewage, sewage disposal, and construction costs. In designing the sewers to meet the requirements indicated by the extensive studies, the main project developed into three separate subordinate projects designated as Storm Drain No. 1 (the 7th Street Project), Storm Drain No. 2 (the 15th Street Project), and the West Side Sanitary Sewer.

Three contracts were awarded; the low bidders all being Great Falls contractors. Utility Builders, Inc., was awarded Storm Drain No. 1, with a bid of $273,972; Storm Drain No. 2, which is the largest of the three, went to Anderson & Millensifer, Inc., on a bid of $723,824. Robertson & Cave, Inc., another Great Falls construction firm, was affiliated with them on this project, supplying heavy equipment and personnel. Dudley Construction Co. was awarded the contract for the West Side Sanitary Sewer on their bid of $268,881. The reinforced concrete pipe on these projects was furnished by two plants located in Great Falls, the Elk River Concrete Pipe Co., makers of Warren's Concrete Products.

Old city dump dust

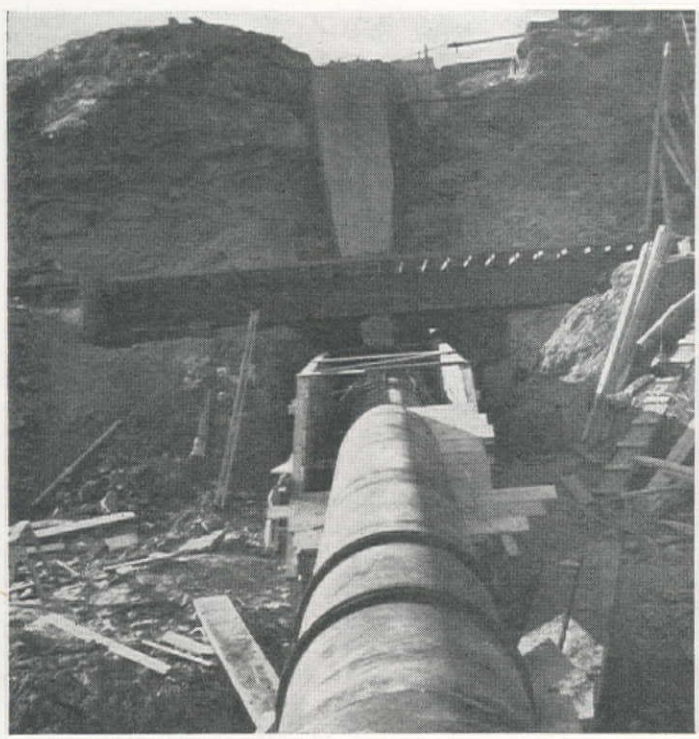
Construction started in August, 1948, when E. H. Blakeslee started a small crew on Storm Drain No. 1, with Adolph Einan as foreman. It was a tough beginning through 150 ft. of the unstable cinders and dust of an old city dump ground, then under two main line railway embankments and a spur track, all three of which were tunnelled, using mining equipment from nearby coal mines. Later, Blakeslee expanded his operation to employ an average of 22 men divided into two crews under the supervision of Dunc Livingston and Phil Connelly with Denver M. Graham as his project engineer. Inspector for the city on this project was N. H. Mannakee, Jr.

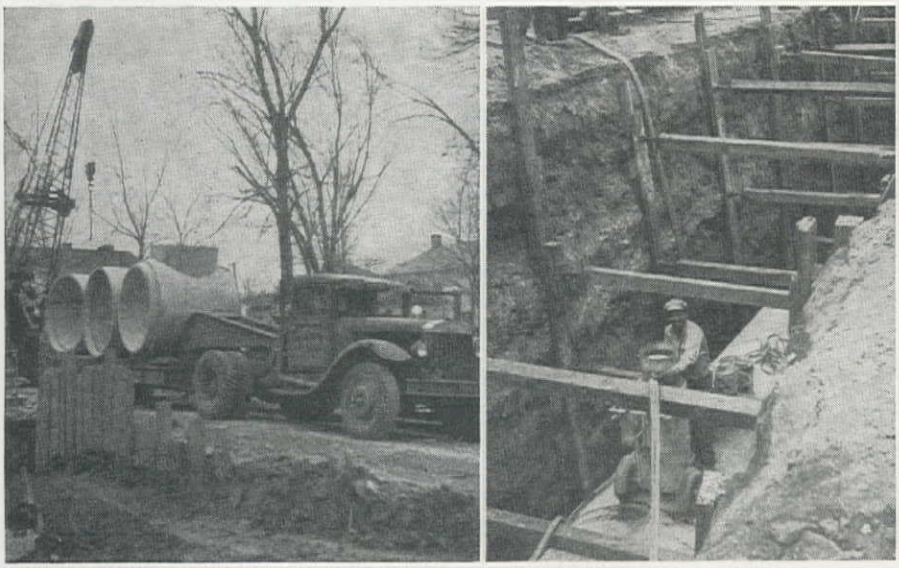
On August 16th, Robertson & Cave moved their model 6 Northwest 1½-cu. yd. back hoe and other equipment to the outfall location on the 15th Street job. Employing an average of about 60 men with Fred L. Cherry as superintendent and Dick Olson as engineer for the contractor, they began a free-swinging, wide open type of operation. Using an Ingersoll-Rand wagon drill with a 315-c.f. Schramm compressor ahead of the hoe, they blasted to trench depth through rock and shale, along the first 3,000 ft.

It's cold outside!

Winter had arrived when Dudley Construction Co. started construction on the West Side Sanitary Sewer on Jan. 17, 1949, during a brief break in the extreme cold which had struck in mid-December. Joe Fagenstrom supervised construction with the assistance of Bill Davey, using a crew of 12 men. Ground water and running sand were encountered immediately, but the contractor was also in some degree fortunate in that the trench depth reached into a strata of almost impervious clay or shale which stabilized the trench bottom throughout the area where ground

REDUCTION from a 78-in. to a 36-in. line is possible at this storm water outfall where the water drops 24 ft. down a 45-deg. slope, (left) and then passes under railroad track to discharge freely into the Missouri River.





GROUND WATER conditions emphasized the need for careful jointing. Concrete pipe was trucked from a local yard (left) and laid up with a Nicholson Groutweld machine (right).

water caused the sandy walls to run into the trench.

Much of the work on these projects was performed during one of the worst winters Great Falls has experienced. Frost penetrated 5 ft. into the ground, making it necessary to blast even after paving had been broken out with air hammers. Temperatures remained around zero and below for days at a time, yet the contractor's men remained persistently on the job, working some days, if the wind was not blowing, when the mercury hovered around 10 and 15 degrees below zero. Because of inclement weather, a total of 16 days were lost on the 7th Street job, 14 days on 15th Street, and 10 days on the West Side Sewer. To the extent that it was possible, lost time was recovered for the employees by working Saturdays, the contractors in this way retaining men whose experience was a benefit when mild weather returned and the close-knit, rather pinched operations practiced during the extremely cold periods could be abandoned in favor of a more free and extensive method. This was very noticeable on the 15th Street Project where the writer was construction inspector for the City.

Approximately 2,000 ft. from the end of the 15th Street job, street pavement, curbs, boulevard trees, and other improvements somewhat restricting for the contractor came to an end and, coincidentally, the trench depth diminished to 8 or 10 ft. in gumbo and sandy soil. Throughout this easier section, a V-trench was dug, using no shoring, and the excavated dirt was piled on the bank instead of waiting for trucks to haul it to the backfill or spoil pile. It took about a day for the workmen to hit a free swinging stride. Then extra equipment and men were put on the backfill to make certain it was properly tamped and extra low bed trailers were pressed into service to haul the pipe. Weather was good and morale was high, and with Fred Cherry encouraging them, the men proceeded to "get that pipe in the ditch." In three days a total of 1,698 ft. of sewer was dug, laid, and backfilled with the best day showing 654 ft. of 48-in. pipe. This pipe was laid in 6-ft. sections and the outside of each joint sealed before backfilling. No one considered this a record but everyone on the job was proud of it as an achievement, particularly after a bad winter.

Equipment used in trench excavation was similar on the three projects with Robertson & Cave's 1½-cu. yd. back hoe leading as a dirt mover, ¾-cu. yd. hoes being used on the other jobs. Several ¾-cu. yd. clamshells supplemented the back hoes. All the pipe on the 15th Street job was placed with a P & H crane with a 35-ft. boom, and an extra 2,000-lb. counterbalance. This rig successfully handled the 78-in. pipe, each section of which weighed 10,875 lb. Pneumatic tampers were used in compacting the backfill on all the projects. On the storm sewers, solid rock was encountered and blasting was necessary, both projects using wagon-drills ahead of the excavation where possible, and shooting to the depth of the cut.

Gumbo and ground water

Maximum cuts on the three jobs were 26 ft. on Storm Drain No. 1, 24 ft. on Storm Drain No. 2, and 20 ft. on the West Side Sanitary Sewer. Trench widths on the storm sewers varied from 8 ft. to 12 ft., although pay quantities were established in the specifications. Much of the cut was through gumbo—a dense, moisture retaining and cohesive gray-colored clay—probably formed by sedimentation in the glacial lake that once covered this area. When sand, gumbo, and underground water combine, ditch walls become unpredictable and hazardous. Solid sheathing was required for 3,600 ft. of trench in one area where this condition existed on the 15th Street job. Sheathing timbers 3 in. thick were used with whalers and cross-braces of 6 x 6-in. timbers.

It was known that ground water would be encountered on all three jobs and the contractors were cautioned against excessive infiltration. On the 7th Street Project each section of pipe was pulled tightly into place with a winch and carefully hand plastered with mortar, giving a satisfactory joint. On the 15th Street job a Nicholson Groutweld Machine was used, shooting a rather dry mix of sand and cement into the joints with air pressure. This gave a very good joint. On the sanitary sewer, where impervious joints were of greater importance, the contractor used rubber gaskets set in a bituminous compound for joints in the concrete pipe, and hot-poured bituminous joints with oakum were used in the vitrified pipe.

Steep slope outfall

Among the more unusual features of the construction was the outfall structure on Storm Drain No. 2, consisting of a form of ¼-in. steel plate encased in a minimum of 12 in. of reinforced concrete and having a 38-ft. spout of 5/16-in. steel which rests on a concrete pier, 18 or 19 ft. above the river water level. The 78-in. concrete pipe ends at the top of the river bank about 45 ft. above the river. As the water enters the outfall it plunges down a 45-degree slope through a 78-in. to 36-in. transition, or funnel, dropping 24 ft. in elevation and leveling off in a 36-in. pipe to pass under the Great Northern Railroad tracks which parallel the river. The increased velocity of the water enables the 36-in. pipe to reach a capacity equal to that of the 78-in. pipe. The reinforced concrete encasement ends at the toe of the railway embankment, the painted spout extending from there over a supporting pier.

A large portion of the area served by the West Side Sanitary Sewer lies in the old flood plain at the mouth of the Sun River, where the general elevation of the ground varies but a few feet. This necessitated a minimum gradient and a lift station. The sewage will be lifted 19 ft. by a 250-gal. Duplex Sewage Ejector and pumped through a 1,530-ft. force main into a drop manhole on the principal trunk. The sewer also passes under two railroad tracks. A short tunnel was driven under one but the other, under an embankment, was negotiated by jacking the 30-in. pipe through the intervening 42 ft. of earth using two 35-ton jacks, an operation which was unexpectedly successful in view of the lack of tolerance in the invert gradient.

Funds from bonds

Funds for the construction were obtained through the sale of revenue bonds, approved by the voters when the proposal was placed on the ballot in the election on Nov. 4, 1947. The bonds were issued on July 1, 1948, and are being retired through a system of surcharges upon water bills charged to the users in the city. Planning funds had been made available to the City through the Federal Works Agency's Bureau of Community Facilities. The Engineer's Office was aided in obtaining these funds by Wm. J. Wenzel, who became Director of the newly created Department of Public Works in May, 1947, and exercised his engineering ability in working out problems in the design of the proj-

Continued on page 114

Modern Traffic Engineering

A review of the need for applying engineering principles to the study of traffic, the duties of a municipal traffic division, and suggestions for handling problems in small communities based on the experience records from large cities

By
J. W. ARCH BOLLONG
Consulting Traffic Engineer
Seattle, Wash.

WE ARE LIVING, in this United States, in the Motor Vehicle Era of Transportation. In one generation, the motor vehicle has become as much a part of the average American's life as his toothbrush, and as never before, our recent wartime experience demonstrated how essential is highway transportation to our economy. The motor vehicle has brought a new way of life in our country. Both urban and rural life has been changed by it. While half of all vehicle-mileage is in cities and their suburban fringes, the motor vehicle has brought town and country closer together.

That traffic congestion on our streets and highways involves tremendous daily costs in time, money, annoyance, physical injury and loss of life is common knowledge. In the year 1946, there were in the world 44,489,619 motor vehicles. Of these, 33,099,845, or 80.9%, were in the United States. In the State of Washington in the year 1946, there were 715,000 motor vehicles and 850,638 in 1948, or one motor vehicle for every three people. This relation exists all up and down the Pacific Coast, and is higher than in any other part of the nation.

A record of horror

Accidents in the United States in 1946 were estimated at 8,750,000, of which 94,000 were in the State of Washington.

Injuries in the United States in 1946 were 1,500,000; in the State of Washington 17,500.

Fatalities in the United States were 33,700; in the State of Washington 587.

These few facts illustrate the outstanding importance, benefit and problems of highway transportation. City, county and state have been hard-pressed to provide anything like adequate roads, especially considering the increase in such factors as volume, speed, night driving and all-weather use, and in the number of large and heavy trucks and buses.

The provision of adequate controls has become a gigantic task, involving legislation, enforcement, motor vehicle administration, traffic control and research. Education and driver training have become "musts." With anticipated growths in traffic, problems will increase, rather than decrease.

The present over-crowding of the existing street space in urban areas is an indication that this space is being used in a disorganized and inefficient fashion. The application of accepted principles of traffic planning and traffic control will bring results that will overbalance the cost.

What causes congestion?

What are the causes of congestion? There are many elements entering into traffic congestion. At first thought, one might state that the growth of population and the remarkable increase in the number of automobiles were the **only** causes. However, these features create congestion by reason of the following:

(1) Inefficient and conflicting use of available street space.

(2) Excessive demand upon inadequate street systems.

(3) Unduly intensive use of the land.

Inefficient and conflicting use of the street space can be corrected by effective traffic control, parking regulations and other control measures.

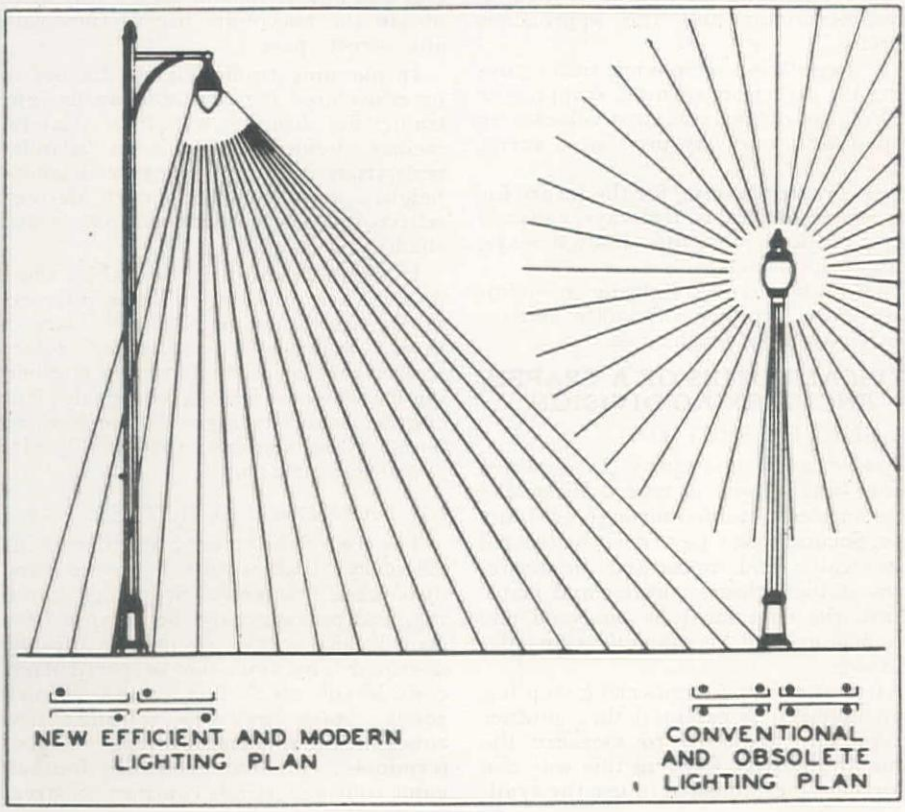
Mass transportation, private vehicles, commercial vehicles, and pedestrians are all seriously affected by traffic congestion. Each group has a place in the traffic control plan and a proper allocation of street space for each must be made. The absence of such planning results in confusion, disorderly movement and congestion.

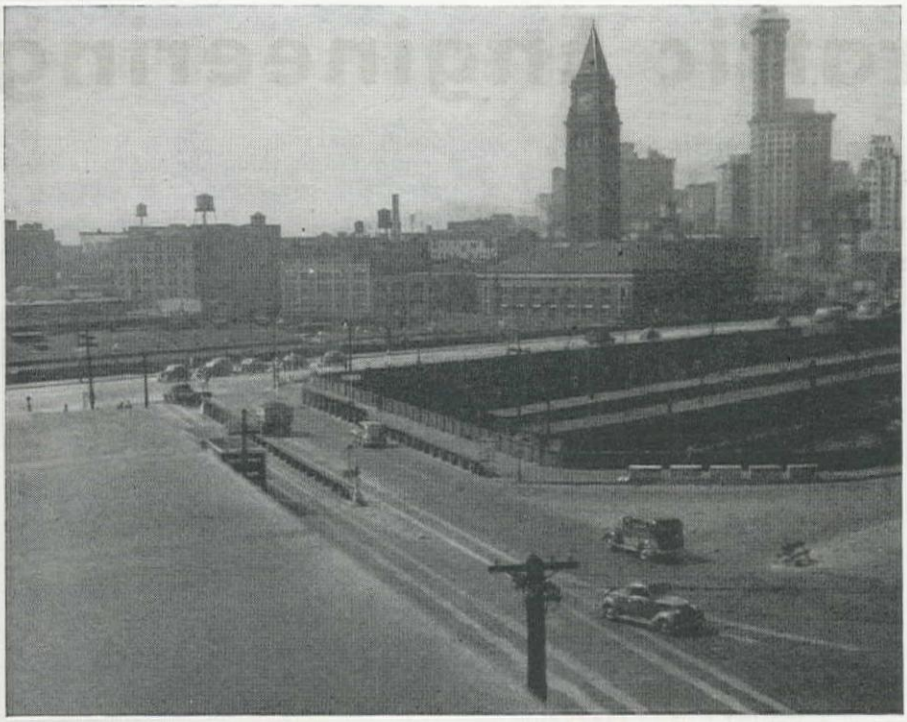
Everyone must cooperate

Engineers, technicians, businessmen and government officials can contribute to improve the transportation problem only to the extent that they **understand its fundamentals** and adopt a program aimed at dealing with these fundamentals. Many technical attempts in past years in this country have failed because they were aimed at specific points which were not fundamentals of the problem. Thus, before attempting to lay out a specific program, it is necessary briefly to review three key considerations: engineering, enforcement, and education—each is vitally important and the transportation problem cannot be improved unless all three are utilized.

The transportation problem may be divided equally between accidents on one hand and congestion on the other hand. The relief of congestion is purely

STREET LIGHTING has evolved from the old concept of "lighting up the neighborhood" to a scientific application of light to the paved areas, with regard to the elimination of glare, production of good silhouettes and increasing visibility of motorists approaching the spot.





BEFORE— Arterial intersection in Seattle including two U. S. highways without adequate provision of direction and protection of traffic.

a physical and mechanical problem, and engineering is its only solution.

Traffic engineering is—

In considering the accident problem, we must consider the natural limitations of the driver and pedestrian. When their performance has been brought to its maximum by education and enforcement, all improvement from there on must be in the direction of improved conditions under which they are forced to operate. This is a matter of traffic engineering.

"Traffic engineering is that phase of engineering which deals with the planning and geometric design of streets, highways and abutting lands, and with traffic operation thereon, as their use is related to the safe, convenient and economical transportation of persons and goods." This is the definition of traffic engineering by the Institute of Traffic Engineers, a Founder Society. Proper traffic engineering will solve all of the problems due to congestion and one-half of the problems due to accidents.

Elimination of congestion, 50% of the problem, is exclusively a physical and mechanical problem, and can be solved only by engineering solutions.

Accidents, 50% of the problem, may be divided into two categories:

(a) Those accidents due to natural human error, which can be corrected only by engineering; i.e., the improvement of physical conditions to make errors less likely, and

(b) The other half of these accidents due to improper driving or walking are corrected **by education** and **enforcement.**

So it is evident that the general transportation problem is 75% an engineering problem.

Major groups of traffic engineering functions are as follows:

(a) Fact finding through surveys and analyses of records and research.

(b) Mechanical and electrical control of traffic through signs, signals, markings, etc.

(c) Channelization through the use of traffic lines, buttons, islands and parking strips.

(d) Traffic design for influence of the shape of the roadway from the surface up.

(e) Parking facilities through control of the space at the curb by time regulation, parking meters, and the control of off-street parking lots, garages, loading bays, terminals and the approaches thereto.

(f) Regulation of moving traffic covering the direction, turning, stopping or prohibition of movement of vehicles by stop streets, one-way prohibited turns, etc.

(g) Traffic planning for the future for major street systems, freeways, elevated ways, grade separations, limited ways, bridges or tunnels.

(h) Traffic safety lighting to eliminate glare, produce silhouette and increase pavement brightness.

TYPICAL DUTIES OF A TRAFFIC ENGINEERING DIVISION

(a) SURVEY SECTION

Traffic facts must always be obtained before any action is taken. **First,** the facts must be obtained through field surveys. **Second,** these facts must be treated statistically and presented in useful form—tables, charts, curves, and maps. **Third,** the data must be analyzed and conclusions and recommendations developed.

After any traffic engineering step has been taken, it is essential that another survey be conducted to measure the value of the step. Only in this way can priorities be established to use the available funds for those transportation improvements which will give the greatest return per dollar invested.

In these two comparative surveys, the subdivisions under the three activities above should be: 1. Volume—vehicles per lane; speed and delay; origin and destination; parking; signal studies; stop sign studies; street use studies; pedestrian counts; routing studies; complaint studies. 2. Accident analysis; congestion analysis; signals required; summarization; charts and graphs; trends; formula; and traffic warrants. 3. Survey files; spot maps; condition diagrams; collision diagrams; flow maps; before and after studies; traffic forecast; enforcement analysis; and education analysis.

(b) MECHANICAL ELECTRICAL CONTROL

Traffic signals are needed at intersections to control heavy volumes, high speed, complicated conflicting movements and pedestrians; ultimately the junction of all primary traffic access streets will be signalized.

In addition to the mechanical job of erecting signals, the following elements must be carefully considered: Adjusting total cycle in each direction; adjusting proportion; adjusting turning periods; speed control; volume control in each direction; pedestrian control; hourly variations; parades; fire control; weather control; inbound and outbound; progression charts; and traffic-actuated.

(c) CHANNELIZATION

The shape of the intersection and the paths of vehicles and pedestrians will control the safety and speed of movement on roadways. Islands, channelization and traffic design are physical elements which control the paths of vehicles and pedestrians in such a way as to obtain the maximum use of the available street space.

In planning traffic islands, factors to be considered include: Button design; traffic fin design; left turn islands; medial divider; right turn islands; pedestrian islands; spreader islands; height; length; width; curb design; reflectorization; illumination; and shadowing islands.

If channelization is desirable, these matters are important: Wide intersections; offset intersections; "T" intersections; multiple intersections; rotary traffic; turning control; reduce conflicting movements; islands for signals; lane control; accelerating and decelerating lanes; filling stations; roadside stands; and storage channels.

(d) PARKING FACILITIES

The use of the street can influence its efficiency. Traffic must be routed and dispatched efficiently. Stopping, standing, and parking must be arranged for crowds and special events, or for any overload condition. To be particularly considered are: Bus zones; truck zones; stage and bus routing; taxi zones; truck routing; passenger zones; terminals; commuter routing; football game routing; parade routing; on street

parking regulation; and off street parking regulation.

(e) REGULATION OF MOVING TRAFFIC

Traffic signs and markings inform motorists of where certain laws apply, regulate their movement, warn them, caution them, and give them information. The entire primary traffic access street system must be signed and marked, with such information as: Stop signs; slow signs; caution signs; directional signs; information signs; center lines; lane lines; channelization lines; obstruction lines; stop lines; crosswalk lines; parking, and loading zone lines.

Beside the surveying and construction of these signs, other engineering matters to consider are: Sign reflector buttons; reflectorized signs; illuminated signs; metal stop signs; spraying lines; reflecting line markers; cleaning reflecting lines; and metal button lines.

(f) TRAFFIC PLANNING FOR THE FUTURE

Consistent progress can only be made by **planning.** The individual corner problem must be solved but an attack on individual corners will produce confusion unless they are attacked on a planned, programmed system basis. Furthermore, while the immediate problems must be solved, it is vital that considerable thought be given to the future. The efficiency of the traffic engineering process can only be increased by a study of its operations with a view to planning them on a work schedule basis.

In the Master Plan, these elements must be considered: Major street system; primary access streets; radial arteries; circumferential routes; by-passes; special truck routes; waterfront traffic plan; municipal parking lots; decentralization; limited way system; and parkways.

Next, land use must be zoned, considering such things as: Building location; zoning control; inside parking requirements; filling station control; trucking prohibitions; recreational areas; and transportation coordination.

(g) TRAFFIC SAFETY LIGHTING

The old conception of street lighting considered only one light on a street corner, in the residential area, with expensive ornamental light standards along a great "White Way." The light was not on the pavement.

The new conception of street lighting takes note of height to eliminate glare; pendant lights to put the light on pavement; and methods to produce silhouette, pavement brightness, and visibility to the eye. Spacing and height will be determined by density of traffic and width of paved area.

For residential streets, spacing should vary from 125 to 175 ft., and intensity should be 2,500 lumens. For traffic streets, the following table is a rough guide:

	Lumens	Traffic	Spacing
Light	4,000	150 to 500	130 ft. staggered
Medium	6,000	500 to 1,200	125 ft. staggered
Heavy	10,000	1,200 to 2,400	90 ft. staggered
Very Heavy	15,000	2,400 to 4,000	100 ft. opposite
Retail	15,000		

In those cities where a traffic engineer is not available or those which do not have the population or funds to support a trained traffic engineer, the duties of a traffic engineer that may be carried on by the city engineer are as follows:

1. Conduct traffic counts and other factual investigations.
2. Control design, installation, proper timing and maintenance of traffic signals and signal systems.
3. Design and plan for installation of traffic signs and markings.
4. Make engineering analysis of accident records and devise remedial measures.
5. Study traffic laws and regulations and propose desirable improvements thereof.
6. Segregate through traffic from local traffic.
7. Assist the police in the analysis of law observance and enforcement, and in the development of ways and means to improve conditions.
8. Develop materials for traffic educational purposes.
9. Develop standards.

Other duties and studies pertaining to traffic engineering that may be carried on by the city engineer as a regular function of his office are the construction of non-skid street surfaces, grade separations at railway crossings and highway intersections, street and highway illumination; and cooperation with highway officials in the location and design of safe primary and secondary highway routes through the city, including such features as traffic circles, width of pavement, throat widening at intersections, cut-back curbs at corners and traffic islands of various types.

AFTER— Same intersection after the application of modern traffic engineering, showing channel islands, traffic-actuated signals, and striping.

Oregon Pollution

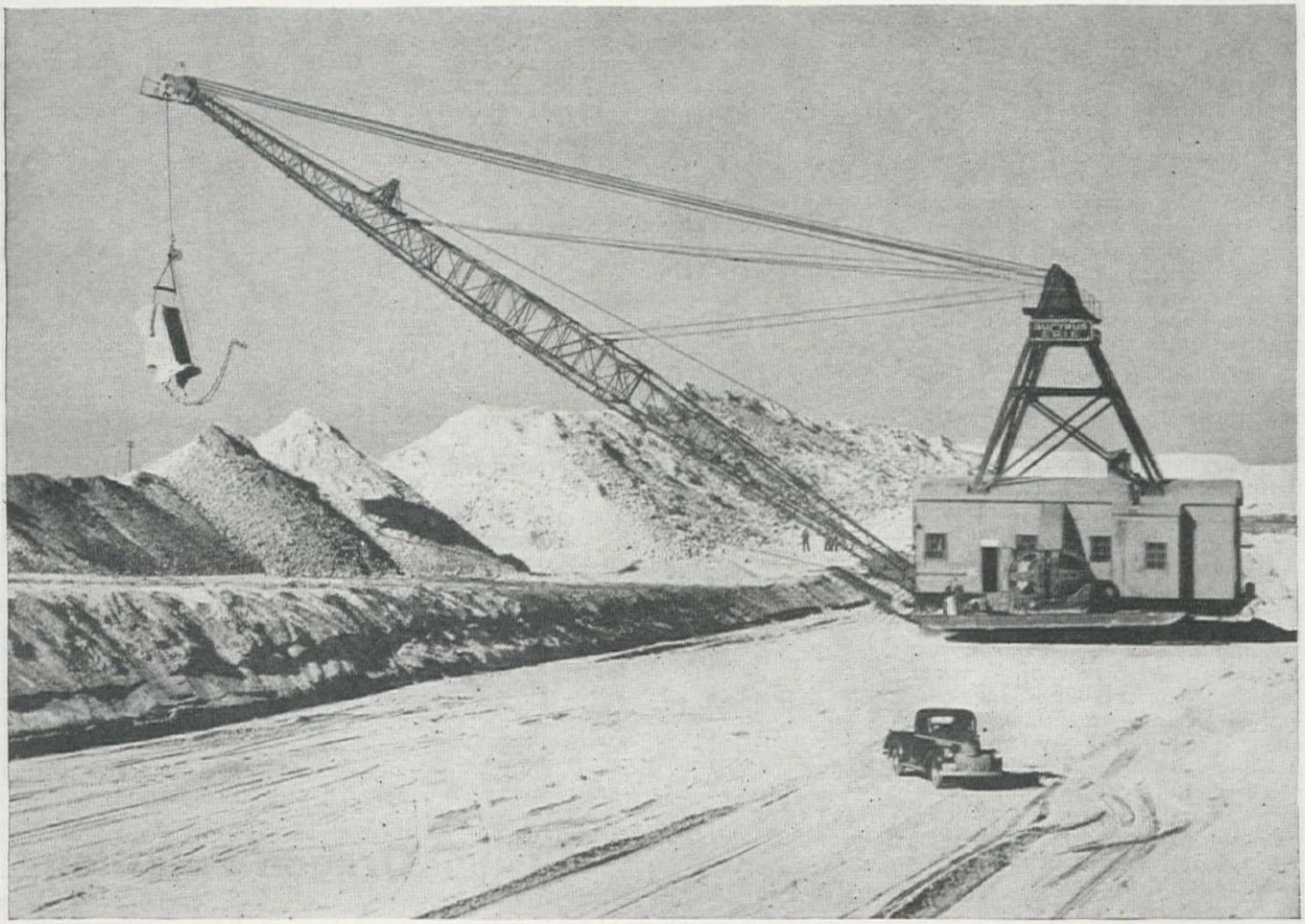
. . . Continued from page 92

to date, more than 25 public sewage treatment plants have been installed or are under construction; and final engineering plans for some 60 more have been completed or are in the process of preparation.

The Authority now requires every city without adequate treatment facilities to prepare engineering plans for such works and furnish to the Authority a definite time schedule for construction as well as an outline of the fiscal plan by which the treatment plant and any intercepting sewers or pumping stations will be financed. The case of each municipality has been reviewed on its own merits and periods of from two to four years have been authorized to permit municipalities to obtain the necessary funds for construction and to proceed with the installation of their sewage treatment plants under a planned program which extends over a reasonable period of time.

The 1949 Oregon Legislature adopted an act to assist financially distressed cities in the small population group. A revolving fund of $1,500,000 was made available to the State Bond Commission for the purchase of municipal bonds that could not be disposed of on the open market. One city has already taken advantage of the act and plans to proceed with construction in the future.

The program for the abatement of pollution caused by municipal wastes is well under way in Oregon, and the State Sanitary Authority is now devoting its attention to the abatement of pollution by industrial wastes.



Canal Carver

On California's great Central Valley irrigation project, contractors Morrison-Knudsen Co., Inc., and M. H. Hasler have assigned the entire 9-million-yard excavating job for the first 23 miles of the Delta-Mendota canal to a Bucyrus-Erie 450-W walking dragline. The big 450-W, equipped with a 165-ft. boom, works round the clock. In an average daily running time of 22½ hours, it cuts some 600 lineal feet of ditch.

Choice of Bucyrus-Erie walking draglines for such heavy duty assignments is an old story because Bucyrus-Eries deliver the "years ahead" performance that means big output. Long reach, big capacity, exceptional maneuverability, great stability, low maintenance, easy operation — these are the requirements for big output, and Bucyrus-Eries have them all!

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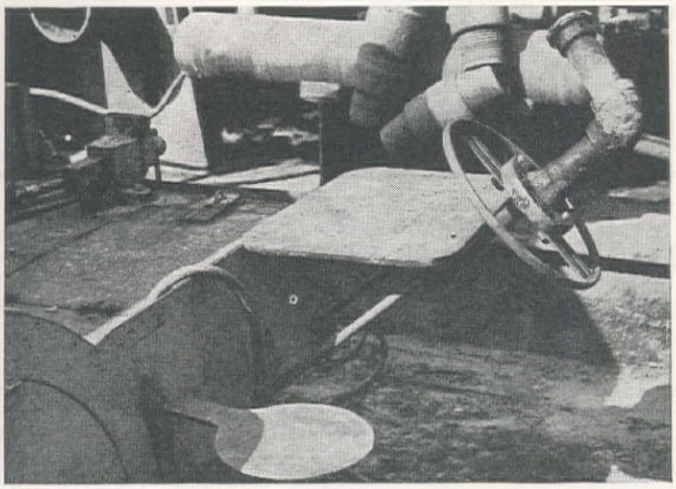
BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

HOW IT WAS DONE

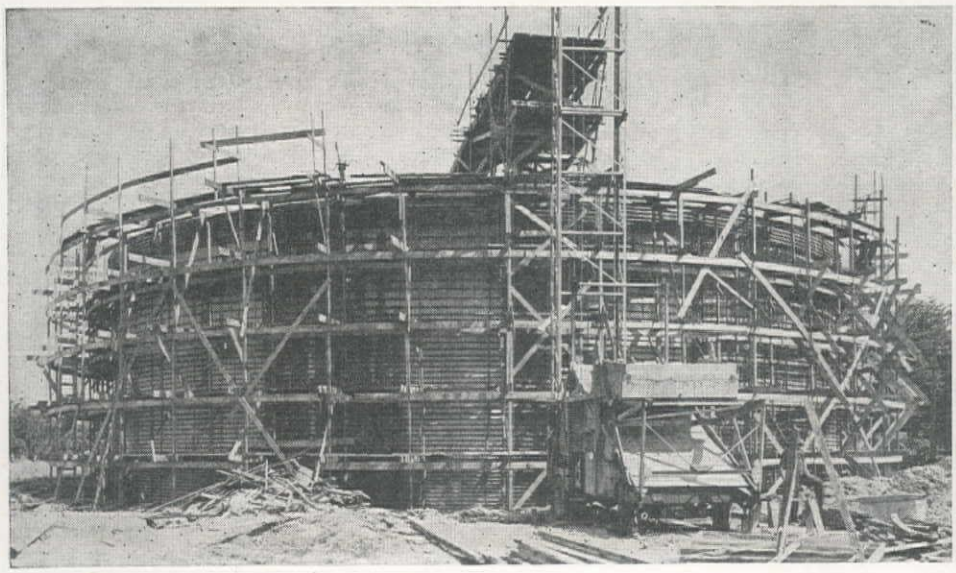
JOB AND SHOP TIPS FROM THE FIELD

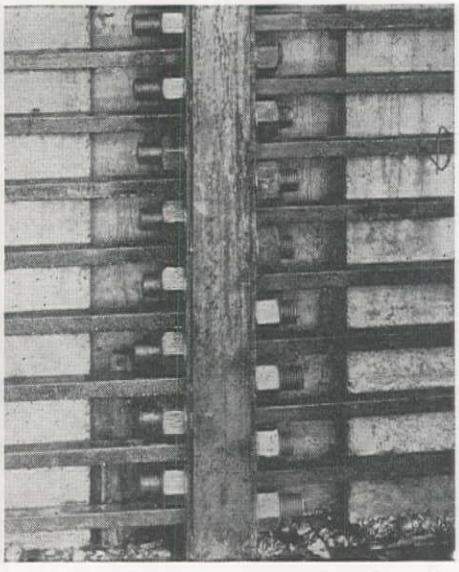


A TURNING DEVICE for welding flanges, which can be mounted on a truck and be held in either a horizontal or 45-deg. position, is the invention of Nelson Welding Service, Compton, Calif. Rods which fit into pipes welded to the truck, attach it to that body. The seat likewise fits into a short length of pipe welded to the truck body.

JUST DELIVERED to the government shale oil mine near Rifle, Colo., is this new type lift truck manufactured by Wagnermobile Co., Portland, Ore. A telescope hoist will quickly raise the platform to a height of 62 ft., to permit miners to reach previously inaccessible spots. The unit has a 92-hp. Diesel engine. When nested, the hoist is only 20 ft. in height. The hydraulically operated platform is for use of two men, but can be enlarged.

DESIGNED BY H. Loren Thompson, of Stevens & Koon, Portland engineers, fabricated by Bethlehem Pacific Coast Steel Co., and erected by E. E. Settergren, Portland contractor, a new type water storage tank is now nearing completion in the city of Milwaukie, Ore. It has a capacity of 1,500,000 gal., believed to be the largest cylindrical concrete tank in the area. It is of prestressed concrete construction, with rod tightened to a tension of 31,000 psi. Rods are 1 in. square with threaded ends. Cost is $65,000.





NEWS OF WESTERN CONSTRUCTION

OCTOBER 15, 1949

Industry Costs Stabilized According to A.G.C. Survey

BUSINESS CONDITIONS nationally have stabilized for the general contracting industry in the construction of buildings, highways, airports, railroads and other engineering projects.

Construction costs are stabilized or declining slightly on a national scale. They are at an estimated 10 per cent below the recent peak.

Contractors generally report adequate supplies of materials, machinery and manpower, with a noted increase in productivity and efficiency. Competition has become keen for the new work coming on the market.

All of these factors mean that the public now can get full value for its investment in construction.

These are the salient features of a nation-wide survey reported by The Associated General Contractors of America at the mid-year meeting of its Governing and Advisory Boards Sept. 12 to 14 at French Lick, Indiana.

The survey was conducted among the A.G.C.'s 107 affiliated local organizations, and among its directors, throughout the United States and Alaska, representing more than 5,300 member firms which annually perform an estimated 80 per cent of all types of the nation's contract construction.

Ample capacity for more activity in all categories of construction was reported. The great majority of replies recommended this as the time when full value would be received for a dollar invested in construction. Strenuous competition and substantially improved labor productivity and management efficiency were cited as major factors in this connection.

Contractors were cutting down on office overhead, reducing the size of key personnel held over between jobs, decreasing price of equipment rental, eliminating overtime, and operating on narrow margins in getting their houses in order for a period of close competition—a period which all reported had already arrived.

In most areas, industrial and commercial building were reported below last year's volume, and in many cases residential construction was lagging.

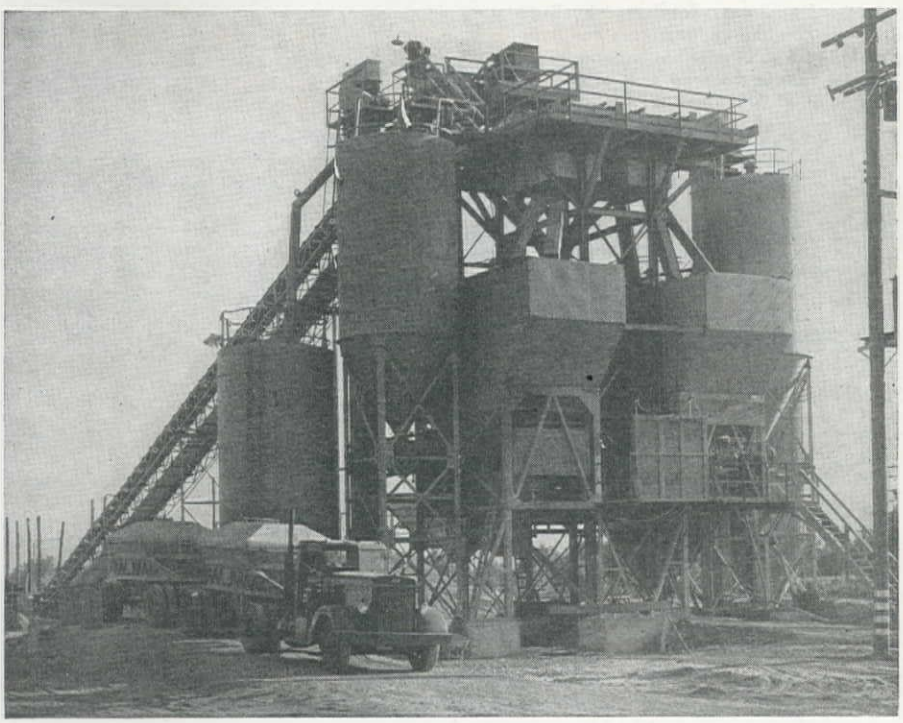
The slack was being taken up, however, by a heavy volume of public and institutional building, which showed indications of continuing to increase. It appeared that those in charge of the public purse were taking advantage of lower costs to launch substantial programs in state, county, and municipal building; in the construction of schools and hospitals. Church and other private institutional building also were up.

Highway construction was reported in many instances hampered because of lack of adequate funds or plans, except in certain states where toll road construction is taking a spurt. Regarding highway costs, 63 per cent reported downward trends, 31 per cent stabilized, and five per cent, upward. The average cost decline was put at 10.4 per cent below the peak.

The heavy market appeared to be fairly good, but in some parts of the West idle equipment was reported as contractors awaited action from the Bureau of Reclamation and Army Engineers, which hinges on Congressional appropriations. Heavy construction costs were stabilized, with the average cost decline reported at 9.4 per cent below the peak.

BATCHING PLANT ON FRIANT-KERN CANAL PROJECT

ONE OF THE TWO VETERAN Noble plants now in use by Peter Kiewit Sons' Co. near Porterville, Calif., turning out dry batches into mixing trucks at a rate averaging 1,074 batches per 8-hr. for the twin setup. Cement silos provide storage for an entire day's run, with a 3-hr. surplus for starting the next day, which reduces worry over cement deliveries. A feature of the plant design is an aggregate screen at the top of the plant to screen the aggregate already graded at the quarry. This screen is an integral part of the batching plant setup, but is mounted on separate supports entirely independent of the framework carrying the bins and batching equipment. One of the plants was used by the same contractor on a highway job.



Work on Idaho Atomic Energy Plant Starts at $6,000,000 in Contracts

CONSTRUCTION ACTIVITIES at the nation's newest atomic energy installation near Arco, Ida., will be on a modest but gradually increasing scale, in contrast to the huge construction programs which have characterized most atomic energy projects. Contract policies to be followed by the U. S. Atomic Energy Commission in developing its Idaho Reactor Testing Station provide for direct AEC contract on individual jobs fitted into a pattern covering several years. Site development work is now getting under way.

L. E. Johnston, manager of the Commission's Idaho operations office at Idaho Falls, reports that the first year will see about $6,000,000 worth of construction start, to consist mostly of comparatively small jobs.

According to Johnston, "We hope to maintain a continuous and gradually expanding construction program, without peaks of high-cost, high-speed work. Since our construction program is geared to the nuclear reactor development work going on at AEC laboratories and in the drafting rooms and shops of AEC contractors, we have reasonably firm schedules for the next three to five years.

"This schedule, and the planned requirements of the reactor project, permits us to develop the site in an orderly manner. A considerable amount of the $6,000,000 which we expect to commit by July 1, 1950, will be in jobs of about $100,000 each."

The Atomic Energy Commission is in negotiation with the Navy to acquire the 173,000 acre Arco Naval Proving Ground and will substantially increase the acreage in the reservation to provide a site for the construction and operation of experimental models of new types of nuclear reactors.

The biggest single job to get under way at Arco within the next six to eight months will be the structure to house the Experimental Breeder Reactor being built by the Argonne National Laboratory at Chicago. Engineering work for the building itself, special equipment and reactor auxiliaries, is being done by the Austin Co. of Cleveland. Bids will be asked this fall for work on an access road, utilities, excavation, and structural steel at a total estimated cost of $250,000.

The total field expenditures for this reactor, on-site in Idaho, will be about $2,500,000. Much of this cost will be taken up in the installation of the complex control equipment and circulating system required for the operation of the reactor, and in the heavy shielding needed to protect personnel from the intense radioactivity produced in the nuclear reacting core. The Commission hopes to have the Experimental Breeder Reactor completed and in operation within 18 months.

"The Experimental Breeder Reactor is important because it will be the first attempt to demonstrate the theory of breeding nuclear fuel. This reactor is designed to produce more fissionable material than it consumes. Its total cost will not be great, as reactors go, but its importance to the United States program of atomic energy can hardly be overstated," according to Johnston.

Another reactor which is being considered for construction in Idaho will be a much larger unit, costing approximately $20,000,000. A contract has recently been awarded to the Blaw-Knox Construction Co., Chemical Plants Division, for the engineering design of this reactor, with completed plans due late in 1950. Known as the Materials Testing Reactor, it is based on research and development work of the Oak Ridge National Laboratory and the Argonne National Laboratory. Some preliminary site preparation, including access roads, rail spur extension, and utility installation, can be started before completion of the detailed plans and specifications.

Master planning of the site is being accomplished by a small group of engineers in the Idaho Operations Office. Detail design of the various features of

"WHO'S IN CHARGE HERE?"

You are—you, the customer. You're the one who brought about the formation of the Truck Mixer Manufacturers Bureau.

You didn't like the multiplicity of sizes and capacities of truck mixers. You didn't like the constant changes in capacity that meant that your machines became obsolete in a hurry. You didn't like not being able to bid accurately and figure your truck mixer costs accurately. Your collective, justified complaint demanded that something be done.

And it was. We organized the Truck Mixer Manufacturers Bureau to set up standards that guaranteed size and capacity. We put a rating plate on the side of each truck mixer so that you could see how large it was, buy on mechanical merit, and figure your operating costs easily.

So look for that rating plate. It's your guarantee of size and accuracy . . . your guarantee that you're in charge here.

Truck Mixer Manufacturers Bureau

Affiliated with The National Ready Mixed Concrete Association

BLAW-KNOX DIVISION
Pittsburgh, Pa.

CHAIN BELT COMPANY
Milwaukee, Wis.

CONCRETE TRANSPORT MIXER CO.
St. Louis, Mo.

THE JAEGER MACHINE COMPANY
Columbus, Ohio

WORTHINGTON PUMP & MACHINERY CORP.
RANSOME DIVISION, Dunellen, N. J.

THE T. L. SMITH COMPANY
Milwaukee, Wis.

the site development will be contracted to architect-engineer firms. Johnston said AEC would follow a competitive bidding procedure on all construction projects wherever possible. First contract awarded was to A. J. Schoonover & Son of Burley, Ida., for an 800-g.p.m. well. A concrete batch plant is being moved from AEC's Hanford Works and will be erected at the new facility by Puget Sound-Macco of Seattle, Washington.

Consistent with the Idaho Operations Office policy of "farming out" as much work as possible, AEC has contracted with E. B. Steele, Civil Engineer of Arco, for initial general survey work on the site.

Other government agencies are working at the site, with the Geological Survey performing water exploration, the Weather Bureau investigating meteorological problems, and the Army Engineers conducting ground exploration and soil bearing tests. The Soil Conservation Service is developing cover grass to minimize wind erosion at construction sites and is arranging with farmers in eastern Idaho to produce the necessary seed.

Permit Asked for 93-mi. Gas Line in New Mexico

THE FEDERAL Power Commission has been asked by El Paso Natural Gas Co. to authorize construction of pipeline facilities which would carry natural gas to the Army's White Sands Proving Ground, the Holloman Air Force Base, and the town of Alamogordo, all in New Mexico, and to Willcox, Ariz. The proposed project also would increase deliveries of natural gas to Phoenix, Ariz.

The plan calls for construction of a total of 93.1 mi. of pipeline, and meters and regulating stations, to be built at an estimated cost of $690,630. The company said that the proposed facilities would have an initial daily capacity of 1,500,000 cu. ft. to the White Sands Proving Ground, 1,850,000 cu. ft. each to Holloman Air Force Base and Alamogordo, and 84,000 cu. ft. to Willcox.

According to El Paso's application, the Sacramento Corp. will supply the gas to the White Sands Proving Ground, the Holloman Air Force Base, and the City of Alamogordo. Distribution in Willcox will be made by that city, and in Phoenix by Central Arizona Light and Power Co. El Paso said the White Sands Proving Ground and Holloman Air Force Base now use oil for fuel, and that Willcox and Alamogordo use manufactured gas.

License New Hydro Project

THE FEDERAL Power Commission has authorized issuance of a 50-year license to Oakdale Irrigation District and South San Joaquin Irrigation District for construction and operation of a hydroelectric project on the Middle Fork of the Stanislaus River in Tuolumne County, Calif. The cost is estimated at $8,840,000.

The project will consist of a rock-fill dam (Beardsley Dam) with a maximum height of 275 ft. and a crest length of 1,150 ft., including the spillway; a water conduit; and a powerhouse and switchyard immediately below the dam. At maximum storage level, the reservoir will have a gross capacity of 97,500 ac. ft. The powerhouse will contain a 13,500-hp. generating unit.

The two Districts distribute water for irrigating San Joaquin Valley farm lands dependent upon the Stanislaus River supply. The storage at Beardsley Dam is intended primarily for irrigation purposes and the reservoir will be operated incidentally for the generation of electric energy. The Districts plan to dispose of the power output to Pacific Gas and Electric Co.

Bidding Small Bureau Jobs

CONTRACTORS interested in bidding on small jobs to be advertised by the Bureau of Reclamation in southern Nevada, southern California, and Arizona are invited to send their names to Regional Director E. A. Moritz of the Bureau's Region 3 office in Boulder City, Nev., it has been announced.

The Regional Office expects to let contracts for the construction of buildings, residences, small laterals and ditches, street paving, curbs and sidewalks, sewer and water systems, small transmission lines and substations, and other small jobs not requiring highly specialized or heavy equipment. No one contract will be in large amount.

Central Valley Project Report Sent To Congress by Secretary Krug

SECRETARY OF THE INTERIOR J. A. Krug transmitted to Congress the Bureau of Reclamation report for the development of the resources of the Central Valley of California, stating, "Developed along the lines approved by the California Legislature in 1941, the report contemplates putting every possible drop of Valley water to work irrigating land, producing power, supplying water to towns and cities, and providing other benefits throughout one of the Nation's best agricultural and industrial areas." Accompanying the report was a letter from the President authorizing its transmission to Congress and endorsing the Folsom formula that multiple-purpose dams are the responsibility of the Bureau of Reclamation, and dams and other works exclusively for flood control are the responsibility of the Corps of Engineers. In general, the plan calls for construction of 38 major multiple-purpose dams, 28 hydroelectric plants with necessary supporting steam plants to provide maximum power, and canals, irrigation works, and transmission lines. The report proposes transfer to the Bureau of Reclamation the construction of the New Melones Dam on the Stanislaus River; Black Butte Dam on Stony Creek; and the New Hogan on the Calaveras River. Previously, all these dams had been authorized for the Corps of Engineers. None has been started to date. Consistent with the Folsom formula, the report recommends that the Corps of Engineers complete construction of the Pine Flat Dam on the Kings River; the Isabella Dam on the Kern River; the Terminus Dam on the Kaweah River; and the Success Dam on the Tule. It provides for these dams to be turned over to the Bureau for operation and integration into the project upon their completion. The report recommends that the Bureau of Reclamation be authorized to build power plants at Pine Flat and New Melones Dams, and the Tulloch after-bay and power plant on the Stanislaus River immediately below the New Melones Dam. It recommends also that the Reclamation Bureau build related transmission lines. The new construction recommended for immediate authorization to the Bureau of Reclamation would cost about $150,000,000 at 1948 costs.

Estimated cost of the Central Valley project as now authorized is $440,000,000.

California Highway Budget Submitted for 1950-1951

MAJOR CONSTRUCTION projects on the State highway system provided for in the 1950-51 fiscal year budget recently made public total $61,702,000, including construction engineering. The 1949-50 budget now in operation totaled $69,703,000. In addition, the Highway Commission budgeted $20,784,200 to be used for the acquisition of right of way for projects contemplated in the 1951-52 program. The new budget includes 53 of the 58 counties in California. The funds appropriated still reflect increased highway revenues made possible by the Collier-Burns Act of 1947, however, estimated revenues for the 1950-51 fiscal year are $4,200,000 less than estimated revenues for the 1949-50 fiscal year. Proposed expenditures and obligations to be incurred for construction of State highways during the next budget year, July 1, 1950 to June 30, 1951, will be divided between the northern and southern counties according to law. Allocations to the northern county group, including construction, engineering, right of way, operation, maintenance, and insurance on the San Francisco-Oakland Bay Bridge, and contingency fund total $43,501,950. The southern county group is allocated $53,169,050. In the larger counties of the State, estimated expenditures are set up as follows: Los Angeles, $27,800,000; San Francisco, $7,088,400; and Alameda, $9,780,600.

California Construction Again Tops the Nation

CALIFORNIA again led the nation in new construction activity during the first half of this year, the U. S. Department of Commerce reported recently. On a year-to-year basis, the State has outbuilt all others since 1941. According to the Department's latest construction and construction materials industry report, the estimated value of new construction put in place in California during the first half of 1949 amounted to $1,042 million. This compares with a total of $1,153 million in the corresponding period of 1948. New York ranked second in the volume of new construction during the first six months, with a total of $683 million, and Texas third, with a $616 million total.

New Snake River Bridge To Replace Burned Span

A NEW Snake River bridge for Pasco, Wash., is now on the drafting board, and it is hoped to have bids on the piling work within several months, it has been reported by Wm. A. Bugge, Washington State Director of Highways. The new structure will accommodate two lanes of traffic and have 28 ft. of clear deck, as compared with the 18-ft. width of the old bridge, recently damaged by fire. On Sept. 8, the fire started on the tar and creosoted planking of the deck, and fanned by winds of near gale proportions, seriously heated the steel spans, warping them to the extent that repair is impossible.

Sewer and Water Program Active at Bountiful, Utah

TWO CONSTRUCTION projects to build a sewer system and increase water facilities in Bountiful, Utah, are well under way and are to be completed before winter weather sets in. Included in the $850,000 contracts is a 750,000-gal. reservoir by the Clarence Waterfall Construction Co., Ogden, Utah, and a 750,000-gal. covered reservoir by Edward L. Eckman, Salt Lake City. The J. K. Thayn Co., also of Salt Lake City, has the $485,355 contract for Bountiful's sewer installations, and the disposal plant is under contract to Bountiful Better Builders, Inc. The L. H. Poulsen Construction Co., Brigham City, has the contract for installation of the water mains.

Concreting at Hungry Horse

THE FIRST CONCRETE has been poured at the Bureau of Reclamation's Hungry Horse Dam in northwestern Montana, and pouring is expected to continue through most of the month of October. When freezing weather sets in, work will continue on the reservoir, road building, and clearing projects, provided the weather is not too severe at the job site.

PERSONALLY SPEAKING

J. S. Bright, deputy commissioner of the Public Roads Administration, has retired from office after 32 years of service with the Bureau. He supervised construction of the Alaska Highway early in the war, when it was his responsibility to coordinate the forces of the many contractors on the giant project. He was appointed deputy commissioner in charge of the department of construction and maintenance in 1944.

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Shipley D. Burton has been named field activities director of the American Road Builders' Association, Highway Contractors Division. He began his association career as manager of the Utah Motor Transport Association, later becoming western representative of the American Trucking Association, Inc. While engaged in this work, he directed the organization of several state trucking associations and organized a Western States Conference of ATA. In 1942, Burton was transferred to Washington, D. C. to become field activities director for the ATA, and continued his work on a national scale. He assisted with the organization of the National Truck Body Manufacturers and Distributors Association, and it is from this work that he comes to the American Road Builders' Association.

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Colonel Donald S. Burns, chief of the engineering division for military construction in the Office of the Chief of Engineers since August, 1947, has been appointed district engineer of the Portland district, Corps of Engineers, it was announced by Colonel O. E. Walsh, North Pacific division engineer. Burns will report for duty about Nov. 15 and have offices in the Pittock Block, Portland, filling the position vacated last July when Colonel Walsh was elevated to the post of division engineer. Lt. Colonel Donald A. Elliget, formerly executive officer to Walsh, is acting district engineer.

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Guy H. Taylor, partner in the consulting engineering firm of Moffatt, Nichol, &Taylor, of Portland, Ore., was recently appointed to the American Society of Civil Engineers' national committee for the study of seismological forces on structures. Taylor is local chairman of the earthquake committee for ASCE, and also a member on the Northwest conference committee.

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State Director H. E. Bailey has announced the appointment of **R. L. (Dick) Burton** as head of the newly created traffic engineering division of the Oklahoma state highway department. Burton has been assistant director and chief of the traffic control division of the state safety department since its creation in 1937, except for a three year period during the war. He studied traffic engineering at Michigan, Tennessee, and Yale universities.

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Utah's Gov. J. Bracken Lee has announced the appointment of three Salt Lake City engineers to the professional engineers' examining committee for the state department of registration. Appointed were **Carl E. Painter, J. Vernon Sharp,** and **George W. Carter.** All three appointments are for three years.

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Walter Frickstad, retired city engineer of Oakland, Calif., has been named consulting engineer for the road and highway work in Alameda County.

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Charles F. Palmetier has been appointed as Office Engineer at the Bureau of Reclamation's Hungry Horse Project, it was announced by Clyde H. Spencer Construction Engineer. Palmetier succeeds Davis S. Culver, who was recently appointed to the position of assistant construction engineer. Palmetier began his career with the Bureau of Reclamation in October, 1933. Following five years in the Chief Engineer's office in Denver, where he worked on design of concrete arch dams, he transferred to the Elephant Butte powerplant construction job on the Rio Grande project in New Mexico; then to powerplant construction on the Minidoka project in Idaho; and finally to the Parker Dam power project on the Colorado River between Arizona and California.

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Harlowe M. Stafford is now in charge of the Central Valley suboffice of the U. S. G. S., located in Sacramento. He was transferred from Glendale, where he was in charge of the Southern California office of the Surface Water Branch.

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John A. Bonnell, Jr., formerly on the engineering staff at the Calif. Institute of Technology, has been appointed assistant professor of civil engineering at the University of Nevada.

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John MacLeod of Macco Corp., general contractors of Clearwater, Calif., has been named to represent the Associated General Contractors of America on a newly-formed committee with manufacturers of construction equipment, supplies, components and materials, according to an announcement made jointly by AGC National President, **Adolph Teichert, Jr.,** and Construction Industries Association President, **Ralph K. Stiles.** Purpose of the committee will be to provide a medium through which manufacturers and general contractors can cooperate to increase efficiency in the construction industry. The cooperative work is specifically aimed at problems in the construction equipment field, such as presentation and utilization of ideas of general contractors concerning desirable new types of equipment; improvements of present equipment, and gradual progress toward more completeness and uniformity in repair parts catalogs.

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Arthur E. W. Dodds, architect and engineer of Seattle, Wash., has been named as assistant superintendent of buildings for Seattle, according to **John B. Cain,** superintendent of buildings. Dodds formerly was chief engineer for the Weyerhaeuser Sales Co., Tacoma, Wash., and engineer in charge of structural design for the Bonneville Power Administration.

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Organizational changes have recently been made within the ranks of the Bureau of Reclamation at Hungry Horse Dam in Montana, according to **C. H. Spencer,** the Project's Construction Engineer. **David S. Culver,** office engineer,

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WILLIAM H. NALDER, Chief Designing Engineer of the Bureau of Reclamation, has accepted a United Nations request to serve with the Economic Survey Mission for the Middle East. He is expected to leave in the near future for Beirut, Lebanon, to join members of the Mission now there working under the direction of Gordon Clapp, Chairman of the Board of Directors, Tennessee Valley Authority. The Mission is concerned primarily with the study of problems related to displaced Arabs in the Middle East, whose welfare is being considered by the United Nations, and Nalder is expected to advise the Mission on reclamation work.

was promoted to the position of assistant construction engineer. **J. M. Patton** was appointed programs and finance officer. Patton was formerly at Shasta Dam in California.

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M. E. Bunger, formerly Chief of the Report Staff at Billings, Mont., for the Department of Interior, is now Consulting Engineer with Ford, Bacon & Davis, Inc., New York City, who have the contract to investigate the possibility of synthetic fuel production from coal oil shales and natural gas for the United States and Alaska. Bunger, in his new position, will pass on water supply plans and cost estimates for bringing water to proposed plant sites.

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Brig. General James H. Stratton, who retired as Division Engineer, New England Division, U. S. Engineers, July 31 and was formerly District Engineer on the construction of the Conchas and John Martin Dams in New Mexico and Colorado, has joined the Knappen Tippetts Abbett Engineering Co. of New York City as a special partner.

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In addition to those "Flying Contractors" mentioned in *Western Construction News* for September 15, the Arizona Chapter of the Associated General Contractors gives a larger list of its members who own and operate aircraft. These are: W. J. Henson, Prescott; Daley Construction - Acme Materials Co., Phoenix; Orr and Orr Construction Co., Phoenix (two airplanes); Vinson Construction Co.; Vinnell Construction Co.; Bowen & McLaughlin; Womack Construction Co.; and the Winston Brothers Co.

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James H. Head, formerly contracting in the California cities of Taft, Wasco, and Bakersfield, is now a general contractor in Arroyo Grande, Calif., doing housing, commercial, and repair work.

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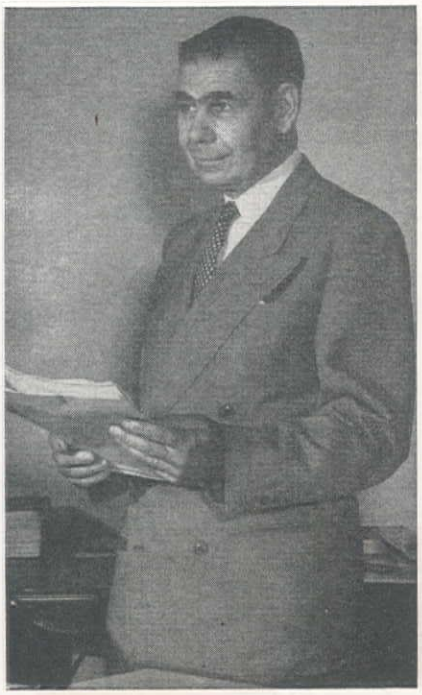
William K. Stamets, Jr., consulting mechanical engineer, announces the opening of his office in the Hoge Building, Seattle, as of October 1. He was formerly instructor of mechanical engineering, Cornell University, and Consultant to Morse Chain Co., Division of Borg-Warner Corp.



WALTER E. BLOMGREN, newly appointed Assistant Chief Engineer of the Bureau of Reclamation, has been with the organization continuously since 1929. He was in charge of designs, estimates, and reports on several large dams, including Shasta and Davis. In May, 1947, he was named assistant regional director of Region 7. In his new position he will serve under L. N. McClellan, Chief Engineer.

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Leon R. Hughes has been appointed Assistant Highway Engineer for the Calif. Division of Highways, Dist. IX, at Bishop. He was formerly associated with Dist. VI in Los Angeles as a junior civil engineer.

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Revoe C. Briggs succeeds S. D. McGlashan, who retired recently, as California District Engineer for the U. S. G. S. Surface Water Branch with offices in San Francisco. After graduation from Stanford University, Briggs worked with the Coast and Geodetic Survey in Alaska and Washington, and in 1917 was transferred to the water resources branch. He has been in California since 1921.

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Paul C. Brown has moved to Atlanta, Ga., to serve as Road Engineer of Region 8, U. S. Forest Service. He was formerly equipment engineer of Region 5, with headquarters in San Francisco.

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James H. Hardy has taken the position of Junior Civil Engineer with the Calif. Division of Highways, District VII in Los Angeles.

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Thomas F. McGowan has been appointed Public Health Engineer for the city of San Jose, Calif., involving work in municipal sanitation and sanitary engineering. He was formerly assistant engineer with the Alameda County mosquito abatement district.

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George D. Atkinson, electrical engineer at Shasta Dam, has been named Superintendent of Operations of Shasta Dam and Powerhouse and of Keswick Dam and Power Plant, located near Redding, Calif. A University of California graduate, the newly-appointed superintendent of California's largest power plant was first employed by the Bureau of Reclamation on the Boulder Canyon Project in 1930. He has also held engineering positions with the Southern California Edison Co., the Federal Power Commission, and the U. S. Army Engineers. For the past two years he has been in direct charge of installation of electrical equipment at Shasta and Keswick power plants.

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Ralph S. Brooks, civil engineer from Monrovia, Calif., was recently appointed city engineer for Azusa. He will retain his consulting practice.

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Owen G. Stanley, chief of the Engineering Division, South Pacific Division, Corps of Engineers, participated

recently in the United Nations Scientific Conference on the Conservation and Utilization of Resources at Lake Success, N. Y. He presented a paper on "The Importance of Sediment Control in the Conservation and Utilization of Water Resources" to the water resources section of the conference. The paper was prepared jointly by Stanley and E. W. Lane, of the Bureau of Reclamation.

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Jack E. McKee, who has been associated with the firm of Camp, Dresser, and McKee, sanitary engineers of Boston, Mass., has been appointed by the Calif. Institute of Technology as professor of sanitary engineering. **Caleb W. McCormick,** formerly with C. F. Braun & Co., and Dames & Moore, soil mechanics and foundation engineers, has been appointed as instructor in civil engineering. McKee received his undergraduate training in civil engineering at the Carnegie Institute of Technology, and following graduate study in sanitary engineering received the Ph.D degree from Harvard in 1941. Subsequently he was employed by the U. S. Public Health Service and the Tennessee Valley Authority. McCormick received his bachelor's and master's degrees at the University of California and is a member of Phi Beta Kappa, Tau Beta Pi, Sigma Xi, and Chi Epsilon.

OBITUARIES . . .

Frederick May Green, 77, retired structural engineer, died in San Francisco on Aug. 8. He had been in California since 1924 as Senior Structural Engineer with the State Division of Architecture. Green was a Life Member of the American Society of Civil Engineers and an Honorary Member of the Sacramento Section.

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W. B. Kiggens, First Vice-President of the San Joaquin Water Conservation and Development Association, died recently in Lindsay, Calif. He was Lindsay's first mayor and one of the principal leaders in the pioneering that led to the development of the Central Valley Project.

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Jay J. Garfield, 64, pioneer building contractor in Tucson, Ariz., died in that city on Sept. 15. Since his first job in Tucson in 1907, he had built many of the city's largest buildings.

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Harold E. Woster, 49, civil engineer with the Washington State Highway Department, died in Seattle on Sept. 4.

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Heber K. Burton, 78, former superintendent of the Salt Lake City water department, died Sept. 14.

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Charles E. Wuensch, 57, former engineer for the American Smelting and Refining Co. and the United States Smelting, Refining and Mining Co., died in San Francisco Aug. 27.

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James E. Beaulaurier, 69, senior member of J. E. Beaulaurier & Sons, Great Falls, Mont., building contractors, died on Sept. 8. He had been engaged in building construction in Great Falls for 44 years.

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Arthur L. Enger, 63, Structural Engineer with the School Section of the California Department of Public Works, Division of Architecture, died Sept. 5 in his Sacramento home. He began his career as a teacher, Brooklyn Tech., in 1911, and was assistant irrigation engineer from 1912 to 1917 at the Agricultural Experiment Station, Univ. of Arizona. He practiced engineering and architecture in El Paso for 5 years, then became Structural Engineer for the Los Angeles City building department in 1923. From 1924 to 1933 he was with the city's bridge department, becoming assistant Chief Structural Engineer. He was connected with the State Division of Architecture since 1933, with the exception of a short time during World War II when he was with Ellison and King, San Francisco, and Peugh and Associates, Pleasanton, on war work. He was appointed Principal Structural Engineer for the Division in 1948. During World War I, he was a captain in the Army and remained active in the reserves until retiring as a major.

SUPERVISING THE JOBS

Cuvier Greene is general superintendent for the Pickard Construction Co. of Long Beach on the Magunden Mesa power line. The contract calls for the erection of 278 towers at a cost of $250,000 for the Southern California Edison Co., and is the first section of a 240-mi., 220-kv. transmission line. The section now under contract is 60-mi. long and extends from Bakersfield to the vicinity of Palmdale, across the Tehachapi Mountains. Other key men for Pickard are **J. J. "Johnny" Carmichael,** job superintendent; **J. A. "Jack" Greene,** engineer; **Ed Lord,** layout and form-setting foreman; **H. E. "Woody" Westbrook,** dirt foreman; **M. C. Nichols,** equipment foreman; **H. M. McIntire,** powder foreman; **William Petting,** drill foreman; **W. E. Evans,** concrete foreman; and **W. H. Hester,** office manager and timekeeper. Roads are being built by Stone & Webster under the supervision of **Bob Weaver.**

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Cleland C. Bull is general superintendent, and **Hubert Martin** is project manager for Martin Construction Co., Boise, Ida., on construction of the Steele Memorial Hospital at Salmon, Ida. It is a $141,670 job. Detweiler Bros., Twin Falls, Ida., have the plumbing sub-contract, and Brown's Appliances, Idaho Falls, the electrical work.

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R. R. Atchinson is general superintendent for Harrison & Atchinson, contractor on the highway grading and structures job on state highway 63 near Meeker, Colo. **L. C. Hill** is structures foreman and **R. H. Atchinson** is grading foreman on the $240,000 contract. **Art Heinold** is foreman and **Lysle Pittman** is the master mechanic.

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George F. Foster is general superintendent for the Owens Tunnel Constructors on the Owens Gorge Tunnels at Bishop, Calif. **C. C. Harris** is assistant superintendent, and **A. M. Brown** is master mechanic and electrical superintendent. **E. G. Byrd** is office manager, and **Lloyd J. Wright** is project engineer. Walkers on schedule 1, six mi., are **Howard F. Foster, W. F. Hall, O. D. Williams, Glen West,** and **Henry U. Wood. Blackie Premo, June Brown,** and **C. W. "Chuck" Williams** were walkers on the two-mi. schedule 2, completed Sept. 4. Walkers on the two-mi. schedule 3, completed Sept. 4, were **George Savage, Ernie Moore,** and **A. L. Austin.**

W. C. "Bill" Mason is in charge of the Burchan Canyon part of the Owens Gorge project for the Los Angeles Department of Water and Power. Other key men for the Dept. of Water and Power on the powerhouse and penstocks job are **C. R. "Jack" Tiessen,** superintendent; **Carl Steen,** general foreman; and **Tommie B. Smith, Donald I. Bengs, Joe M. Gullono, S. D. Sprague,** and **Otto Martin,** labor foremen. All surveys are under **Cecil F. Moore. Dean Sprague** is master mechanic.

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Guy H. James is project manager and **R. E. Leech** is general superintendent on Enders Dam, Enders, Neb. Wunderlich-James-Phelps hold the $4½ million contract for the Bureau of Reclamation. **F. A. Bleecker** is assistant general superintendent, and foremen are **C. B. Harmer, R. E. Spitler, E. E. Chumley, E. F. Van Dorn, F. E. Wilson, R. A. Mershon, C. A. Stokes, J. A. Jurst, M. E. George, G. C. Green, W. L. Stoneking,** and **C. W. Ott.** Other key men are **J. G. Quisenberry, B. M. Shelton, B. A. Kasinger,** and **H. L. Davis.** Chief engineer on the project is **U. V. Engstrom.**

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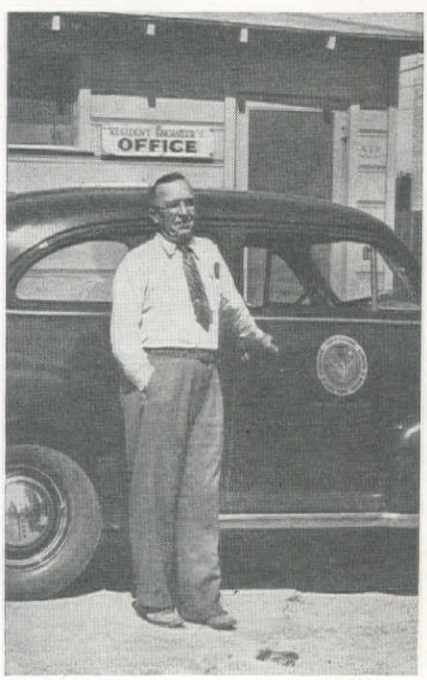
L. M. Hawkins is general superintendent and **Dick Lamb** assistant superintendent for the $490,000 Hinman Bros. Construction Co. contract for new highway construction in Clear Creek Canyon, 8 mi. west of Golden, Colo. **Stan "Irish" Hart** and **Roy Perry** are foremen on the job. **Chris Eastin** is engineer, and **Frank Baldridge** master mechanic.

R. A. COLLINS, resident engineer for the California Division of Highways, on the removal of Fort Moore Hill, in downtown Los Angeles. Story on page 62.



J. P. Elliott is general superintendent for Platt Rogers, Inc., contractors with the $360,000 contract for highway grading and structures constructed for the PRA on state highway 91, near Kokomo, Colo. **W. R. Brown** and **Herb Snow** are foremen, and **Carl Todd** is master mechanic on the job.

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Bill Short is project manager, **R. J. Wolfenbarger** is general superintendent, and **M. E. Schlichter** is superintendent for the Brown Construction Co. on their bridge section of the $800,000 state highway project on U. S. 50 near Penrose, Colo. The Eichleay Corp. are subcontractors on the job.

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Jack Edwards, recently of the Texas Gravel Co., is general superintendent for J. G. Shotwell, contractor on concrete aggregates at the Corps of Engineers' McNary Dam, Umatilla, Ore. **George D. Jones** is assistant superintendent. Gravel plant foremen are **Tom Johnson, Wayne Folsom, H. H. Smith,** and **Leo A. Davenport. John Webb** and **A. E. Curtiss** are sand plant foremen, and **M. W. McAnally** is maintenance foreman.

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John Kelso is project manager and **L. A. Tomlinson** is general superintendent for the Borchert Construction Co. job at Pendleton, Ore., on the Oregon Grange Warehouse. The $175,000 contract for the nearly completed reinforced concrete structure calls for 27,000 sq. ft. of floor space and a modern cold storage locker plant. **Elmer Herman** is carpenter foreman and **Ernest Harper** is labor foreman.

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Carl Rutledge was project manager and **F. R. Frazier** general superintendent for Monaghan & Kilgroe, contractors on the recently completed $250,000 Cherry Creek Bridge on state highway 83, near Franktown, Colo. **Fred Stearns** was resident engineer, and **Paul Bailey** engineer for the highway department. **King Burkhardt** was engineer for the PRA on the job.

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Bob Thomas is general superintendent for L. J. Hesser Construction Co. on the Colorado Highway Dept. four-lane bridge two mi. north of Colorado Springs, now being completed. **G. T. Dorsey, Pete Johnson, Dean Schuman,** and **Elmer Korsey** are foremen on the $85,000 contract.

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Kenneth Barton was superintendent and **C. S. "Sam" Countryman** general foreman for the Underground Construction Co. on the recently completed bridge work on Highway 99E at Marysville, Calif. The $97,000 contract called for new piles, capping, and concrete work on the foundations of the existing bridge.

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S. A. Marshall is project manager and **W. J. Ballantyne** is assistant project manager on the $1,650,000 Bureau of

Reclamation contract for excavating the core trench at Trenton Dam, Trenton, Neb. Marshall, Haas, and Royce are the contractors. **Earl Morgan** is general superintendent on the project. Foremen include **Don Cunningham, E. H. Timmins, C. H. Ingersoll, E. H. Kreuger,** and **Bill Reiff.** Other key men are **Fabel Story** and **Dallas D. Schafer. H. D. Shannon** is project manager for the Martin Green Construction Co., subcontractors on the project.

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Walt Backus is general superintendent for the Colorado Constructors on the grading and excavation for the Denver Valley Highway, a job being done with funds from the City and County of Denver, Colorado highway department, and the PRA. Foremen on the job include **Ed Fagin, Andy Biddle,** and **Don Baker.**

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M. F. Moulton is general superintendent for the $1,700,000 J. A. Terteling & Sons contract for building a railroad spur from the Union Pacific line to North Richland, Wash., for the U. S. Atomic Energy Commission. Foremen on the job are **Burl Rutledge, Inart Olson, Ray Clements,** and **Jack Coons. Al Blanchard** is master mechanic and **Frank Collins** is office manager.

* * *

Fred Bowlus is in charge of the outfall sewer to Whites Point, Los Angeles County, a job being done by the county's sanitation district. Superintendents are **Norman S. Marchment** and **Richard Gilman. O. L. Beck, Albert L. Richardson,** and **L. H. Smith** are shifters. **F. S. "Tex" Bygum** is topside foreman, and **Sam Waggoner** is bullgang foreman.

* * *

John Leone is general superintendent for the Domenic Leone Construction Co. on their $365,000 contract for road relocation for the National Forest Service. The job is located in San Isabel National Forest, near Pueblo, Colo. **George Gahm, Bill Gerres,** and **Carl Amato** are foremen on the job, and **Chas. Menapace** is master mechanic.

* * *

The Joiner Construction Co., new in the field in Long Beach, Calif., are specializing in paving, grading, and excavation, and have just completed grading and turfing the Placentia School at Placentia. The business is operated by **Lloyd A. Joiner. L. A. Anderson** is general manager, **B. J. Bryce** is general superintendent, and **Dorman Bryce** is office manager.

* * *

C. R. "Spot" Denton was superintendent for the Northwestern Engineering Co., Rapid City, So. Dakota, and Denver, Colo., on a $33,000 contract for road mix surfacing of 5 mi. of highway at Brockton, Mont. The job was completed in 8 days. **Walter Koester** was resident engineer for the highway department.

* * *

Emmett Anderson is project manager, **H. Hansen** is general superintendent, and **Claude Cox** is foreman for the Twin Harbor Construction Co. on the Washington state highway department new road at Markham. **Nels Hyndman** is office manager for the contractor on the $135,700 contract.

* * *

E. A. Green is general superintendent on the Bajara, Calif., sewer job nearing completion. The Granite Construction Co. of Monterey has the $150,000 contract. **Lee MacGowan** and **Jerry Elliott** are foremen on the job, and **Bob Knox** is concrete foreman. **Ed S. Kellar** is master mechanic.

* * *

Frank Nelson is general superintendent for Northwestern Engineers on the $50,000 road oiling contract for the PRA on U. S. 34 at the entrance to Rocky Mountain National Park. **Bill Coffey** and **Earl Goble, Jr.,** are foremen on the nearly completed job.

* * *

Herman Snyder is general superintendent for Isak Mattson & Son, contractor for the $125,000 garage building being built in Minot, S. D., for Granvold Blasner. Snyder is also in charge of a $125,000 building job in the same city for the Red Owl chain grocers.

* * *

Lloyd Dayley is project manager and **Hi Dayley** is general superintendent for the Dayley Bros. Construction Co., Boise, Idaho, on the $40,000 road and airfield excavating job at Richland, Wash. **John Sells** is foreman on the job, now being completed for the Atomic Energy Commission.

* * *

Howard Caton is superintendent on the Calif. State Highway work between Willows and Descanso Junction, in the San Diego area. **Leo G. Cline** is engineer, and **George Havins** is office engineer on the job. **Tom Hoffman** is assistant office engineer. The job involves an 800-ft. tunnel 28 ft. by 20 ft.

* * *

H. J. Curl, Jr., was project manager, and **H. J. Curl, Sr.,** was general superintendent for the Coast Blacktop Paving Co., Bend, Ore., on the $7,000 asphalt job at Sisters, Ore. **Russell Reeder** was foreman.

* * *

George Rockne is project manager and **Hart Peterson** is general superintendent for Rockne & Son, contractors on the $45,000 water treatment plant now nearing completion at Plentywood, Mont.

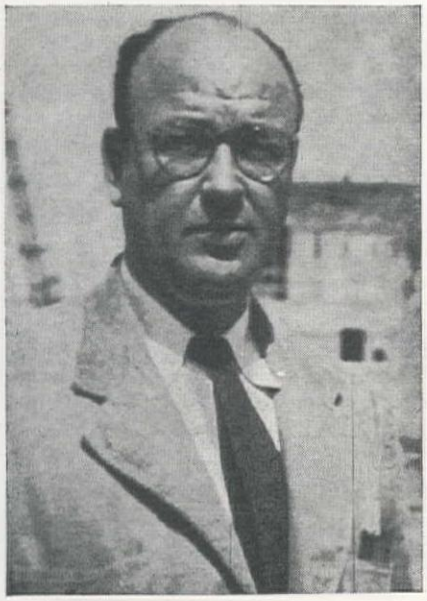
* * *

William J. Cole is shovel superintendent for the Peter Kiewit Sons' Co. on their contract for work on Highway 2F, Odair to Electric City, Wash.

* * *

Jim Green is general superintendent for J. A. Terteling & Sons, Inc., on their $8 million contract for the East Low Canal, southernmost part of the Columbia basin irrigation system now being built by the Bureau of Reclamation. General foremen on the job include **Harry Hanson,** carpentry, and **Cliff Emmons,** grading and excavation.

STANDING BY a specially-equipped tractor in use on Wixson, Crowe, and J. H. Trisdale's reservoir clearing contract above Hungry Horse Dam in Montana are, left to right: BOB ROBINSON and "DOC" BINKLEY, master mechanics; JACK ANDERSON, shift foreman; and EMIL FELSTAT, schedule superintendent.



WILLIAM R. (BILL) BUSHELLE, project manager for Guy F. Atkinson Co., on construction of portions of the Hyperion sewage treatment plant, being built for the City of Los Angeles.

Other key men include **Irv Blanchard**, master mechanic, **Jim Erwin**, chief engineer, and **Chet Heller**, office manager.

* * *

Hans Hagen is general superintendent on the $250,000 Good Samaritan Hospital job in Rugby, N. D., under contract to Isak Mattson & Son.

* * *

Lloyd "Shorty" Dowell is superintendent for W. D. Haxton, contractor on the $396,000 school building under construction in Vista, Calif. **Ralph Guest** and **Ed Means** are carpenter foremen on the job.

* * *

Fred Rognlie is general superintendent and **Louis Primeau** is foreman for the Lake Construction Co. on the Immanuel-Lutheran Church in Rolla, N. D. **Lawrence Gourneau** is masonry foreman on the $50,000 job.

* * *

Reed Coulan was foreman on the $25,000 remodeling job in Twin Falls, Ida., recently completed by Reynolds & Walker, Inc., contractors for Ropers, Inc.

* * *

Walter Hogg is general superintendent for Jess and Walter Hogg, contractors, on the $48,000 sewer job being built for Yuba City, Calif.

* * *

Bob McKinzie is general superintendent for the Willow Creek channel job near Creede, Colo., a Corps of Engineers project. Medley & Lizar, Inc., of Albuquerque, are the contractors. Foremen on the job are **A. C. Gibson, Joe Martinez,** and **Robert Anderson.**

* * *

I. W. Delaye is general superintendent on the Consolidated Western Steel Corp. subcontract on steel pump line erection at Grand Coulee, Wash. Foremen on the job include **T. J. Roskowyk, W. R. Bohn, R. N. Coykendall, R. E. Cookston, C. D. Bowers, T. J. Hildabrand,** and **R. A. Barnes.**

* * *

Jack Cass is superintendent for the Valley Construction Co. of Fontana, Calif., on their $350,000 contract for building the Home Street School at Bishop. **Glen Ball** is carpenter foreman and **Art Hauer** is labor foreman. **T. V. Beyer** is on the job representing Weston & Reichard of Los Angeles, architects.

* * *

B. H. Pebley is general superintendent for Monaghan & Smith, contractors on road grading and realignment for the Colorado state highway department on state highway 14, Muddy Pass, near Steamboat Springs, Colo. Foremen on the $210,000 job are **Lawrence Peters, John Schmier,** and **Lyle Berry.**

* * *

D. K. Refer was superintendent for the Northland Construction Co. on their $38,000 contract for construction of a light commercial building in Forsyth, Mont., for the Miles & Ulmer Hardware Co.

* * *

Robert Skinner is general superintendent for A. Teichert & Sons, Inc., on their California state highway job on Route 71, 10 mi. south of Ontario. The

job involves 6½ mi. of realignment. **Ralph Bitter** is excavation and grading foreman. **Roy Thomas** is labor foreman, **Tommy Thompson** is in charge of structures, and **Roy Ham** is master mechanic.

* * *

C. H. Grimes, with 30 years of experience with equipment, is dragline operator for Marshall-Haas-Royce, contractors, on the Trenton Dam, Nebraska, contract.

* * *

Chas. Antilla, Jr., was general superintendent for A. Wilson Benold, contractor on the $45,000 Kenwood Gymnasium job at Bend, Ore.

* * *

Ed T. Pritchard is steel foreman for the McNary Dam Construction Co. at Plymouth, Wash., and is in charge of the reinforcing steel.

* * *

Gil Davis was superintendent and **Mike Walters** foreman for the C. O. Overaa Construction Co. contract for a frame and stucco dental clinic at Richmond, Calif.

Great Falls Sewers

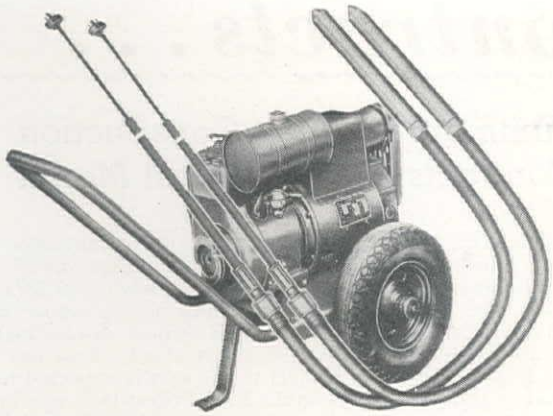
. . . Continued from page 96

ects. However, it fell to R. E. McCormick, who was appointed City Engineer in January, 1948, to push through to completion the plans and specifications for actual construction. In the spring and summer following his appointment, bids were called for on the three projects.

Storm Drain No. 1 had a total of 4,225 ft. of reinforced concrete pipe from 42 to 60 in. in diameter and a total of 18,221 cu. yd. of excavation of which 3,811 cu. yd. were solid rock. There were 10,214 ft. of reinforced concrete pipe in Storm Drain No. 2 ranging in diameter from 48 to 78 in. Excavation totalled 50,665 cu. yd., including 10,156 cu. yd. of solid rock. The West Side Sanitary Sewer included 16,950 ft. of pipe ranging from 8 to 30 in., the smaller sizes being vitrified clay and the 15 and 30-in. being concrete. Excavation has not yet been completed but was estimated at 22,388 cu. yd.

Except on the sanitary sewer, the work remaining to be done consists of repaving the trench area. City Engineer R. E. McCormick is having this work postponed until the Summer of 1950, so that the trench will more nearly reach its ultimate settlement, particularly in those areas where the cuts were made through heavy gumbo, an unpredictable material at best.

From the beginning of construction, everyone participating in the projects, from the pipe companies to the City Council, has shown a singleness of purpose in striving for a better than standard job, and a satisfying willingness to cooperate toward the end that Great Falls shall have an adequate, efficient, and well-constructed system of storm and sanitary sewers.



the generator unit is a hundred feet away

But it makes no difference – because of the easily handled electric cable of this new, lightweight, high frequency, electric vibrator . . . no need for flexible shafts . . . necessary movements of generator unit are minimized.

Built for one-man operation, the CP-220 Vibrator is designed for concretes of 2″ slump and over; walls, footings, columns, floor and roof slabs; precast piles and similar products.

Two CP-220 Vibrators are powered with a CP-2KW gasoline-driven Generator, 220 volt, 3-phase, 180 cycle.

Every requirement for mass or reinforced concrete is met by seven different models of CP Vibrators – pneumatic and electric – including the new CP-5190 High Frequency Vibrator for low-slump concrete specified on current dam projects.

Write for further information on the CP-220 or other CP Vibrators.

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Contracts . . .

Summary of Major Construction Contracts Awarded Last Month

Paul Jarvis, Inc., Seattle, Wash., has been recommended for award of a long-planned improvement of U. S. Highway 10 east of Coeur d'Alene, Idaho. Jarvis submitted the low bid of $871,155 for construction of a 1,300-ft. steel piling bridge across Blue Creek Bay on Lake Coeur d'Alene. This project, in conjunction with a State-Federal-Aid Project on the west side of the bay and a Forest Highway grading project to the east is expected to be completed by June, 1951. Bids on the 2-mi. Forest Highway grading project were opened on Aug. 25, and award to **General Construction Co.** of Seattle for grading is being recommended concurrently with recommendation of award to Jarvis.

Grafe-Callahan Construction Co. and **Rhodes Bros. & Shofner,** Los Angeles, were awarded a $4,379,961 contract by the Bureau of Reclamation for completion of the Duchesne tunnel unit of the Provo River Project, Utah. The contract includes excavation of 3.7 mi. of the remaining 6 mi. of tunnel to be holed, 20,000 ft. of concrete lining, and construction of a diversion dam and works on the north fork of the Duschene River. With the letting of the Duchesne tunnel contract, all unfinished schedules of the Provo River Project are under contract or the bids have been received, with the exception of the terminal reservoir for the Salt Lake aqueduct and a section of tunnel lining.

Campbell-Bennett Limited, 1718 West 5th Ave., Vancouver, B. C., have received a $1,119,694 contract for grading an additional 16 mi. of the Quesnel to Prince George extension of the Pacific Great Eastern Railway. The company previously received contract for the first 14-mi. section from Quesnel to Cottonwood Canyon for $634,029.

Fluor Corp., Ltd., 2500 Atlantic Blvd., Los Angeles, has received a $4,500,000 contract by the Richfield Oil Corp. for construction of a wet gas plant near Cuyama, Santa Barbara County, Calif.

Irvin Geo. Gordon & Son, 1111 W. Central Ave., Newport Beach, Calif., were awarded a $250,000 contract by the Clovis Union High School District, Fresno County, for the supervision of the construction of a steel frame and reinforced concrete auditorium building at Clovis High School site.

Curlett Construction Co., 820 W. Esther St., Long Beach, Calif., was awarded a $139,559 contract by the Clark County, Nevada, Commissioners for construction of an addition and alterations to existing court house at Las Vegas, Nevada.

Silver State Construction Co., Fallon, Nev., was awarded a $210,980 contract by the Nevada State Highway Dept. for construction of a portion of the state highway system in Ely, Nev.

Erickson, Phillips & Weisberg, 3341 Telegraph Ave., Oakland, Calif., were awarded a $298,387 contract by the East Bay Municipal Utility District for the construction of a concrete-lined open reservoir of 30,000,000-gal. capacity. Known as the Seneca Reservoir, it is located in Alameda County.

Franks Dredging Co., 1813 La Playa St., San Diego, Calif., and the **Guy F. Atkinson Co.,** 223rd St. and Santa Fe Ave., Long Beach, Calif., were awarded a $648,500 contract by the San Diego City Council for dredging in four areas in San Diego Bay.

M. H. Golden Construction Co., 3485 Noell, San Diego, was awarded contracts totaling $617,000 by the San Diego City Council for tremied rip-rap and concrete bulkhead and appurtenant work at San Diego Bay.

Artukovich Bros., Inc., 7320 N. Atlantic Ave., Paramount, Calif., were awarded a $210,075 contract by the Los Angeles Board of Public Works for the construction of a West Los Angeles intercepting sewer and sanitary sewer.

Baldwin Locomotive Works, Philadelphia, Pa., has received an order from the City of Seattle, Dept. of Lighting, to build the first three 140,000-hp. hydraulic turbines for installation at Ross Dam, located on the Skagit River. The total value of the contract is approximately $2,600,000. Ultimately the Ross Dam installation will consist of four units. While the turbines are rated at 140,000 hp., they are currently being designed for 120,000 hp. under a head of water somewhat lower than the ultimate capacity of the dam. When the dam is raised to its full height, new runners will be installed to develop the full 140,000 hp., the true rating of the turbines.

Alliance Construction Co., Pasadena, Calif., has been awarded a $1,191,070 contract by the U. S. Navy Chief of Bureau of Yards and Docks for the construction of technical and service buildings at the Naval Missile Test Center, Point Mugu, Calif. Contract time for the work is 240 calendar days. Six buildings are included under this contract, namely: a test and evaluation building, small missiles projects building, main base transmitting building, Laguna Peak transmitting building, Laguna Peak Receiving building, and a high-pressure air and inert gas station.

Notice to proceed with work in connection with McNary Dam on the Columbia River has been sent to two firms and two other firms here have been notified that their bids have been accepted, it has been announced by the Corps of Engineers. The "go" signal was given **Parker-Schram Co.** of Portland, Ore., for construction of levees in the vicinity of Richland, Wash., to protect that area from the waters of McNary reservoir and also from natural flooding. Five days from receipt of the notice will be allowed to get the work started and 180 days are scheduled for completion of the $417,802 contract. **Willamette Iron & Steel Co.**, also of Portland, was notified to proceed under terms of a $369,733 contract for furnishing and installing 11 lower gate leaves for the McNary Spillway gates. This contract also includes wheel assemblies, seal and appurtenances, lifting beams for gate leaves, and dogging devices for 11 bays of the spillway dam. Completion is set for Dec. 1, 1950. **Moloney Electric Co.**, St. Louis, Mo., was awarded a $857,800 contract for the design, manufacture, testing, and delivery of seven 56,500 kva. power transformers and appurtenances. **Electric Machinery Mfg. Co.**, Minneapolis, Minn., was awarded a $154,789 contract for the design, manufacture, and delivery of two 3,759 kva. generators and appurtenances.

Acting as joint venturers, **Ben C. Gerwick**, 112 Market St., San Francisco, and **Geo. C. Pollock Co.**, Sacramento, were awarded a $1,687,916 contract on schedule 1, land section, by the East Bay Municipal Utility District for construction of an outfall sewer in the City of Oakland. **Healy Tibbitts Construction Co.**, 411 Brannan St., San Francisco, was awarded the contract on schedule 2, submarine portion, for $1,267,071.

F. W. Case and **Harry Gast**, 7700 Balboa Blvd., Van Nuys, Calif., were awarded a $320,000 contract by the Los Angeles Board of Public Works for construction of influent conduits of the Hyperion Activated Sludge Plant. Completion time is 240 calendar days.

American Pipe & Steel Co., South Gate, Calif., was awarded a $151,152 contract by the Los Angeles Department of Water and Power for 2,630 lin. ft. of 106-in. welded steel tunnel liner for the Owens Gorge Project.

American Pipe and Construction Co., South Gate, Calif., was awarded a $208,266 contract by the San Diego City Council on schedule 1 of the Kearny Mesa Pipeline, section 1, for furnishing steel pipe. **Carroll & Foster**, 2260 Main St., San Diego, were awarded a $137,039 contract for schedule 1A of the Kearny Mesa project, for installation of pipe.

Nomellini Construction Co., Stockton, Calif., has been awarded a $2,643,363 contract by the Reno, Nev., School District No. 10, for construction of a large building to provide for 1,500 students, including gymnasium, rifle room, cafeteria, 60 classrooms, and standard academic facilities.

McGuire & Hester, 796 66th Ave., Oakland, Calif., were awarded a $177,865 contract by the City of Concord, Calif., for construction of intercepting and outfall sewers including vitrified clay pipe sewers up to 30-in. size.

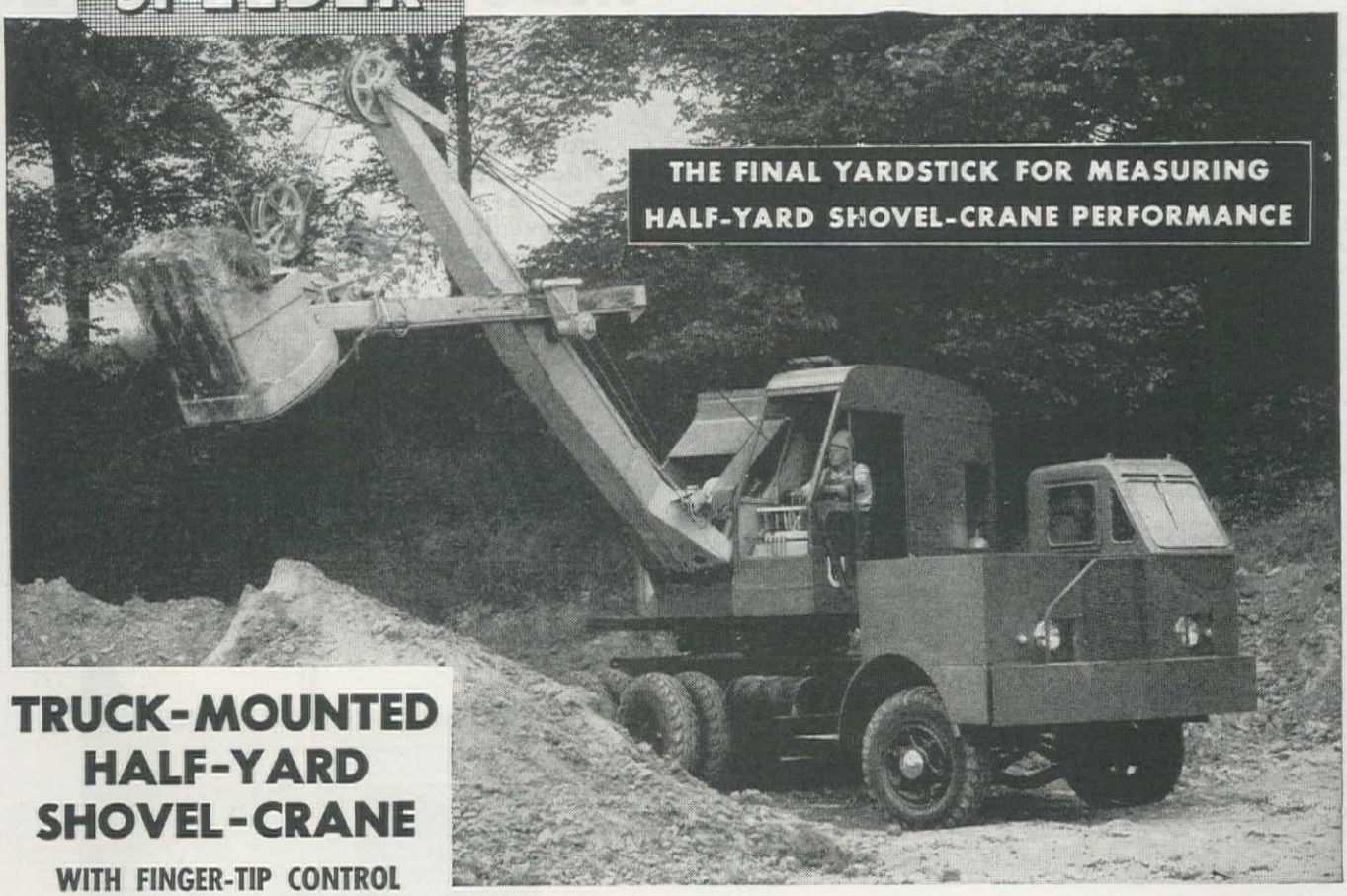
Barrett & Hilp, 918 Harrison, San Francisco, and **Henry George & Son**, Spokane, Wash., were awarded a $674,446 contract by the Sacramento-Yolo Port District, Corps of Engineers, for construction of a reinforced concrete grain elevator plant consisting of 12 circular storage bins 24 ft. in diameter and 105 ft. high, adjacent structures and spur track.

Charles L. Harney, 575 Berry St., San Francisco, was awarded a $333,180 contract by the City and County of San Francisco for construction of the sludge force main for San Francisco's North Point Sewage Treatment Plant, now under construction.

Westinghouse Electric Corp. were awarded a $2,094,000 contract by the Corps of Engineers for furnishing two 55,555 kva. generators and appurtenances for the Detroit Dam Powerhouse on the North Santiam River in Oregon. Installations are scheduled for Feb. 1 and July 1, 1953.

Cope Drilling and Pump Co., Terreton, Idaho, has been awarded a $27,750 contract by the Geological Survey, acting under the Atomic Energy Commission, for drilling the first group of a series of ground water test holes in the central Snake River Plain in Idaho. The Idaho operations office of the AEC is gathering fundamental engineering information concerning its Reactor Testing Station near Arco, Idaho.

LINK-BELT SPEEDER HC-51 With Speed-o-Matic Hydraulic Controls



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WHAT SPEED-O-MATIC MEANS

Variable pressure valves give finger-tip control, constant "feel" of load. Faster operating cycles, precision control of every movement, elimination of operator fatigue boost production up to 25% over manually operated machines of same basic capacity. Absence of mechanical linkage simplifies servicing, greatly reduces maintenance.

Fast, flexible, mobile . . . that's the 6-wheel version of the new ½ yard Link-Belt Speeder Shovel-Crane, the HC-51, with a 12½ ton lifting capacity. All the advantages of Speed-o-Matic hydraulic control, formerly available only on 1½ yard machines or larger, are combined with new, advanced features of design on both truck and crane, to give speed to the job, high maneuverability, and the utmost ease of operation and precision control. All add up to greater output at less cost.

FEATURES THAT MAKE THE HC-51 THE OUTSTANDING MACHINE IN ITS CLASS

Specially designed truck, 10 speeds forward (up to 30 m.p.h.), 2 speeds reverse.

Walking beam rear axles allow full traction on rough terrain, even tire wear, greater stability.

Removable rear outrigger.

All-welded frame construction, both crane and truck.

Independent safety boom hoist, power raising and lowering.

Front drum reverse mechanism available for power controlled load lowering.

Same engine in truck and crane, simplifying service and repair parts stock.

All clutches except one, in upper, completely interchangeable.

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Splined shafts throughout.

All clutches, brakes and gears readily accessible and easily serviced.

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TRADE WINDS

News of Men Who Sell to the Construction West

Western Distributor News Round-up

D. G. Gibson, General Manager of CONSTRUCTORS EQUIPMENT CO. of Denver, recently announced that **R. G. Currie** replaced **W. M. Irwin** in sales at their Colorado Springs office. Currie was formerly from Wyoming.

☆ ☆ ☆

The CATE EQUIPMENT CO. of Salt Lake City recently added **Birt Slater** and **Allen Stephenson** to their sales staff. Both were with Thompson Steel Products Co. of Denver for many years. They are well known throughout this area, having travelled the territory for that firm. They will headquarter in Salt Lake City and will call upon contractors.

☆ ☆ ☆

The H. W. MOORE EQUIPMENT CO. of Denver have been appointed Colorado distributors for Tucker Sno Cat equipment and Buda-Hebard Material Handling Equipment.

☆ ☆ ☆

The WESTERN MACHINERY CO. of Denver have been appointed distributors for Gar-Bro products.

☆ ☆ ☆

The J. D. ADAMS MFG. CO. have appointed **Tony Gosselin** as Eureka, Calif., distributor for Humboldt and Del Norte counties, and ORTON'S EQUIPMENT CO. as distributors at Stratford, Calif., for King County.

☆ ☆ ☆

HEINER EQUIPMENT CO. of Salt Lake City have been appointed distributors for the LeRoi Co., according to K. P. Heiner, President. Their territory covers the state of Utah.

☆ ☆ ☆

The H. W. MOORE EQUIPMENT CO. of Denver recently appointed **Roy Wicker** to their sales staff. Wicker is a native of Denver and is well known in construction circles, having been with Western Machinery and Power Equipment for many years. He will cover the Denver area for Moore.

☆ ☆ ☆

"Gene" Jund, for many years a Pabco Paint salesman in the Northwest, is now the independent operator of the new Pabco Paint Mart in Seattle. This new outlet is an addition to the system of independently-owned Pabco Paint Mart warehouses being franchised by the PARAFFINE COMPANIES, INC., and will service retail Pabco Paint stores in the entire Seattle area. Assisting him as superintendent will be **Clyde Henderson,** also a former Pabco man, with over 21 years of experience in Paraffine's Seattle office.

☆ ☆ ☆

Howard D. White, executive vice-president of the LIQUEFIED PETROLEUM GAS ASSOCIATION, will resign effective Oct. 31 to become associated in a newly organized business at Albuquerque, N. M., it was announced recently. He will be one of three owners of the PERLITE DEVELOPMENT CORP., which will manufacture industrial furnaces for the processing of the volcanic glass, perlite, and develop new applications for the mineral. Associated with White in the new venture will be **J. V. Slavick,** President, and **Ray Leyen,** Sales Manager.

☆ ☆ ☆

Eldon M. Young has recently joined the sales staff of the J. K. WHEELER MACHINERY CO. of Salt Lake City. He was formerly with Morrison-Knudsen contractors. He will specialize in the building field.

☆ ☆ ☆

R. G. LeTOURNEAU, INC., Peoria, Ill., announces the appointment of Capitol Tractor & Equipment Co., North Sacramento, Calif., as LeTourneau Distributor for Northern California. Heading Capitol Tractor is **Carl E. Danielson,** well-known

West Coast distributor. Associated with earthmoving equipment for the past 23 years, Danielson has been in the earthmoving field since the pioneer days of "jerk line" outfits. He first started selling equipment in 1926, when he joined Cornell Tractor and Equipment Co. of Watsonville, Calif.

☆ ☆ ☆

A. V. Gunn recently joined the sales staff of the N. C. RIBBLE CO., El Paso, Texas. Gunn is well-known in the construction industry, having been with the Tri State Equipment Co. of that city for several years. His appointment was announced by **N. C. Ribble,** president and owner of the N. C. Ribble Co. of Albuquerque, N. M.

☆ ☆ ☆

Bert Foulger, President of FOULGER EQUIPMENT CO. of Salt Lake City recently announced the appointment of **C. E. Vincent** to their sales staff. He has had many years of experience, having been with Paramount Sales Co., War Assets Administration, and Columbia Steel Co. He will cover the southern part of Utah.

☆ ☆ ☆

The N. C. Ribble Co. of Albuquerque were recently appointed distributors for the LE ROI CO. The Albuquerque firm's territory comprises the state of New Mexico.

☆ ☆ ☆

The CATE EQUIPMENT CO. of Salt Lake City recently were appointed distributors for the Transmission and Roller Chain Division of Chain Belt Co. Their territory comprises the state of Utah.

☆ ☆ ☆

The WECO EQUIPMENT CO. of North Hollywood, Calif., announces the association of **Robert L. Wicker** as general partner in the firm. Wicker, well known in his field, assumed the partnership on Sept. 1. As a former sales manager of the Bevis Machinery Co., sales promotion manager of Columbia Steel in San Francisco, and with specialized work in construction equipment export, Wicker will assume an active role in WECO's expanded sales and service plans.

☆ ☆ ☆

G. W. Sudbury has been appointed to the sales staff of the LUND MACHINERY CO. of Salt Lake City, according to Joseph N. McRae, President. Sudbury will cover Northern Utah and Southern Idaho. He will headquarter at Salt Lake City.

News of Western Manufacturers

Members of the Los Angeles Press made a tour of BETHLEHEM PACIFIC'S Los Angeles Steel Plant on Sept. 12. Under construction now are the foundations for a new ingot stripping building and a new 75-ton electric furnace which will nearly triple the plant's war time steel making capacity. The new facilities will enable the plant to produce approximately 350,000 net tons of ingots annually in 1950. Among some of the major facilities which have been recently completed are the new 50-ton electric furnace, now largest on the West Coast, new soaking pits for heating steel ingots, a new blooming mill to roll the ingots, and a new 10-in. high-speed bar and rod mill producing both bars and coiled rod.

☆ ☆ ☆

The appointment of **Bryce W. Simpson** as controller of STANDARD GYPSUM CO. OF CALIF. was announced by General Manager **Claude E. Harper.** Simpson has been with the Kaiser organization since January, 1943, at which time he was an accountant and office manager for Kaiser Steel Corp. at the Sunnyside, Utah, coal mine. He joined Standard Gypsum in 1947. Replacing Simpson as office manager of the company's accounting offices is **C. W. Eshelman.** Prior to joining the company in 1947, Eshelman was employed by Western Pipe and Steel and the Security National Bank of Southern California.

☆ ☆ ☆

The Electrical Wire and Cable Dept., UNITED STATES RUBBER CO., has appointed two divisional managers in the West to supervise sales of electrical wire and cable. **Don B. Karlskind** has been named southwestern division sales manager with headquarters in Dallas, Texas. He will be in charge of branch sales in the

western cities Houston, Dallas, Tulsa, and Denver. **L. M. Guibara** has been appointed Pacific Coast division sales manager with headquarters in Los Angeles. He will be in charge of branch sales in Los Angeles, San Francisco, Portland, Seattle, and Salt Lake City.

☆ ☆ ☆

The BETHLEHEM PACIFIC COAST STEEL CORP. announced the purchase of about 8 acres of land in Seattle, where they will immediately begin construction of a structural steel fabricating shop. It is expected that the new facilities will be ready for operation about April 1, 1950.

TRADE WINDS

The building of this new fabricating unit in the Northwest near the campany's Seattle Steel Mfg. Plant will, when added to the plants at Alameda, South San Francisco, and Los Angeles, round out the company's steel fabricating and erecting operations on the Pacific Coast.

☆ ☆ ☆

Personnel changes involving four men in the Western Sales Division of CATERPILLAR TRACTOR CO., San Leandro, Calif., have been announced by **B. L. Hagglund,** Western Division Sales Manager. **E. H. Gormsen,** Supervisor of Agricultural Sales, has been transferred from Spokane, Wash., to the company's offices at San Leandro. **J. D. Thomas** has been appointed Agricultural Representative with headquarters in Spokane, replacing **Byron J. Kluesing** who has been promoted to District Representative and transferred to the Central Sales Division. Hagglund also announced the appointment of **Thomas A. Hopkins** as Special Representative in Sales Engineering, located in Spokane. Hopkins will work with Caterpillar Distributors and customers on Diesel engines applications, earthmoving, and logging problems.

☆ ☆ ☆

THE PERMANENTE CEMENT CO. announces that "SS SANTACRUZCEMENT" has been added to its fleet of bulk cement carrying ships, to coincide with the reopening of the company's Duwamish distribution plant in Seattle. The new ship is one of the only two self-loading, bulk cement cargo ships on the Pacific Coast. The other, "SS PERMANENTE SILVERBOW," is also operated by the company. The new ship has a cargo capacity of approximately 40,000 bbl. of bulk cement, and is equipped with a Fuller-Kinyon pneumatic cargo-handling system which forces the cement by air pressure from the holds into shore side silos in less than 24 hours.

☆ ☆ ☆

The PERMANENTE CEMENT CO. reopened its Duwamish plant in Seattle to full operation on Sept. 1. During the past 18 months, the $750,000 installation has been used only on a standby basis for cement storage. Pacific Northwest headquarters of Permanente have been shifted to the Duwamish location at the same time, according to **E. H. Kendall,** District Sales Manager.

☆ ☆ ☆

Manufacturing News From the East and Midwest Regions

SMITH

Carl D. Smith has joined the LETOURNEAU CO. as Special Representative of the Sales Division. Smith, who has been with Firestone Tire & Rubber Co. for 26 years, will headquarter at Peoria.

☆ ☆ ☆

Frederick Fahnoe, industrial chemist who has specialized in experimental plant design and acetylene chemical research, has joined the staff of the Chemistry Department of the KELLEX CORP. at that company's Jersey City, N. J., laboratory.

☆ ☆ ☆

Appointment of **F. H. Heintz** as Division Sales Manager of the Southwestern Division, SYLVANIA ELECTRIC PRODUCTS INC., was announced recently by **B. K. Wickstrum,** General Sales Manager. Heintz, formerly Assistant Division Sales Manager in Chicago, will have his offices in Kansas City, Mo. He replaces **J. C. Hicks,** who has been appointed Sales Manager of Sylvania's Canadian subsidi-

ary. The company also announces the appointment of **H. L. Schreiner** as Field Representative in its Los Angeles Division office. Schreiner was formerly with the Rheem Mfg. Co., South Gate, Calif., as Sales Promotion Manager in the Los Angeles area, and with Douglas Aircraft Co. as assistant supervisor in its Santa Monica plant.

☆ ☆ ☆

Frank J. Aschenbrenner and **Earl C. Clark** have been appointed assistant directors of research and engineering for the AIR REDUCTION PACIFIC CO. Aschenbrenner will be in charge of the Air Reduction Murray Hill, N. J., laboratory, and Clark has been placed in charge of the development and engineering groups.

☆ ☆ ☆

FAIRBANKS, MORSE & CO. announce the appointment of **Frank M. Mason, Jr.**, as Director of Engineering. He will continue to be located at the firm's headquarters office in Chicago.

☆ ☆ ☆

E. L. Saberson has retired from active service after 23 years with the MASONITE CORP. of Chicago. In that period, which began six weeks after the company had started the production of hardboard, Saberson rose from salesman to vice-president and a member of the board of directors. He was the second salesman employed by the company, and his territory included Wisc., Mich., Iowa, and parts of Ill. and Mich.

☆ ☆ ☆

The OSGOOD CO. and the GENERAL EXCAVATOR CO. of Marion, Ohio, announce the appointment of **Earl R. Herb** as District Sales Manager in the states of North and South Dakota, Minnesota, Wisconsin, Michigan, and the northern halves of Indiana and Illinois. Herb will make his headquarters at Milwaukee, Wisc., and supervise the sales and service of Osgood and General power shovels and material handling equipment, working closely with the firm's distributors in his territory.

☆ ☆ ☆

Frank J. Hasselman has been appointed Division Manager for the St. Paul Division of GAR WOOD INDUSTRIES, INC. He succeeds **W. L. Larson**, who has become Division Manager for the Gar Wood Wayne Division. Hasselman started with the St. Paul factory in 1934 as a stock room helper. Previous to his present position he held the posts of Purchasing Agent, Personnel Manager, Sales Representative, and most recently, Sales Manager for the St. Paul line of dump truck bodies, hoists, and truck patrols at Minneapolis, Minn.

☆ ☆ ☆

KNAPP

Wilson D. Patterson, Pacific Coast Regional Manager for the WHITE MOTOR CO., announces the appointment of **Joe C. Knapp** as Branch Manager of White's Portland Branch, effective Sept. 1. Knapp's promotion culminates more than 25 years of service with the Pacific Coast Region. He first joined the firm's Salt Lake City Branch in 1922, later being transferred to the Portland Branch in 1924. In 1926 he joined the Los Angeles

Branch as District Accountant and soon became Credit Manager. From 1940 to 1947, Knapp served as Business Manager at Los Angeles, leaving that position to serve in the Sales Dept. at San Francisco and subsequently in the Portland Branch Sales Dept.

☆ ☆ ☆

One of the more unusual manufacturing layouts in the entire country is nearing completion at the CHICAGO PNEUMATIC TOOL COMPANY's new plant in Utica, N. Y. The main building is over 1/5th of a mile long and nearly half as wide. Faced with the problem of designing production lines for two basically different types of tools, CP engineers first laid out two six-acre sections; the west section to manufacture tools having a rotary action; the east section for tools with a reciprocal action. A horseshoe production line was then laid out for each operation, and the plant was actually built around the whole. Separated from the main structure are buildings for the forge shop, plating shop, power plant, and foundry. The latter is one of the most complete non-ferrous foundries to be found in any industrial plant. Designed by the National Engineering Co., the sand handling equipment and core oven installations are almost entirely mechanized. Each division has its own air conditioned sound proofed physical, chemical, and metallurgical laboratories and experimental shops, with electronic controls and testing devices. Typical of the machinery already in use in the main shop is the new SIP Hydroptic Jig Borer, whose optical measuring system is the most accurate in the world. Both sections of the plant are serviced by a ChipVeyor system for automatically handling and processing metal chips and coolant.

TRADE WINDS

LOUX

Frederick K. Daggett, president of the FLEXIBLE TUBING CORP., Branford, Conn., makers of Spiratube Flexible Tubing, announced recently the appointment of **A. H. Loux** as Manager of Distributor Sales for the company. Starting his business career in the petroleum indusry, Loux spent many years with such organizations as Standard Oil Co. of N. Y. During the war, he was called into service as Assistant District Manager and Chief of the Production Service Dept. of the War Production Board, stationed at Albany, N. Y. In his new position he will have full responsibility for the development of distributor sales, acquisition of new distributors and the origination and recommendation of policies affecting manufacturer-distributor relations on Spiratube and all kindred products including accessories sold by the company.

☆ ☆ ☆

The JOHN A. ROEBLING'S SONS CO. of Trenton, N. J., manufacturers of wire products, announces that its new Denver office and warehouse is ready for occupancy as of Sept. 30. **Homer H. Davis,** who has represented the company in the Denver area for 23 years, will serve as manager, with **Roy H. Hainsworth** acting as his assistant. **Fred L. MacLean** will be in charge of oil field sales.

☆ ☆ ☆

John A. Robinson has been named regional sales manager for the Midwest, Rocky Mountain, and Pacific Coast areas for Brown Instruments Division of MINNEAPOLIS - HONEYWELL REGULATOR CO.

☆ ☆ ☆

Appointment of **Lloyd Wolf** as Chief Engineer in charge of the TWIN DISC CLUTCH COMPANY'S Engineering Dept. at Racine, Wisc., was announced recently. He joined Twin Disc in July, 1947, as Chief Development Engineer. During the war, he was chief engineer of Army Ground Forces at Fort Knox, where he was concerned with the development of hydraulic power transmissions for the Army's heavy tank program.

☆ ☆ ☆

TWIST

FOOD MACHINERY AND CHEMICAL CORP. announced the appointment of **Gerald F. Twist** as manager of the firm's Peerless Pump Division with headquarters at Los Angeles. The appointment became effective Sept. 1 when he took over the duties of **Francis F. Fairman, Jr.,** who is resuming his former association with the General Electric Co. Following his graduation from the Stanford University School of Mechanical Engineer-

NEW... 25 TON CRANE ON RUBBER

NOW more crane *value* for your crane *dollar!*

WRITE FOR CATALOG 190 W

Please specify type of carrier in which you're interested.

Here are two new rubber mounted Model 190 BAY CITY cranes, both having 25 ton capacities — the CraneMobile on the left — the CraneWagon on the right. Both are designed and built to meet requirements of heavier lifts and longer booms. The 190-T61 CraneMobile is a two-engine job with speeds up to 35 M.P.H., 9 feet wide over tires with outriggers that extend to 17 feet. The 190-CW CraneWagon is a self-propelled one-man operated crane with 4 travel speeds, 11 feet wide over tires and outriggers. Both are amply powered and equipped with independent boom hoist, power load lowering device, hi-collapsible gantry, pin-connected boom and many other features that will give you more crane value for your dollar. BAY CITY SHOVELS, INC., BAY CITY, MICHIGAN.

BAY CITY

SHOVELS • CRANES • HOES • DRAGLINES • CLAMSHELLS

See your nearest Bay City dealer for excavating and material handling equipment in sizes from ⅜ to 1¼ yard with crane rating up to 25 tons. Both crawler and pneumatic tire mountings.

TRADE WINDS

ing, Twist became associated with FMC's Anderson-Barngrover Division, producer of canning equipment. Later he accepted a position in the experimental department of the Atlas Imperial Diesel Engine Co. at Oakland, Calif. He eventually became a director and executive vice-president of Atlas, resigning in 1947 to take charge of FMC's new corn harvester manufacturing operation in Indiana. In January of this year, he was made a vice-president and manager of FMC's newly acquired subsidiary, the Stokes and Smith Co. at Philadelphia.

☆ ☆ ☆

George E. Gilliam will manage pyrometer supplies sales nationally for Brown Instruments division of MINNEAPOLIS-HONEYWELL REGULATOR CO., it was announced by **William H. Steinkamp,** Brown field sales manager. Gilliam has been with the company for the past five years, most recently at its South Bend branch office, and will make his headquarters at the home office in Philadelphia.

☆ ☆ ☆

John L. Collyer, president of the B. F. GOODRICH CO., and **Harry Miller,** oldest employe in point of service in the belting dept., were present at ceremonies at the company's new $6 million belt manufacturing plant in Akron, Ohio. Steelwork on the structure, which is claimed to be the most modern belt plant in the world, has been completely erected. Production of all types of belting is scheduled to begin about next January 1.

☆ ☆ ☆

Ending a year-long building program, plant expansions and improvements have been completed at the Parsons Co. in Newton, Iowa, and the C. S. Johnson Co., Champaign, Ill. Both are subsidiary branches of the KOEHRING CO. of Milwaukee, heavy-duty construction equipment manufacturer. The new Parsons Co. structure adds 16,000 sq. ft. of space devoted to warehousing and shipping departments, and new company offices. Johnson's new unit covers more than 22,000 sq. ft. of production floor space in addition to 6,400 sq. ft. for enlarged stock rooms and shop office facilities.

☆ ☆ ☆

Announcement of personnel changes in the sales department of the PEERLESS PUMP DIVISION of the FOOD MACHINERY AND CHEMICAL CORP., is made by **B. A. Tucker,** Peerless divisional sales manager. **Frank W. McCann,** previously head of centrifugal pump sales at the company's Indianapolis, Ind., works, has been appointed manager of Peerless' Atlantic district sales. His headquarters are at New York City. **Robert H. Hull** replaces McCann at Indianapolis. He was previously located at Peerless' Los Angeles works in charge of sectional sales of the Peerless vertical pump line.

☆ ☆ ☆

Meeting in Clintonville, Wisc., Sept. 13, the stockholders of the FOUR WHEEL DRIVE AUTO CO. unanimously returned to office as Directors **J. D. Cotton, Donald S. DeWitt,** and **Max Stieg.** Cotton, largest individual stockholder in the company, was nominated by Director **A. A. Washburn,** who had nominated him for his first term in 1918. Following the meeting of the stockholders, the Board of Directors of the company convened and returned **Walter A. Olen** to office as President for his 39th term. Olen is the oldest president in point of service in the automotive industry.

☆ ☆ ☆

J. G. VanNest has been named Director of Purchases for the MACK TRUCK CO., with overall responsibility for all purchasing for all of the company's plants, it is announced by **A. N. Morton,** vice-president. VanNest joined Mack in 1928 as a clerk, and became successively buyer of finished materials; assistant to **J. W. Rogers,** purchasing agent at Plainfield, N. J.; and then assistant to **O. L. Lear,** purchasing agent at Mack's Allentown, Pa., plant. He will make his headquarters in the company's Allentown offices.

☆ ☆ ☆

The sales and general executive offices of the C. R. JAHN CO., formerly located at 1106 W. 35th St., Chicago, moved to 212 Main St., Savanna, Ill., on July 1. The Jahn factory has been located in Savanna for several years, manufacturing a complete line of heavy duty, low-bed trailers. Company officials state the combining of operations in one locality will result in greater efficiency and better service to customers and dealers.

☆ ☆ ☆

CHAIN BELT CO. of Milwaukee, Wis., manufacturers of Rex Construction Machinery, announces the promotions of **D. A. Kalton** to office manager of sales, and

Claude Vorpahl to field manager of general service. Both of these men have been with the Construction Machinery Division of Chain Belt for many years and have thorough knowledge of modern construction machinery practices.

☆ ☆ ☆

ELASTIC STOP NUT CORP. OF AMERICA, Union, N. J., announces the appointment of **Howard Peters** as project engineer for its Rollpin Division. Peters was formerly a vice-president of Mid-Continent Metal Products Co. of Chicago, and while with that company he developed the process and machinery for producing the Rollpin fastener.

☆ ☆ ☆

Roger W. Batchelder has been appointed Vice-president in Charge of Sales of the National Bearing Division of AMERICAN BRAKE SHOE CO., according to an announcement by **T. W. Pettus,** Division president. Batchelder, formerly assistant to the president of National Bearing, has been with Brake Shoe since 1933. He will continue to be located at division headquarters in St. Louis, Mo.

☆ ☆ ☆

The AMERICAN INSTITUTE OF BOLT, NUT AND RIVET MANUFACTURERS officially changed its name on July 1 to the INDUSTRIAL FASTENERS INSTITUTE. Hampered by a cumbersome and not fully descriptive name since the Institute's formation in 1931, according to **Herman H. Lind,** president, the name change in no way affects the present organization and offices remain at 1550 Hanna Bldg., in Cleveland.

☆ ☆ ☆

Election of **John J. Healy, Jr.,** assistant general manager of the Merrimac Division of MONSANTO CHEMICAL CO., St. Louis, Mo., as a member of the Board of Directors of Merritt-Monsanto Corporation of Lockport, N. Y., has been announced by **William M. Rand,** president of Monsanto.

☆ ☆ ☆

R. L. Brown has been appointed by WESTINGHOUSE ELECTRIC CORP., Pittsburgh, Pa., as division engineer in charge of engineering and development of instrument transformers, tap changers, and large power centers for its Transformer Division in Sharon, Pa. He succeeds **J. H. Chiles, Jr.,** who has been made engineering manager for the entire Transformer Division.

☆ ☆ ☆

Appointment of **Vernon Sears,** staff architect, UNITED STATES PLYWOOD CORP., New York City, as head of its newly created Division of Partitions, has been announced by **Lawrence Ottinger,** president.

☆ ☆ ☆

FAIRBANKS, MORSE & CO., Chicago, announce that **T. M. Robie,** who has for the past several years been manager of the company's Diesel division with headquarters in Chicago, has now been appointed director of quality control for the firm's Beloit Works in Beloit, Wis. He has been succeeded by **J. W. Wright** who more recently was manager of the company's Diesel engine sales department at the Kansas City branch.

☆ ☆ ☆

William A. Haley III has joined the staff of the AMERICAN CONCRETE PIPE ASSN. as assistant to the managing director, according to an announcement by **Howard F. Peckworth,** managing director.

TRADE WINDS

Haley saw three years of active combat duty in the late war and is a graduate civil engineer. He will be located at the headquarters of the American Concrete Pipe Assn., 228 N. La Salle St., Chicago 1, Ill.

☆ ☆ ☆

The appointment of **C. H. Bartlett** as sales manager for the Westinghouse Transformer Division at Sharon, Pa., has been announced. Bartlett succeeds **W. W. Sproul,** who has been named sales manager of industrial products for the entire WESTINGHOUSE ELECTRIC CORP.

☆ ☆ ☆

The RICHKRAFT COMPANY of Chicago, national distributors of reinforced building papers and road curing blankets, announces the appointment of **Lester R. Wroble** as assistant sales manager. Wroble has long been associated with the construction industry and with the sale of reinforced papers. His new position will be that of assistant to the president, **Franklin A. Richards,** and specifically will involve hiring and training Richkraft salesmen, distributor contact and appointment and training dealer salesmen.

☆ ☆ ☆

William C. Henning, president of the A. LESCHEN & SONS ROPE CO., St. Louis, Mo., passed away on September 6.

☆ ☆ ☆

L. B. Dobbins has been appointed supervisor of plant engineering, it was announced by **C. G. Andres,** vice-president of the AIR REDUCTION PACIFIC CO. Dobbins, formerly superintendent of the Johnstown tonnage oxygen plant, will be succeeded in that position by **J. C. White,** former superintendent of the Gloucester, N. J., oxygen plant.

UNIT BID SUMMARY

Pipeline . . .

California—San Joaquin County—City and County—Pipeline River Crossing

P. & J. Artukovich, Los Angeles, with a bid of $835,316, was low on Schedule I, and United Concrete Pipe Corp., Baldwin Park, Calif., with a bid of $776,762, was low on Schedule II (elimination of bid item 1) for construction of the San Joaquin River Crossing of San Francisco City and County's Hetch Hetchy Aqueduct, Line No. 2. Unit bids were submitted as follows:

(A) P. & J. Artukovich ..... $ 835,316
(B) Morrison-Knudsen Co., Inc..... 909,842
(C) Pacific Bridge Co. 1,035,786
(D) Ben C. Gerwick 1,072,117
(E) Macco Corp. $1,118,516
(F) Matthew J. Saich 1,203,917
(G) United Concrete Pipe Corp. (Item 1 deleted) 776,762

(1) 5,312 lin. ft. furn. and laying 64-in. diam. lined steel pipe
(2) 175 lin. ft. furn. and laying 62-in. diam. lined steel pipe
(3) 420 lin. ft. furn. and laying 63-in. diam lined steel pipe
(4) 5,312 lin. ft. cement mortar coating on 64-in. diam. lined steel pipe
(5) 124 lin. ft. double cement mortar coating on 62-in. diam. lined steel pipe
(7) 5,260 lin. ft. conc. encasement for 64-in. steel pipe
(9) 396 lin. ft. conc. encasement for 36-in. steel pipe
(10) Lump sum, removal of existing dished heads
(11) 4,650 cu. yd. excav. for structs. and large pipe east of Station G-2136 plus 70
(12) 13,500 cu. yd. excav. for structs. and large steel pipe betw. Station G-2136 plus 70 and G-2157 plus 00
(13) 12,500 cu. yd. excav. for structs. and large pipe west of Station G-2157 plus 00
(14) 50 cu. yd. excav. for small pipe
(15) 20,600 cu. yd. backfill
(16) 3,900 cu. yd. earth fill near San Joaquin valve house
(17) 3,000 cu. yd. furn. imported materials
(18) 1,600 cu. yd. furn. rock for backfill and for other use as ordered
(19) 32,000 lin. ft. furn. and driving piles
(20) 5 ea. pulling piles
(21) 1,450 cu. yd. conc. Class A
(22) 10 cu. yd. conc. Class B
(23) 110 cu. yd. conc. Class C
(24) Adjustment price for Portland cement
(25) 180,000 lb. steel reinforcement bars
(26) 1,200 lb. misc. steel work attached to the pipe line
(27) 15,000 lb. steel work not attached to the pipe line
(28) 2,000 lb. galv. steel
(29) Lump sum, const. detour road and replacing highway pavement
(30) 5 ea. furn. and install manholes
(31) 1 only air valve assemb. furn. and install
(32) 1 only air release valve assemb. furn. and install
(33) Lump sum, furn. and install relief valve with appurtenances
(34) Lump sum, water sup. piping in valve vault
(35) 175 sq. yd. membrane water proofing
(36) 1 only pressure gage, furn. and install
(37) 250 lin. ft. tile drain
(38) Lump sum, alterations and additions to the existing valve house

	(A)	(B)	(C)	(D)	(E)	(F)	(G)
(1)	44.80	52.00	79.50	60.00	63.00	97.00	.....
(2)	39.50	51.00	75.00	50.00	60.00	72.00	40.00
(3)	20.00	83.00	47.50	30.00	40.00	45.00	26.00
(4)	6.45	8.00	5.50	5.00	7.00	6.25	12.00
(5)	12.50	16.00	12.50	10.00	15.00	12.00	59.00
(7)	13.00	22.00	33.70	30.00	30.00	15.00	14.00
(9)	9.00	25.00	18.00	15.00	11.00	14.00	10.00
(10)	200.00	270.00	429.00	700.00	100.00	25.00	200.00
(11)	6.50	6.00	1.74	5.00	12.00	4.50	1.60
(12)	10.00	11.50	5.50	15.00	20.00	11.00	12.00
(13)	8.00	1.00	2.20	5.00	.30	3.50	1.00
(14)	10.00	6.00	4.00	4.00	5.00	10.00	5.00
(15)	1.00	.60	1.37	2.00	.75	2.00	.30
(16)	1.50	1.00	1.20	1.00	.70	4.50	.40
(17)	2.50	1.60	1.20	1.50	.90	2.00	.50
(18)	10.00	9.00	3.80	8.00	6.00	4.00	4.00
(19)	1.25	1.80	1.34	2.00	1.30	1.75	1.50
(20)	20.00	125.00	40.00	400.00	100.00	50.00	50.00
(21)	70.00	87.00	84.06	80.00	84.00	70.00	40.00
(22)	65.00	60.00	55.00	60.00	70.00	80.00	39.00
(23)	60.00	32.00	42.60	60.00	70.00	85.00	20.00
(24)	4.50	3.60	4.00	4.20	3.30	4.00	4.00
(25)	.12	.10	.10	.10	.13	.14	.10
(26)	.50	.40	.40	.40	.70	.65	.50
(27)	.40	.50	.38	.20	.50	.35	.30
(28)	.20	.06	.10	.05	.10	.75	.05
(29)	$10,000	$5,550	$24,750	$9,000	$7,000	$25,000	$8,000
(30)	500.00	500.00	620.00	220.00	700.00	450.00	600.00
(31)	550.00	600.00	560.00	500.00	700.00	500.00	600.00
(32)	100.00	80.00	66 00	500.00	700.00	550.00	100.00
(33)	$2,000	$27,000	$25,465	$15,000	$25,000	$27,000	$24,000
(34)	200.00	100.00	685.00	400.00	300.00	300.00	100.00
(35)	2.00	1.75	3.80	2.00	6.00	6.00	4.00
(36)	200.00	80.00	340.00	250.00	300.00	450.00	300.00
(37)	3.00	3.00	2.00	2.00	4.00	5.00	2.00
(38)	$1,800	$6,500	$4,635	$1,597	$7,000	$15,000	$4,000

Sewerage . . .

New Mexico—Bernalillo County—City—Trunk Sewer

Miller & Smith, Albuquerque, New Mexico, with a bid of $122,949, were low before the City Engineer at Albuquerque for construction of the North Fourth Ave. Intercepting Sewer Trunkline. Unit bids were submitted as follows:

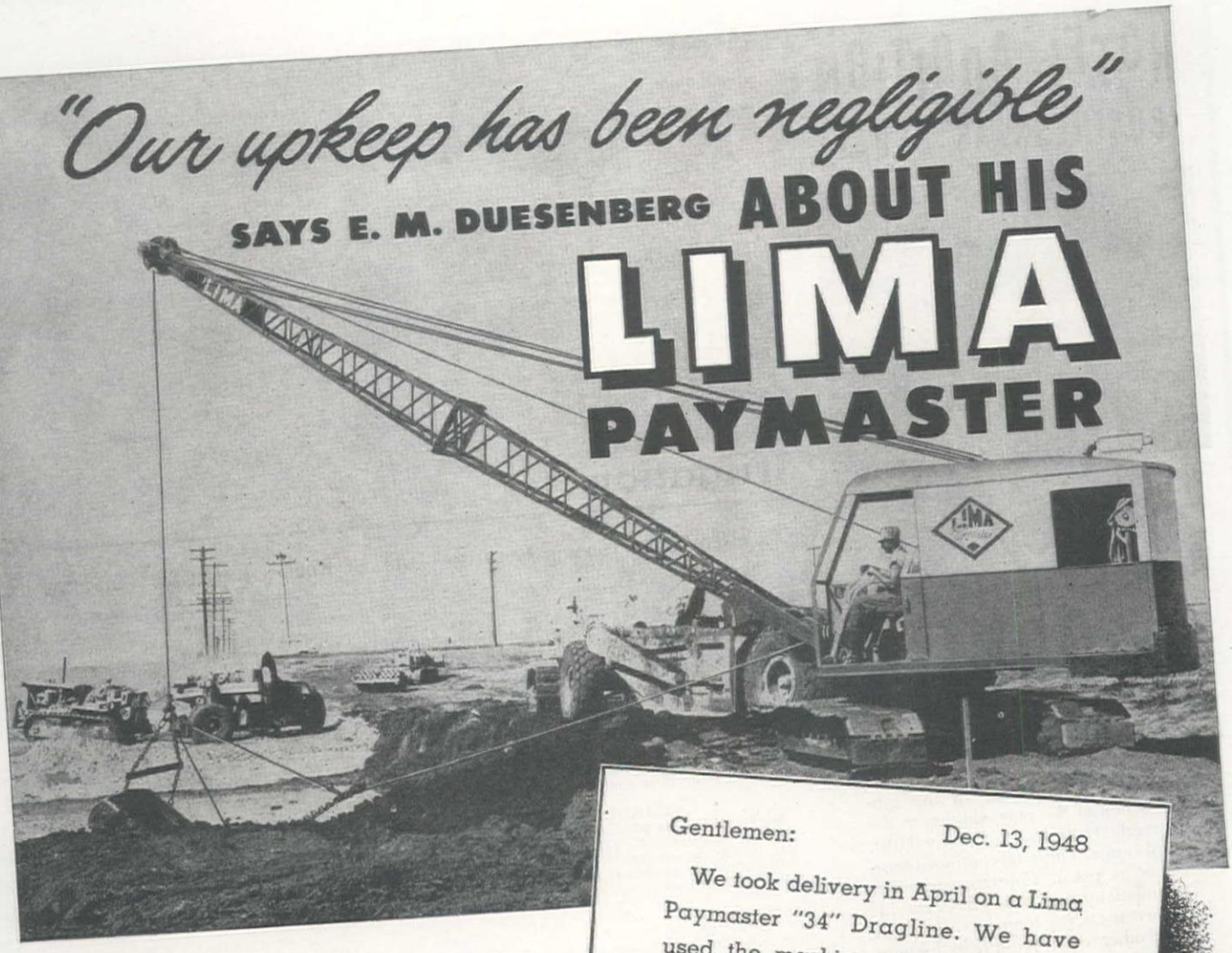
(1) Miller & Smith $122,949
(2) Allison & Haney 131,777
(3) F. D. Shufflebarger $164,517

	(1)	(2)	(3)
28 ft. 8-in. plain conc. pipe 6 ft. to 8 ft. cut in place asph. pavement rem.....	5.00	6.90	9.00
32 ft. 8-in. plain conc. pipe 6 ft. to 8 ft. cut in place conc. pavement rem.....	6.26	7.20	11.00
84 ft. 8-in. plain conc. pipe 8 ft. to 10 ft. cut in place asph. pavement rem.....	6.50	7.70	9.00
96 ft. 8-in. plane conc. pipe 6 ft. to 10 ft. cut in place conc. pavement rem.....	7.05	7.90	11.00
28 ft. 8-in. plain conc. pipe 10 ft. to 12 ft. cut in place asph. pavement rem.	7.25	8.40	9.00
32 ft. 8-in. plain conc. pipe 10 ft. to 12 ft. cut in place conc. pavement rem.....	8.00	8.75	11.00
4 ft. 15-in. reinf. conc. pipe 6 ft. to 8 ft. cut in place asphalt pavement rem.	7.80	7.90	11.50
3,349 ft. 15-in. reinf. conc. pipe 8 ft. to 10 ft. cut in place asphalt pavement rem.	8.25	8.05	11.75

(Continued on next page)

"Our upkeep has been negligible"

SAYS E. M. DUESENBERG ABOUT HIS LIMA PAYMASTER



The LIMA (type 34) Paymaster is a favorite with owners and operators because of its proven ability to *STAY ON THE JOB.* This is the result of expert engineering, superior workmanship and higher quality materials which go into every LIMA unit, and the gruelling performance tests subjected to every machine before shipment.

The LIMA line includes Shovels ¾ to 6 yards, Cranes 13 to 110 tons and Draglines variable.

Gentlemen: Dec. 13, 1948

We took delivery in April on a Lima Paymaster "34" Dragline. We have used the machine steady since that time on our various highway projects and think very highly of its performance. Our upkeep has been negligible and the men on the projects think it is one of the best machines on the job. We are glad to recommend this model to anyone and wish to compliment your company on building a fine machine.

Clear Lake, Iowa

E. M. DUESENBERG, INC.
(Signed) E. M. Duesenberg

LIMA EQUIPMENT SOLD AND SERVICED BY:

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

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

Sales Agents:

Feenaughty Machinery Co., 112 S. E. Belmont St., Portland 14, Ore.
Feenaughty Machinery Co., 600 Front St., Boise, Idaho
Smith Booth Usher Co., 2001 Santa Fe Ave., Los Angeles 54, Calif.
McCoy Co., 3201 Brighton Blvd., Denver 5, Colo.
Contractors' Equipment & Supply Co., Springer Bldg., Albuquerque, N. M.
Buran Equipment Company, 777 - 100th Avenue, Oakland, California
Modern Machinery Co., Inc., 4412 Trent Ave., Spokane 2, Wash.
Fouiger Equipment Co., Inc., 1361 South Second Street West, Salt Lake City 8, Utah
Acme Iron Works, Culebra Ave. at Expressway, N.W., San Antonio, Texas
Thompson-Sage, Inc., 400 South Wilson Way, Stockton, Calif.
Jameson Engineering Sales, Fairbanks, Alaska

Lima Shovel and Crane Division

LIMA, OHIO

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

LIMA HAMILTON CORPORATION

153 ft. 15-in. reinf. conc. pipe 10 ft. to 12 ft. cut in place asphalt pavem't rem.	9.60	8.35	12.00
13 ft. 15-in. reinf. conc. pipe 10 ft. to 12 ft. cut in place encased in concrete	40.00	16.90	14.50
4 ft. 8-in. plain conc. pipe 8 ft. to 10 ft. cut in place bell and spigot asphalt pavement removal (wet sewer)	15.50	14.30	15.50
4 ft. 15-in. plain conc. pipe 10 ft. to 12 ft. cut in place bell and spigot asphalt pavement removal (wet sewer)	16.75	14.90	17.50
4 ft. 15-in. conc. pipe 10 ft. to 12 ft. cut in place bell and spigot encased in concrete (wet sewer)	20.00	21.50	21.50
4 ft. 18-in. reinf. conc. pipe 6 ft. to 8 ft. cut in place asphalt pavement rem.	7.75	9.40	11.50
1,321 ft. 18-in. reinf. conc. pipe 8 ft. to 10 ft. cut in place asphalt pavement rem.	8.00	9.70	11.00
1,280 ft. 18-in. reinf. conc. pipe 10 ft. to 12 ft. cut in place asphalt pavem't rem.	8.75	9.80	12.50
1,020 ft. 18-in. reinf. conc. pipe 12 ft. to 14 ft. cut in place asphalt pavem't rem.	9.50	10.10	13.50
4 ft. 21-in. reinf. conc. pipe 8 ft. to 10 ft. cut in place asphalt pavement rem.	9.25	10.50	11.00
3,497 ft. 21-in. reinf. conc. pipe 10 ft. to 12 ft. cut in place asphalt pavem't rem.	9.75	10.70	12.50
85 ft. 21-in. reinf. conc. pipe 10 ft. to 12 ft. cut in place conc. pavement rem.	10.50	10.90	15.00
60 ft. 21-in. reinf conc. pipe in conc. cradle under S. F. R. R. tracks 10 ft. to 12 ft. cut in place	40.00	18.00	24.00
791 ft. 21-in. reinf. conc. pipe 12 ft. to 14 ft. cut in place asph. pavement rem.	11.00	10.10	13.75
165 6-in. conc. saddle tee, open ends capped, complete in place	3.50	7.50	2.00
74 8-in. conc. pipe manhole studs 3-ft. length, open end capped in place	3.00	12.10	36.00
1 18-in. reinf. conc. pipe M. H. stubs 4-ft. length, open end capped in place	20.00	26.40	57.00
5 std. Type "B" 4-ft. diam. san. sew. M. H. 6 ft. to 8 ft. cut in place compl.	160.00	222.00	230.50
29 std. Type "B" 4-ft. diam. san. sew. M. H. 8 ft. to 10 ft. cut in pl. comp.	190.00	260.00	230.50
1 std. Type "B" 4-ft. diam. san. sew. M. H. 8 ft. to 10 ft. cut in place (wet)	300.00	350.00	535.00
16 std. Type "B" 4-ft. diam. san. sew. M. H. 10 ft. to 12 ft. cut in pl. comp.	275.00	280.00	280.00
1 std. Type "B" 4-ft. diam. san. sew. M. H. 10 ft. to 12 ft. cut in pl. (wet)	325.00	390.00	610.00
5 std. Type "B" 4-ft. diam. san. sew. M. H. 12 ft. to 14 ft. cut in pl. comp.	260.00	312.00	330.00

Irrigation . . .

California—Merced County—Bur. of Recl.—Earthwork and Struct.

Morrison-Knudsen Co., Inc., and M. H. Hasler of Los Angeles, with a bid of $2,100,365 on Schedule I and a bid of $2,173,507 on Schedule II, and an all or none stipulation, were low before the Bureau of Reclamation at Tracy, Calif., for construction of earthwork, concrete lining and structures of the Delta-Mendota Canal from 6 mi. west of Volta to 7 mi. southwest of South Dos Palos, Calif. A description of the work involved and a summary of the unit bids is as follows:

	Schedule I	Schedule II
(A) Morrison-Knudsen Co., Inc., and M. H. Hasler	$2,100,365	$2,173,507
(B) Western Contracting Corp.	2,156,694	2,241,661
(C) Peter Kiewit Sons' Co.	2,164,807	2,314,574
(D) Utah Construction Co.	2,231,255	2,417,468
(E) Ashbach-Steenberg Co., Inc.	2,311,834	2,550,029
(F) Stolte, Inc.	2,433,760	2,527,889
(G) Bressi & Bevanda Constructors	2,371,557	2,597,059
(H) Parish Bros. and Erickson, Phillips & Weisberg	2,447,338	2,605,364

SCHEDULE I
Station 3024 plus 80 to Station 3538 plus 00

(1) 2,750,000 cu. yd. excavation for canal
(2) 50,000 sta. cu. yd. overhaul
(3) 83,000 cu. yd. compacting embankments
(4) 15,000 cu. yd. excav. drainage channels and dikes
(5) 55,200 cu. yd. excav. for structs.
(6) 24,200 cu. yd. backfill
(7) 7,800 cu. yd. compacting backfill
(8) 600,000 sq. yd. trimming foundations for concrete lining
(9) 345 cu. yd. riprap
(10) 100 cu. yd. gravel or crushed rock bedding for riprap
(11) 5,900 cu. yd. concrete in structures
(12) 66,200 cu. yd. conc. in unreinf. conc. canal lining
(13) 107,500 bbl. furn. and handling cement
(14) 820,500 lb. furn. and placing reinf. bars
(15) 67,000 lb. placing reinf. bars furn. by Gov't.
(16) 1,650 sq. ft. furn. and placing ½-in. elastic filler in joints
(17) 60 sq. ft. ¾-in., same
(18) 255 sq. ft. 1-in., same
(19) 900 lin. ft. placing rubber water stops in jts.
(20) 4,350 lb. furn. and placing metal water stops in jts.
(21) 2,100 sq. ft. furn. and placing 1½-in. asph. plank on bridge floors
(22) 33.4 M.b.m. furn. and erecting untreated timber in structs.
(23) 31.6 M.b.m. furn. and erecting treated timber in structs.
(24) 35.5 M.b.m. erect timber furn. by Gov't.
(25) 14 cattle guards furn. matl. in constr. cattle guards
(26) 13 mi. furn. and erect barbed wire right-of-way fence
(27) 3 mi. furn. and erect comb. barbed wire and woven wire right-of-way fence
(28) 6 gates furn. and install metal fence gates
(29) 2,700 lin. ft. const. graded sand drains
(30) 18,000 lin. ft. const. graded sand and gravel drains with 6-in. sewer-pipe
(31) 300 lin. ft. laying 6-in. sewer drain with cemented joints for drain outlets
(32) 16 outlet boxes furn. and install outlet boxes for drains
(33) 1,300 lin. ft. furn. and laying 15-in. diam. standard strength reinf. conc. pipe with rubber gasket or copper seal joints
(34) 300 lin. ft. furn. and laying 24-in. diam. conc. pipe with rubber gasket seal joints
(35) 600 lin. ft. furn. and laying 18-in. diam. standard strength reinf. conc. culvert pipe
(36) 700 lin. ft. furn. and laying 24-in. diam. std. str. reinf. conc. culvert pipe
(37) 200 lin. ft. furn. and laying 30-in. diam. extra str. reinf. conc. culvert pipe
(38) 100 lin. ft. laying 30-in. diam. conc. pipe furn. by the Gov't.
(39) 800 lin. ft. furn. and install 2½-in. diam. steel pipe
(40) 120 lin. ft. furn. and install 14-in. diam. welded steel pipe
(41) 106,300 lb. install gates and gate hoists
(42) 7,500 lb. furn. and install miscl. metal work
(43) 34,000 lb. install miscl. metal work
(44) 520 lin. ft. furn. and install ¾-in. diam. elec. metal conduit
(45) 340 lin. ft. furn. and install 1½-in. diam. elec. metal conduit
(46) 20 lin. ft. furn. and install 2½-in. diam. elec. metal conduit
(47) 310 lb. furn. and install elec. conductors and grnd. wires

SCHEDULE II
Station 3538 plus 00 to Station 4108 plus 50

(48) 2,500,000 cu. yd. excav. for canal
(49) 50,000 sta. cu. yd. overhaul
(50) 75,500 cu. yd. compacting embankments
(51) 3,000 cu. yd. excav. for drainage channels and dikes
(52) 18,100 cu. yd. excav. for structs.
(53) 13,100 cu. yd. backfill
(54) 8,700 cu. yd. compacting backfill
(55) 674,500 sq. yd. trimming foundations for conc. lining
(56) 200 cu. yd. gravel sub base under piers
(57) 460 cu. yd. riprap
(58) 150 cu. yd. gravel or cr. rock bedding for riprap
(59) 4,120 cu. yd. conc. in structures
(60) 75,150 cu. yd. conc. in unreinf. conc. canal lining
(61) 105,900 bbl. furn. and handling cement
(62) 639,700 lb. furn. and placing reinf. bars
(63) 50,000 lb. placing reinf. bars furn. by Gov't.
(64) 1,350 sq. ft. furn. and placing ½-in. elastic filler in joints
(65) 129 sq. ft. ¾-in. same
(66) 490 sq. ft. 1-in. same
(67) 700 lin. ft. placing rubber water stops in jts.
(68) 96.1 M.b.m. furn. and erecting untr. timber in structs.
(69) 70 M.b.m. erect timber furn. by the Gov't.
(70) 2 cattle guards furn. matl. and const. cattle guards
(71) 2 mi. furn. and erect barbed wire right-of-way fence
(72) 1 mi. furn. and erect combination barbed wire and woven wire right-of-way fence
(73) 2 gates furn. and install metal fence gates
(74) 26,700 lin. ft. const. graded sand drains
(75) 77,000 lin. ft. const. graded sand and gravel drains with 6-in. sewer pipe
(76) 300 lin. ft. laying 6-in. sewer pipe with cem. jts. for drain outlets
(77) 100 outlet boxes furn. and install outlet boxes for drains
(78) 500 lin. ft. furn. and install 12-in. diam. std. str. reinf. conc. pipe with rubber gasket or copper seal jts.

(Continued on next page)

the truck mixer fleets that grow are Jaegers

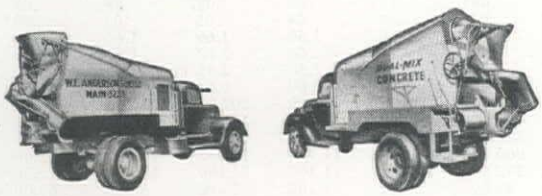
because Jaeger dual-mixed, specification

concrete is acceptable on any and all jobs . .

Experienced ready-mix operators know that their $200,000,000 a year business was built by furnishing a high quality product, mixed to close specifications, accurately controlled for slump, and delivered without segregation over long or short hauls.

The majority of successful plants — and the new plants that will prove successful — insure the acceptable quality of their product by using Jaeger Dual-Mix Truck Mixers.

Because they produce uniform higher strength concrete, with a larger daily payload average and lower cost of maintenance, more concrete is sold in Jaegers than by any other method. The Jaeger Machine Company, Columbus 16, Ohio.



Sizes 2 - 3 to 5½ - 7¾ cu. yd., including all standard Truck Mixer Bureau ratings. Top or end loading type — as best fits your needs. Ask for Catalog TM-8.

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EDWARD R. BACON CO., San Francisco 10
SMITH BOOTH USHER CO., Los Angeles 54
A. H. COX & CO., Seattle 4 and Wenatchee
NELSON EQUIPMENT CO., Portland 14
ANDREWS EQUIPMENT SERVICE, Spokane 9
WESTERN MACHINERY CO., Salt Lake City & Denver 2
CENTRAL MACHINERY CO., Great Falls & Havre
TRACTOR & EQUIPMENT CO., Sidney & Miles City
WORTHAM MACHINERY CO., Cheyenne & Billings
J. D. COGGINS & CO., Albuquerque
MILES CITY EQUIPMENT CO., Miles City
SCHRIVER MACHINERY CO., Phoenix
IDAHO MACHINERY CO., Boise

(79) 1,000 lin. ft. furn. and lay 15-in. diam. std. str. reinf. conc. pipe with rubber gasket or copper seal jts.
(80) 3,000 lin. ft. furn. and lay 18-in. diam. std. str. reinf. conc. pipe with rubber gaskets or copper seal jts.
(81) 225 lin. ft. furn. and lay 21-in. diam. std. str. reinf. conc. pipe with rubber gasket or copper seal jts.
(82) 300 lin. ft. furn. and lay 24-in. diam. extra str. reinf. conc. pipe with rubber gasket or copper seal jts.
(83) 450 lin. ft. furn. and lay 30-in. diam. extra str. reinf. conc. pipe with rubber gasket or copper seal jts.
(84) 225 lin. ft. furn. and laying 36-in. diam. ex. str. reinf. conc. pipe with rubber gasket or copper seal jts.
(85) 600 lin. ft. furn. and lay 18-in. diam. std. str. reinf. conc. culv. pipe
(86) 200 lin. ft. furn. and laying 24-in. diam. std. str. reinf. conc. culvert pipe
(87) 300 lin. ft. furn. and laying 30-in. diam. extra str. reinf. culvert pipe
(88) 300 lin. ft. laying 30-in. diam. conc. pipe furn. by the Gov't.
(89) lump sum, furn. and install 48-in. diam. conc. pipe and 2-in. diam. asbestos cem. pipe in turnout
(90) 500 lin. ft. furn. and install 12-in. diam. welded steel pipe
(91) 400 lin. ft. 14-in. same
(92) 700 lin. ft. 16-in. same
(93) 650 lin. ft. 18-in. same
(94) 150 lin. ft. 20-in. same
(95) 200 lin. ft. 24-in. same
(96) 275 lin. ft. 30-in. same
(97) 150 lin. ft. 36-in. same
(98) 50,700 lb. install gates and gate hoists
(99) 7,900 lb. furn. and install miscl. metal work
(100) 69,800 lb. install miscl. metal work
(101) 260 lin. ft. furn. and install ¾-in. diam. elec. metal conduit
(102) 210 lin. ft. furn. and install 1½-in. diam. elec. metal conduit
(103) 10 lin. ft. furn. and install 2½-in. diam elec. metal conduit
(104) 150 lb. furn. and install elec. conduit and ground wires

SCHEDULE I	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
(1)	.14	.14	.15	.115	.14	.17	.155	1.86
(2)	.02	.02	.03	.02	.02	.02	.02	.02
(3)	.40	.40	.20	.30	.30	.32	.25	.44
(4)	.30	.65	.25	.30	2.75	.40	.30	.40
(5)	.65	1.00	.75	1.00	.78	1.10	1.00	.69
(6)	.60	.60	.60	.50	.44	.60	.60	.55
(7)	3.00	4.25	3.00	3.00	3.00	4.00	4.00	3.50
(8)	.28	.30	.30	.30	.34	.30	.38	.38
(9)	9.00	8.90	8.00	6.00	7.57	10.00	10.00	7.08
(10)	7.00	6.80	6.00	5.00	5.55	6.00	5.75	5.77
(11)	58.00	56.00	56.00	60.00	55.50	50.00	55.00	49.20
(12)	8.50	8.65	8.40	8.50	9.76	10.00	10.00	10.00
(13)	3.15	3.05	3.20	4.00	3.84	4.00	3.35	3.52
(14)	.085	.085	.10	.09	.087	.08	.09	.087
(15)	.03	.03	.04	.04	.05	.03	.035	.04
(16)	1.75	1.60	1.80	1.50	1.66	1.60	1.90	1.71
(17)	2.00	2.40	2.40	2.00	2.12	1.80	2.50	2.25
(18)	2.50	2.90	3.00	2.50	2.55	2.00	2.75	2.88
(19)	2.00	1.80	1.10	2.00	1.54	1.50	2.00	1.42
(20)	.60	.40	.45	.25	.42	.50	.50	.45
(21)	1.50	1.45	1.00	1.25	1.37	1.00	1.40	1.16
(22)	200.00	225.00	220.00	250.00	207.00	240.00	240.00	232.00
(23)	230.00	260.00	280.00	350.00	248.00	300.00	300.00	301.00
(24)	100.00	125.00	110.00	150.00	180.00	150.00	150.00	140.00
(25)	355.00	320.00	350.00	500.00	300.00	380.00	350.00	307.00
(26)	890.00	960.00	$1,000	$1,400	$1,033	$1,200	$1,200	$1,100
(27)	$1,075	$1,160	$1,100	$1,800	$1,190	$1,800	$1,500	$1,250
(28)	50.00	45.00	50.00	70.00	59.00	50.00	65.00	50.00
(29)	1.00	1.40	1.70	2.00	1.51	2.50	2.10	1.75
(30)	1.00	1.40	2.25	2.50	2.28	4.00	2.20	1.80
(31)	1.30	1.00	3.00	1.50	1.56	1.80	1.75	1.80
(32)	60.00	30.00	120.00	85.00	34.90	50.00	50.00	50.00
(33)	6.50	7.25	8.00	7.50	6.54	6.00	6.50	6.85
(34)	13.00	12.80	13.00	15.00	11.65	8.00	13.00	12.15
(35)	5.20	4.10	5.00	6.00	5.58	5.00	5.00	5.02
(36)	7.00	5.10	7.00	8.00	6.95	7.50	6.50	6.55
(37)	11.00	11.00	10.00	14.00	11.11	10.00	11.00	10.15
(38)	5.00	2.40	3.00	6.00	6.50	5.00	3.50	5.31
(39)	1.10	1.00	2.00	2.00	.92	1.20	1.00	1.06
(40)	15.00	10.00	8.25	15.00	9.68	10.00	10.00	11.02
(41)	.10	.18	.15	.25	.14	.14	.15	.16
(42)	.30	.55	.30	.85	.41	.40	.60	.53
(43)	.15	.25	.18	.20	.24	.20	.30	.16
(44)	1.00	2.00	2.00	1.00	1.24	1.30	2.00	2.12
(45)	1.50	2.60	2.50	1.50	1.77	1.70	2.25	2.83
(46)	2.50	3.90	3.00	3.00	3.40	4.00	3.50	4.25
(47)	.50	1.30	2.50	1.00	1.90	2.00	2.00	1.77

SCHEDULE II	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
(48)	.14	.14	.15	.115	.14	.17	.16	.186
(49)	.02	.02	.03	.02	.02	.02	.02	.02
(50)	.40	.40	.20	.30	.30	.32	.25	.44
(51)	.30	.65	.25	.30	2.75	.40	.30	.40
(52)	.65	1.00	.75	1.00	.78	1.10	1.00	.90
(53)	.60	.60	.60	.50	.44	.60	.60	.55
(54)	3.00	4.25	3.00	3.00	3.00	4.00	4.00	3.50
(55)	.28	.30	.30	.30	.34	.30	.38	.38
(56)	6.00	7.20	6.00	7.00	6.85	6.00	5.75	5.90
(57)	9.00	8.90	8.00	6.00	7.57	10.00	10.00	7.08
(58)	7.00	6.80	6.00	5.00	5.55	6.00	5.75	5.77
(59)	58.00	56.00	56.00	60.00	71.39	50.00	65.00	51.92
(60)	8.50	8.65	8.40	8.50	9.76	10.00	10.00	10.00
(61)	3.15	3.05	3.20	4.00	3.84	4.00	3.35	3.52
(62)	.085	.085	.10	.09	.087	.08	.09	.087
(63)	.03	.03	.04	.04	.05	.03	.035	.04
(64)	1.75	1.60	1.80	1.50	1.66	1.60	1.90	1.71
(65)	2.00	2.40	2.40	2.00	2.12	1.80	2.50	2.25
(66)	2.50	2.90	3.00	2.50	2.55	2.00	2.75	2.88
(67)	2.00	1.80	1.10	2.00	1.54	1.50	2.00	1.42
(68)	200.00	225.00	220.00	250.00	207.00	240.00	240.00	232.00
(69)	100.00	125.00	110.00	150.00	180.00	150.00	150.00	140.00
(70)	355.00	320.00	350.00	500.00	300.00	380.00	350.00	307.00
(71)	890.00	960.00	$1,000	$1,400	$1,033	$1,200	$1,200	$1,100
(72)	$1,075	$1,160	$1,100	$1,800	$1,190	$1,600	$1,500	$1,250
(73)	50.00	45.00	50.00	70.00	59.00	50.00	65.00	50.00
(74)	1.00	1.40	1.70	2.00	1.50	1.30	2.10	1.75
(75)	1.00	1.40	2.25	2.50	2.28	2.00	2.20	1.80
(76)	1.30	1.00	3.00	1.50	1.56	1.80	1.75	1.80
(77)	60.00	30.00	120.00	85.00	34.90	50.00	50.00	50.00
(78)	5.50	6.50	7.00	7.00	5.90	5.00	6.00	6.20
(79)	6.50	7.25	8.00	7.50	5.61	6.00	6.50	6.85
(80)	7.50	8.10	9.00	8.50	7.52	7.00	7.50	7.67
(81)	9.00	9.10	10.00	10.00	8.46	8.00	9.00	8.56
(82)	13.00	12.80	13.00	15.00	11.65	9.00	12.50	12.15
(83)	16.00	18.10	18.00	19.00	15.60	11.00	15.50	16.00
(84)	21.00	21.60	22.00	24.00	19.82	15.00	19.00	20.50
(85)	5.00	4.10	5.00	6.00	5.11	5.00	5.00	5.02
(86)	7.00	5.10	7.00	8.00	6.48	7.50	6.50	6.55

(Continued on next page)

Double duty construction!

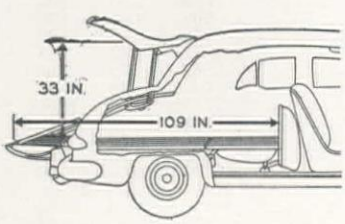
2-cars-in-one Kaiser Traveler

only $2088*

First car ever built to serve a double purpose! Kaiser Traveler is a big, beautiful six-passenger sedan. But in 10 seconds, it's on the job as a rugged cargo carrier! Load the nearly 10-foot-long hold with anything from blasting caps to air compressors...heavy-duty springs and shocks smooth out rough field locations. Here's what construction men say about Kaiser Traveler ...the perfect answer to your two-car problem:

Mr. Hugh Morris, *Construction Fleet Operator, Winner, South Dakota says*
"Real cargo capacity! Holds a man-sized load of gear...then converts in 10 seconds to a king-sized pleasure car. Traveler is the most useful car I've ever owned."

Clyde L. Smalley, Jr., *Building Contractor, Topeka, Kansas says*
"Ideal moving equipment around on the job. Converts easily and quickly to a real family luxury sedan. Gives me the use of 'two cars' at upkeep cost of one car."



Kaiser Traveler... world's most useful car!

★Factory delivered and equipped. Federal tax paid. Transportation, local taxes (if any) add'l.

See your neighborly Kaiser-Frazer Dealer for a demonstration!

(87)	11.00	11.00	10.00	14.00	11.47	12.00	10.50	10.15
(88)	5.00	2.40	3.00	6.00	6.49	5.00	3.50	5.31
(89)	450.00	300.00	500.00	350.00	415.00	500.00	300.00	354.00
(90)	12.50	7.20	8.00	14.00	10.21	13.00	8.00	11.15
(91)	12.50	10.00	8.25	15.00	10.00	11.00	10.00	11.02
(92)	16.00	11.30	10.50	20.00	14.51	14.00	13.00	14.48
(93)	17.00	17.25	11.00	21.00	15.75	16.00	14.00	15.09
(94)	26.00	18.80	17.00	30.00	22.42	21.00	22.00	21.89
(95)	28.00	22.00	20.00	38.00	27.93	26.00	25.00	27.81
(96)	38.00	32.25	26.00	48.00	35.40	37.00	37.00	34.99
(97)	45.00	45.00	30.00	63.00	45.67	45.00	48.00	44.80
(98)	.10	.18	.15	.25	.14	.14	.15	.16
(99)	.30	.55	.30	.85	.41	.40	.60	.53
(100)	.15	.25	.18	.20	.24	.20	.30	.16
(101)	1.00	2.00	2.00	1.00	1.24	1.30	2.00	2.12
(102)	1.50	2.60	2.50	1.50	1.77	1.70	2.25	2.83
(103)	2.50	3.90	3.00	3.00	3.39	4.00	3.50	4.25
(104)	.50	1.30	2.50	1.00	1.90	2.00	2.00	1.77

Nebraska—Scotts Bluff County—Bur. of Recl.—Laterals

An interesting comparison between unit costs of concrete lateral lining as applied by the slip form method or pneumatically applied was provided by the bids for earthwork, lateral lining and structures on certain laterals of the Fort Laramie Canal on the North Platte Project in Nebraska and Wyoming. Unit bids for two of five schedules are presented:

SCHEDULE NO. 2

Slip Form Method
(1) Starr Construction Co. $21,195
(2) A. C. Smith Co. 29,543

Pneumatically Applied
(3) Inland Construction Co. $20,720
(4) Rentlor Co., Inc. 24,414
(5) A. C. Smith Co. 37,443

	(1)	(2)	(3)	(4)	(5)
Lump sum, filling, excavating, and shaping lateral	$5,230	$5,634	$2,650	$3,628	$5,634
5,750 sq. yd. preparing and trimming earth found. for later. lining	1.00	.43	.33	1.00	.43
80 cu. yd. excavation for structures	.60	7.50	3.25	4.00	7.50
80 cu. yd. compacted backfill	.50	8.00	2.50	4.00	8.00
5,750 sq. yd. pneumatically applied mortar or concrete lateral lining	1.15	2.50	1.87	1.46	2.10
28 cu. yd. concrete in structures	30.00	56.00	73.00	78.00	56.00
425 bbl. furnishing and handling cement	5.20	7.80	4.90	6.50	31.80
2,150 lb. furnishing and placing reinf. bars in structures	.15	.21	.20	.19	.21
1 cu. yd. furn. and plac. gravel cushion under inclines of drops	2.00	6.00	10.00	6.00	6.00
25 lb. furnishing and installing miscel. metal work	.20	.50	1.25	.40	.50
30 sq. ft. furnishing and placing elastic filler matl. in joints	2.00	.63	1.25	1.00	.63
Lump sum, removing and replacing one existing farm bridge	50.00	100.00	200.00	525.00	100.00
Lump sum, removing existing structures	25.00	350.00	125.00	75.00	350.00

SCHEDULE NO. 4

Slip Form Method
(1) Harry F. Bergren & Sons, Inc. $38,516
(2) A. C. Smith Co. 50,229

Pneumatically Applied
(3) Rentlor Co., Inc. 45,226
(4) Inland Construction Co. 48,383
(5) A. C. Smith Co. 53,285

	(1)	(2)	(3)	(4)	(5)
Lump sum, filling, excavating, and shaping lateral	750.00	$10,800	687.00	$2,650	$10,800
950 sq. yd. preparing and trim'g earth founda. for lateral lining	1.00	.43	1.00	.33	.43
30 cu. yd. excavation for structures	5.00	7.50	4.00	3.25	7.50
100 cu. yd. compacted backfill	2.00	8.00	4.00	2.50	8.00
10 cu. yd. riprap	15.00	12.00	13.50	33.00	12.00
950 sq. yd. pneumatically applied mortar or conc. lateral lining	2.50	2.50	1.46	1.87	2.10
35 cu. yd. concrete in structures	50.00	56.00	133.50	73.00	56.00
93 bbl. furnishing and handling cement	5.00	7.80	6.50	4.90	44.75
2,475 lb. furnishing and placing reinforcement bars in structs.	.16	.21	.19	.20	.21
6 sq. ft. furnishing and placing elastic filler material in joints	5.00	.63	1.00	1.25	.63
8.5 M.b.m. furn. and erecting treated timber in structs.	336.96	310.30	300.00	400.00	310.30
1,430 lin. ft. furnishing and driving timber pile	2.75	4.40	3.90	3.65	4.40
115 lb. furn. and installing miscl. metal work	1.75	.50	.40	1.25	.50
89,820 lb. furn. and laying 30-in. O.D. welded steel pipe flume	.265	.25	.30	.335	.25
Lump sum, removing and replacing one existing farm bridge	200.00	100.00	525.00	200.00	100.00
Lump sum, removing existing structures	300.00	750.00	150.00	400.00	750.00

Highway and Street . . .

New Mexico—Luna County—State—Grade and Surf.

W. T. Bookout Construction Co., Las Vegas, New Mexico, with a bid of $560,630 (well below the estimated cost), was low before the New Mexico State Highway Department for the grading and asphaltic surfacing of 11.6 mi. of U. S. Highway 70 and 80 from Deming to Las Cruces. Unit bids were submitted as follows:

(1) W. T. Bookout Construction Co. $560,630
(2) Allison & Haney 592,237
(3) Brown Contracting Co. 592,496
(4) Henry Thygesen & Co. 629,610
— Floyd Haake & Wylie Bros. 637,924
— G. I. Martin and O. D. Cowart $645,957
— Sharp & Fellow Construction Co. 656,947
— Armstrong & Armstrong 678,605
— Skousen Construction Co. 722,369
(5) Estimated Cost 741,823

	(1)	(2)	(3)	(4)	(5)
Lump sum, removal of old structures	$1,600	$2,000	$1,000	500.00	800.00
Lump sum, removal of obstructions	100.00	250.00	100.00	100.00	200.00
301,500 cu. yd. excavation—unclassified	.19	.20	.21	.18	.25
240 cu. yd. excavation for structures	3.00	2.20	2.00	1.00	2.00
9,730 cu. yd. excavation for pipe culverts	1.00	.75	1.00	.45	.50
296,850 sta. yd. overhaul	.015	.011	.02	.02	.02
560,800 ¼ mi. yd. haul	.05	.045	.06	.05	.06
3,270 hr. mechanical tamping	3.00	3.00	4.00	3.00	5.00
3,020 hr. rolling—sheepsfoot roller	4.50	2.50	3.00	4.50	5.00
575 hr. rolling—steel tired roller	5.00	4.40	3.00	5.00	5.00
2,850 hr. rolling—pneumatic tired roller	5.00	3.00	3.00	3.50	5.00
106,460 ton ballast	.52	.53	.55	.68	.75
48,120 ton leveling course	.62	.75	.64	.86	.90
10,400 M gal. watering	1.50	1.00	1.00	1.50	3.00
56 cu. yd. Class "AE" concrete	50.00	45.00	40.00	60.00	40.00
6,430 lb. reinforcing steel	.14	.10	.12	.15	.10
392 lin. ft. stand. reinf. conc. culv. pipe—24-in. diam.	4.00	4.50	4.50	5.00	5.00
43,904 lin. ft. stand. reinf. conc. culv. pipe—30-in. diam.	4.60	5.50	5.00	5.48	6.50
2 ea. cattle guard—12-ft. roadway	$1,000	880.00	800.00	900.00	800.00
4 ea. cattle guard—18-ft. roadway	$1,600	$1,540	$1,500	$1,600	$1,500
1 ea. monuments and markers	100.00	50.00	50.00	50.00	50.00
113,700 lin. ft. galvanized barbed wire fence	.12	.12	.15	.14	.12
20 ea. gates—Texas type	10.00	8.00	10.00	10.00	7.50
117 ea. bracing	5.00	4.50	5.00	5.00	5.00
6,470 lin. ft. galv. woven wire farm fence	.18	.25	.20	.30	.25

(Continued on next page)

8 ea. standard gates	40.00	26.50	25.00	40.00	30.00
41 ea. treat. timb. warn. posts (refl.)—6-in. diam.	8.00	7.00	8.00	8.00	7.00
75 ea. right-of-way markers	6.00	6.00	6.00	6.00	5.00
8.1 mi. obliterating old road	200.00	225.00	100.00	300.00	200.00
7,180 bbl. cutback asphalt—Type MC-3	5.75	6.10	5.90	5.75	7.00
12,670 ton top course surfacing	.72	.80	1.00	.86	.90
11.559 mi. mixing cement and aggregate	600.00	600.00	700.00	800.00	750.00
1,030 bbl. cutback asphalt—Type RC-4 seal coat	6.00	6.30	5.80	6.50	7.00
1,730 ton aggregate—seal coat	4.00	4.30	4.50	3.00	5.00
0.41 mi. grading	$1,000	700.00	$1,000	$2,000	500.00
11.559 mi. asphalt processed base	400.00	550.00	700.00	800.00	600.00
7,870 cu. yd. granular backfill	1.00	.95	1.00	1.25	1.00

Colorado—Clear Creek County—Bur. of Public Roads—Grading

Burks & Co., Denver, Colo., with a bid of $408,277 (not including $41,723 for engineering and contingencies) were low before the Bureau of Public Roads at Denver for the grading and draining of 4.69 mi. of the Echo Lake Highway in the Arapahoe National Forest. Unit bids were submitted as follows:

(1) Burks & Co. $408,277
(2) Horner & Switzer 437,471
(3) Lowdermilk Bros. 483,683
(4) Colorado Constructors, Inc. $492,051
(5) J. H.-N. M. Monaghan & Associated Companies 510,262
(6) C. L. Hubner Co. 513,143

	(1)	(2)	(3)	(4)	(5)	(6)
57 acre clearing and grubbing	$1,000	700.00	700.00	700.00	550.00	800.00
3,000 cu. yd. stripping and storing topsoil	.75	.60	.85	1.20	.65	1.00
296,000 cu. yd. unclassified excavation	.93	1.05	1.20	1.20	1.32	1.21
1,880 cu. yd. unclass. excav. for structures	5.00	5.00	5.00	5.00	4.00	5.00
18,000 cu. yd. unclass. excav. for borrow, Case 1	.50	1.00	1.00	.90	.90	1.16
300,000 sta. yd. overhaul (1,000 ft. free haul)	.03	.025	.02	.03	.02	.03
11,000 cu. yd. mi. spec. overhaul of borrow (1000 ft. free haul)	.25	.20	.20	.30	.20	.30
2,300 cu. yd. replacing topsoil	.50	.50	.75	.70	.50	1.16
Lump sum, obliteration of old roadways to be paid for as earned	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
4.69 mi. finishing earth graded roads	400.00	400.00	500.00	400.00	400.00	500.00
3,000 unit watering of embankment, Item 29	.50	1.00	1.00	1.00	1.50	2.50
Lump sum, providing and maint. water plant or plants	100.00	500.00	350.00	500.00	400.00	250.00
1,000 hr. sheepsfoot or tamping roller for embankment, Item 29	2.00	3.00	5.00	3.00	3.00	7.00
Lump sum, prov. and maint. sheepsfoot or tamping roller or rollers on the project	450.00	100.00	750.00	500.00	200.00	250.00
100 cu. yd. cement rubble masonry	55.00	60.00	75.00	60.00	50.00	50.00
3,644 lin. ft. 24-in. C.G.S.M. culvert pipe	5.00	5.30	5.00	6.00	6.50	6.00
168 lin. ft. 30-in. C.G.S.M. culvert pipe	7.00	6.50	6.00	7.00	7.50	7.00
2,100 lin. ft. 6-in. perf. C.G.S.M. pipe underdrain	4.00	4.00	3.00	6.00	4.75	6.00
25 concrete maint. marker posts	12.00	15.00	30.00	15.00	15.00	10.00
230 ea. timber guide posts with warning reflectors (treated)	5.00	5.50	7.00	5.00	5.00	5.00

Oregon—Multnomah County—State—Grade and PCC Pave.

C. J. Montag & Sons, Portland, Ore., with a total bid of $865,911, were low before the Oregon State Highway Department for construction of structures, grading and paving with Portland cement concrete of the Tillamook St.-Broadway Bridge Section of the Pacific West Highway. Unit bids were submitted by the following:

(1) C. J. Montag & Sons $865,911
(2) L. H. Hoffman 885,818
(3) Kuckenberg Construction Co. 898,810
(4) Lee Hoffman 930,211
(5) Natt McDougall Co. $932,328
(6) Peter Kiewit Sons' Co. 985,369
(7) General Construction Co. 986,853

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lump sum, clearing and grubbing	$19,000	$10,000	$12,000	$30,000	$19,000	$15,000	$15,000
Lump sum, remov. bldg. at 1340 Crosby Ave.	$19,250	$1,200	$1,400	$3,700	$3,000	$3,000	$1,000
7,200 sq. yd. removal of pavement	1.00	.70	.90	1.15	1.15	.75	1.25
2,500 sq. yd. removal of walks and driveways	.50	.35	.20	.45	.60	.75	.75
2,900 lin. ft. removal of curbs	.25	.35	.20	.40	.45	.35	.50
5 only removal of inlets	20.00	12.00	10.00	25.00	22.00	19.00	25.00
1 only removal of manholes	100.00	88.00	50.00	200.00	65.00	100.00	150.00
850 cu. yd. removal of misc. conc. and masonry structs, location "A"	5.00	3.50	5.00	11.50	2.90	5.60	7.50
1,250 cu. yd. removal of misc. conc. and masonry structs, location "B"	20.00	11.00	5.00	16.00	11.25	10.00	7.50
1,300 lin. ft. removal of rails in car track	1.25	1.00	1.00	2.75	1.05	1.35	1.50
1,300 lin. ft. removal of ties in car track	1.25	1.00	1.00	1.50	1.05	1.35	1.50
1,900 cu. yd. structl. excav., unclass.	5.00	6.00	5.50	5.50	3.75	5.40	7.50
59,000 cu. yd. gen. excav., loca. "A", unclass.	.80	1.00	1.20	.65	1.00	1.35	1.50
18,000 cu. yd. genl. excav., loca. "B", unclass.	1.50	1.70	1.40	1.10	1.65	1.35	1.75
7,400 short overhaul	.03	.04	.02	.02	.05	.05	.05
176,000 yd. mi. truck haul	.22	.29	.20	.27	.26	.30	.20
3,000 cu. yd. excav. and plac. topsoil	3.00	3.00	2.20	3.00	2.50	2.50	2.00
Lump sum, finishing, roadbed and other areas	$4,000	$4,000	$3,000	$6,000	$4,600	$6,000	$5,000
25 lin. ft. 8-in. conc. drain pipe	1.00	1.15	1.25	1.50	1.00	1.55	1.50
2,400 lin. ft. 8-in. sewer pipe	1.00	1.15	.90	1.75	.90	1.55	1.50
420 lin. ft. 12-in. sewer pipe	1.75	2.00	1.75	2.25	1.65	2.65	1.85
900 lin. ft. 15-in. sewer pipe	2.00	2.35	2.00	3.50	2.10	3.35	2.25
60 lin. ft. 15-in. ex. str. cor. met. pipe, protected invert (under R.R.) extra for installing	5.00	10.00	3.25	6.00	10.00	5.00	5.00
600 lin. ft. pipe under pavement	4.00	3.50	5.00	4.00	5.00	5.60	2.00
5 only adjustment of manholes	80.00	80.00	80.00	57.50	70.00	135.00	100.00
1 only adjustment of catch inlets	80.00	40.00	50.00	40.25	55.00	52.50	50.00
1 only reconstructing manhole	200.00	180.00	150.00	143.75	100.00	135.00	150.00
10 only Type "A" manholes, 5 to 10 ft. deep	250.00	300.00	175.00	287.50	240.00	175.00	300.00
4 only Type "A" manholes 10 to 21 ft. deep	350.00	400.00	300.00	402.50	485.00	220.00	400.00
40 only concrete inlets	65.00	58.00	60.00	63.25	70.00	85.00	75.00
190 lin. ft. 1½-in. copper water pipe	3.00	3.50	1.00	1.10	1.50	2.00	3.00
80 lin. ft. 2-in. copper water pipe	4.50	4.70	1.50	1.40	2.25	3.00	3.50
400 cu. yd. concrete curbs and gutter	40.00	47.00	35.00	44.10	46.75	35.00	50.00
930 sq. yd. concrete walks	2.75	2.75	2.75	3.15	3.10	2.50	2.75
140 cu. yd. concrete islands	44.00	44.50	40.00	44.10	39.25	40.00	50.00
600 lin. ft. metal guardrail	4.00	2.10	2.50	3.25	2.95	3.50	5.00
6 only concrete sight posts	10.00	12.00	15.00	12.00	10.50	15.00	15.00
60 lin. ft. 3-ft. metal guard fence	2.50	2.00	3.00	2.25	2.75	3.20	2.50
Lump sum, const. recesses for traffic control markers	150.00	250.00	500.00	500.00	210.00	120.00	200.00
3,200 cu. yd. 3-in. - 0-in. material in base	2.25	2.70	2.75	3.25	3.00	3.00	3.00
500 cu. yd. ¾-in. - 0-in. material in base	3.25	3.50	2.75	3.75	3.65	3.45	3.50
350 cu. yd. ½-in. - 0-in. matl. in cush. crse.	3.75	3.60	3.00	3.85	3.80	3.60	3.50
100 M. gal. sprinkling	2.50	3.00	3.00	3.00	3.00	3.00	3.00

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11,000	sq. yd. Portland cem. conc. pavement	3.60	3.85	3.50	3.78	3.70	3.75	4.00
200	lin. ft. ¾-in. x 4-in. expansion joints	.20	.13	.20	.17	.20	.15	.20
30	lin. ft. ¾-in. x 6-in. expansion joints	.25	.21	.25	.23	.25	.15	.25
280	lin. ft. ¾-in. x 8-in. expansion joints	.25	.28	.30	.29	.35	.20	.30
730	lin. ft. ½-in. x 4-in. expansion joints	.15	.11	.15	.14	.15	.15	.18
350	lin. ft. ½-in. x 8-in. expansion joints	.15	.22	.25	.23	.30	.15	.25
6,700	lin. ft. contraction joints	.05	.04	.15	.06	.10	.05	.04
90	only ¾-in. x 6-in. dowel pins	.50	.40	.30	.40	.30	.35	.25
400	only ¾-in. x 10-in. dowel pins	.50	.44	.50	.52	.40	.40	.35
180	only ¾-in. x 18-in. dowel bars	.50	.57	.60	.58	.50	.50	.45
21,000	lb. tie bars and reinforcement	.15	.09	.12	.13	.10	.12	.10
2,100	tons Class "B" asphaltic concrete	8.50	8.75	8.75	8.50	8.80	10.00	10.00
2,800	cu. yd. excav. for structs.	10.00	4.70	9.00	10.00	6.20	11.00	13.50
100	cu. yd. struct. excav. below elev. shown	10.00	14.00	11.00	12.00	9.20	16.00	10.00
30,000	lin. ft. treated piling	1.25	1.00	1.35	1.20	1.27	1.25	1.15
770	only drive piles	35.00	46.00	32.50	30.00	43.50	22.50	42.50
70	MFBM lumber	150.00	130.00	160.00	140.00	175.00	248.00	170.00
5,400	sq. ft. Cedar wearing surface	.75	.50	.35	2.00	.33	.50	.65
5,100	cu. yd. Class "A" concrete	50.00	62.50	58.00	60.00	58.65	68.00	65.00
1,000,000	lb. metal reinforcement	.095	.09	.12	.11	.10	.10	.09
2,060	lin. ft. metal rail	9.00	9.00	9.50	10.00	13.20	11.00	10.00
370	sq. yd. membrane waterproofing	5.00	4.00	6.00	4.50	3.30	5.00	5.00
Lump sum,	lighting	$10,500	$8,000	$15,000	$6,000	$6,215	$12,000	$7,000
Lump sum,	trolley troughs	500.00	200.00	$3,500	500.00	$1,165	500.00	$1,000
Lump sum,	providing for traffic	$45,000	$25,000	$40,000	$40,000	$65,000	$43,500	$53,000
Lump sum,	metal guard fence on structure	300.00	100.00	750.00	300.00	280.00	425.00	250.00
300	lin. ft. 4-in. perf. conc. drain pipe	.90	1.00	1.00	.80	.85	.68	.75

Bridge and Grade Separation . . .

California—Los Angeles County—State—Box Girder Bridges

J. E. Haddock, Ltd., Pasadena, Calif., with a bid of $1,255,489, was low before the California Division of Highways for the grading and paving with Portland cement concrete on cement-treated subgrade and with plant-mixed surfacing on untreated rock base of about 1.8 mi. of Ramona Parkway in Los Angeles, construction of three reinforced concrete box girder type bridges and extension of the present reinforced concrete pedestrian overcrossings. Unit bids were submitted as follows:

(1) J. E. Haddock, Ltd. $1,255,489
(2) Griffith Co. 1,262,406
(3) United Concrete Pipe Corp. and Jesse S. Smith 1,262,820
(4) Charles MacCloskey Co. & Clyde W. Wood, Inc. 1,311,810
(5) Basich Bros. Construction Co. & Basich Bros. $1,312,405
(6) Winston Bros. Co. & Yount Constructors, Inc. 1,345,201
(7) Guy F. Atkinson Co. 1,365,304
(8) Spencer Webb Co. 1,430,165
(9) Peter Kiewit Sons' Co. 1,446,218

		(1)	(2)	(3)	(4)	(5)	(6)
3,100	cu. yd. removing concrete	8.00	7.30	3.00	5.22	4.00	6.50
Lump sum,	clearing and grubbing	$12,850	$9,200	$10,000	$15,000	$12,000	$5,000
220,000	cu. yd. roadway excav.	.53	.60	.41	.485	.60	.52
4,620	cu. yd. struct. excav. (bridges)	1.75	2.10	2.50	2.60	2.25	2.50
5,570	cu. yd. struct. backfill (bridges)	1.50	2.15	3.00	1.70	2.50	2.50
29,000	cu. yd. struct. excav.	1.90	1.95	2.00	3.10	1.75	2.50
20	cu. yd. ditch and channel excav.	2.20	1.75	2.50	3.00	2.00	3.00
22,000	sq. yd. compacting original ground	.05	.04	.08	.05	.06	.06
900,000	sta. yd. overhaul	.004	.009	.008	.005	.004	.01
70,000	ton imp. subbase material	.70	.75	.65	.75	.60	.70
50,000	ton imp. base material	.77	1.00	.75	1.20	.85	.95
28,000	sq. yd. prep. slopes (eros. cont.)	.07	.09	.10	.10	.10	.06
34,000	sq. yd. cultivat. (preparatory landscape)	.035	.06	.10	.10	.05	.06
Lump sum,	dev. wat. supp. & furn. wat. equip.	$7,200	$4,000	$10,000	$5,700	$10,000	$3,000
8,000	M. gal. applying water	1.35	1.75	1.00	1.50	1.25	1.55
Lump sum,	finishing roadway	$1,000	$1,700	$3,000	$2,300	$6,600	$1,500
70,000	sq. yd. mix and compact. (C.T.S.)	.20	.25	.25	.19	.21	.24
3,300	bbl. P.C. (C.T.S.)	3.60	3.70	4.00	3.65	4.00	3.15
70	ton liq. asph. RORC-5 (cur. seal C.T.S.)	40.00	47.00	40.00	22.50	40.00	25.00
11,000	tons untr. rock base	1.45	1.50	2.00	1.55	1.50	1.70
41	tons liq. asph. SC-2 (pr. ct. and pen. tr.)	32.00	22.00	25.00	20.00	22.00	20.00
17	ton asph. emuls. (paint binder and sl. ct.)	45.00	33.00	35.00	30.00	35.00	28.00
8,285	ton min. aggr. (P.M.S.)	3.85	3.50	3.80	4.10	3.20	4.00
415	ton pav. asph. (P.M.S.)	18.00	16.00	22.00	17.00	17.00	28.00
400	lin. ft. raised bars	.90	1.15	1.00	1.00	.70	1.00
15,000	cu. yd. P.C.C. (pavement)	11.35	10.70	10.50	11.75	11.45	11.00
14,500	ea. pavement tie bolt assemblies	.48	.55	.50	.60	.50	.60
22	M.F.B.M. Douglas firm timber (detour br.)	300.00	250.00	210.00	200.00	191.00	175.00
6,250	cu. yd. Class "A" P.C.C. (struct.)	51.04	46.00	49.00	45.00	48.37	52.00
146	lin. ft. rubber water stops	2.30	2.65	2.50	4.00	2.00	2.50
1,128,000	lb. bar reinf. steel	.078	.08	.08	.07	.0782	.08
60	sq. yd. mesh reinforcement	.40	1.25	.70	2.00	.30	.50
74,000	lb. misc. iron and steel	.26	.25	.30	.26	.25	.28
3,528	lin. ft. furn. conc. piling	2.70	2.70	4.00	2.35	2.63	2.60
156	ea. driving piles	55.00	56.00	45.00	49.00	55.00	55.00
2,100	cu. yd. P.C.C. (curbs, gutters and sidewalks)	25.00	28.00	31.00	32.00	30.00	31.00
2,710	lin. ft. steel railing	7.00	7.00	7.00	6.30	7.00	7.00
102	lin. ft. pipe handrail (wall type)	4.00	4.20	5.00	4.00	4.25	4.00
62	lin. ft. pipe handrail (post type)	5.75	6.50	10.00	6.00	6.50	6.00
316	lin. ft. metal stair treads	1.65	2.00	4.00	3.00	1.75	2.00
16,000	lin. ft. chain link fence	1.30	1.24	1.30	1.30	1.30	1.20
5	ea. walk gates (chain link fence)	50.00	55.00	50.00	75.00	36.00	50.00
74	lin. ft. 12-in. R.C.P. (std. str.)	3.10	2.40	3.00	3.50	5.61	3.50
3,200	lin. ft. 15-in. R.C.P. (std. str.)	3.25	2.85	3.20	3.75	6.32	4.10
4,600	lin. ft. 18-in. R.C.P. (std. str.)	3.95	3.45	4.00	4.75	6.47	5.00
1,880	lin. ft. 21-in. R.C.P. (std. str.)	4.50	4.10	4.50	5.50	7.31	5.70
170	lin. ft. 24-in. R.C.P. (std. std.)	5.40	4.90	5.00	6.00	7.98	6.50
270	lin. ft. 30-in. R.C.P. (std. str.)	7.00	6.40	7.00	7.25	9.12	8.25
430	lin. ft. 33-in. R.C.P. (std. str.)	7.85	7.40	7.50	8.25	10.76	9.20
1,550	lin. ft. 36-in. R.C.P. (std. str.)	8.65	8.00	8.50	9.75	11.45	10.20
300	lin. ft. 36-in. R.C.P. (1600-D)	9.10	8.30	9.00	12.00	12.30	10.50
460	lin. ft. 42-in. R.C.P. (std. str.)	11.45	10.30	11.00	13.00	13.15	13.00
470	lin. ft. 48-in. R.C.P. (std. str.)	13.00	12.50	14.00	14.00	14.80	15.50
290	lin. ft. 54-in. R.C.P. (std. str.)	16.25	15.00	16.00	16.00	17.05	18.75
46	cu. yd. Class "C" P.C.C. (pipe reinf.)	25.00	18.00	20.00	50.00	14.00	19.00
90	lin. ft. 4-in. cast iron pipe	1.75	2.20	4.00	3.00	2.93	3.50
4	lin. ft. 8-in. cast iron pipe	6.00	5.00	10.00	8.00	5.00	10.00
122	lin. ft. 6-in. std. drain tile	.75	7.20	1.00	2.00	1.20	2.00
5	cu. yd. filter material	6.00	11.00	7.00	10.00	3.00	10.00
57	sq. yd. membrane waterproofing	2.65	3.00	5.00	6.00	3.00	3.00
220	lin. ft. 6-in. deck drain discharge pipe	4.50	3.00	6.00	4.00	3.50	6.00
360	lin. ft. salv. exist. pipe culv.	1.00	1.20	1.50	2.00	1.00	2.00
150	lin. ft. pipe shaft matl.	12.50	15.00	20.00	22.00	15.00	15.00
210	lin. ft. reconst. M.H. (sanitary sewers)	23.00	17.00	20.00	22.00	11.30	25.00
1	ea. adjust. M.H. to grade	30.00	30.00	100.00	60.00	25.00	50.00

(Continued on next page)

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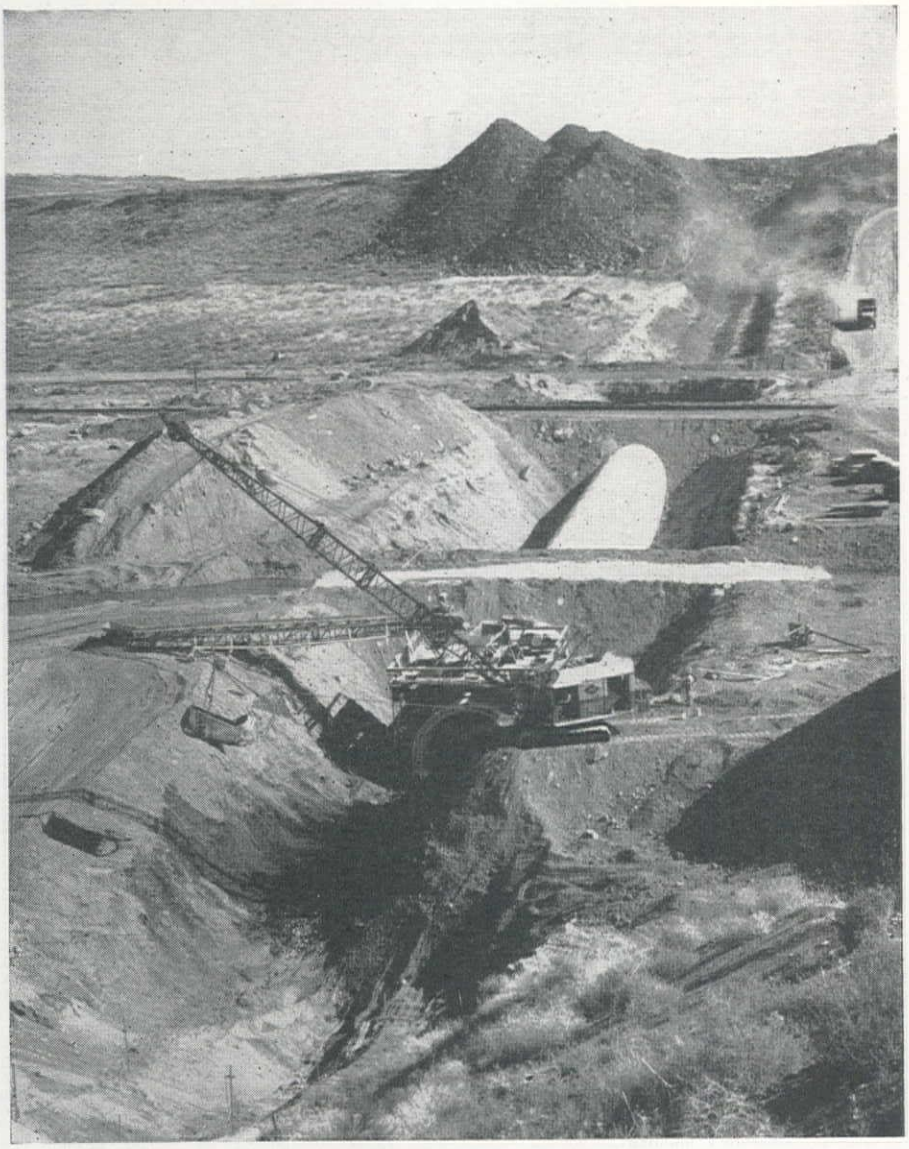

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14,000 lin. ft. remov. and relay. wat. pipe lines	.32	.32	.70	.55	.65	1.20
10 ea. horizontal reflector units	6.50	8.50	10.00	10.00	7.50	6.00
Lump sum, engineers' office	$2,000	$1,700	$2,500	$1,000	$2,000	$2,000
Lump sum, remov. exist. br. (Herbert Ave.)	$6,750	$3,200	$3,000	$1,650	$3,800	$3,000
Lump sum, washing equipment (pedestr. underc.)	600.00	250.00	$1,000	800.00	650.00	750.00
720 lin. ft. metal plate guard rail	2.30	3.50	2.50	3.50	3.50	3.00
420 lin. ft. 6-in. V.C.P. (std. str.)	1.45	1.00	2.00	3.00	3.48	1.30
660 lin. ft. 8-in. V.C.P. (std. str.)	1.70	1.30	2.50	4.00	3.90	1.50
1,000 lin. ft. 8-in. V.C.P. (extra str.)	2.00	1.70	2.70	5.00	4.31	1.50
10 ea. brick matl.	240.00	200.00	300.00	325.00	200.00	300.00
1 ea. drop matl.	300.00	250.00	350.00	325.00	260.00	400.00
1 ea. flushing matl.	300.00	300.00	450.00	325.00	280.00	450.00
60 ea. house connection caps	23.00	14.00	30.00	20.00	25.00	25.00
Lump sum, highway and undercross light. syst.	$7,300	$7,600	$12,000	$5,500	$7,000	$7,500

Wyoming—Goshen County—State—I-Beam

Etlin E. Peterson, Casper, Wyoming, with a bid of $320,627, was awarded the contract by the Wyoming State Highway Department for construction of a bridge approximately 357 ft. long across the North Platte River at Torrington consisting of six I-beam spans together with a detour bridge and the grading, draining, base course surfacing and oil treatment by the road-mix method on 0.751 mi. of the Torrington South Road. Unit bids were submitted as follows:

(1) Etlin E. Peterson $320,627
(2) Charles M. Smith 355,451
(3) Inland Construction Co. 357,331
(4) N. A. Nelson 362,922
(5) Northwestern Engineering Co. 372,319
(6) J. H. & N. M. Monaghan & Associated Companies 374,672

	(1)	(2)	(3)	(4)	(5)	(6)
44,700 cu. yd. excavation	.30	.80	.543	.44	.50	.40
4,250 cu. yd. selected matl. surfacing (Type 1)	.40	1.00	.57	.80	.60	.50
4,100 cu. yd. sta. overhaul	.01	.01	.01	.01	.01	.01
9,000 cu. yd. mi. haul	.20	.30	.20	.20	.15	.10
145 hr. sheepsfoot roller operation	10.00	15.00	12.00	11.00	11.20	12.00
30 hr. equipment roller operation	15.00	15.00	13.00	12.00	15.00	12.00
720 M. gal. watering	1.50	1.00	2.00	3.50	1.90	1.50
65 cu. yd. structure excavation	2.00	3.00	3.30	4.50	3.70	2.50
405 cu. yd. excavation for pipe culverts	1.50	3.00	2.65	3.00	2.20	2.50
485 hr. mechanical tamping	6.00	7.00	9.00	7.00	5.20	5.00
10 cu. yd. Class 1 riprap	12.00	12.00	20.00	15.00	12.50	10.00
12 cu. yd. grouted riprap	20.00	20.00	25.00	18.00	18.50	16.00
46 lin. ft. 8-in. C.M.P.	2.00	1.40	1.65	2.00	1.50	1.80
350 lin. ft. 10-in. C.M.P.	2.20	1.70	1.90	2.50	2.00	2.15
66 lin. ft. 18-in. C.M.P.	3.00	3.00	3.00	3.50	3.10	5.60
54 lin. ft. 24-in. C.M.P.	4.50	5.50	5.60	4.80	5.40	5.60
64 lin. ft. 30-in. C.M.P.	5.00	5.50	6.50	5.85	5.90	6.50
238 lin. ft. 36-in. C.M.P.	8.00	9.00	10.00	12.00	8.90	12.00
100 lin. ft. 60-in. C.M.P.	17.00	18.00	21.00	22.00	21.40	17.25
28 lin. ft. 22-in. x 13-in. C.M.P. arch culvert	4.00	4.00	4.50	4.50	3.30	4.75
4,100 ton crushed gravel base course (1-in. max.)	.80	1.20	.80	.90	1.10	1.00
180 cu. yd. gravel base course (1-in. max.)	.80	1.20	2.20	1.00	1.10	1.00
850 cu. yd. binder	.40	.40	.65	.50	.60	.50
1,925 ton crushed gravel surfacing (Type B)	.80	1.30	.65	1.00	1.60	1.00
110 ton stone chips (Type B)	5.00	8.00	8.00	6.50	5.50	4.00
65 ton sand	1.50	3.00	7.00	4.00	1.25	1.00
25 cu. yd. sand	1.75	4.00	10.00	4.50	1.60	1.00
2,600 ton mi. haul of surfacing material	.20	.20	.27	.16	.15	.08
40 ton asphaltic material MC-Prime	30.00	35.00	42.50	38.00	30.00	36.00
90 ton asphaltic material MC-3	35.00	35.00	42.50	38.50	30.00	36.00
26 ton asphaltic material RC-Seal	30.00	40.00	42.50	42.00	31.00	36.00
19,800 sq. yd. processing	.07	.12	.066	.09	.09	.10
37 hr. roller operation (base)	7.00	10.00	10.00	7.50	11.00	7.00
89 M. gal. watering (base)	1.50	1.50	2.00	2.50	1.90	1.50
20 ea. reflectorized guide posts	2.50	2.75	5.30	5.50	6.00	4.00
1,500 lin. ft. Type A right-of-way fence	.30	.25	.21	.25	.30	.30
160 lin. ft. standard right-of-way fence	.20	.17	.13	.20	.25	.20
5 ea. brace panels	10.00	12.00	8.00	10.00	10.00	12.00
10 ea. end panels	12.00	14.00	12.00	12.00	12.00	13.00
1 ea. 16-ft. galvanized steel gate	60.00	50.00	50.00	100.00	40.00	60.00
10 ea. drop inlets	120.00	100.00	100.00	150.00	105.00	200.00
3,810 lin. ft. straight curb	1.50	1.25	1.65	1.50	1.30	2.50
3,280 sq. yd. concrete double gutters	5.50	6.00	4.25	5.10	5.50	3.50
2,005 sq. yd. concrete sidewalk	3.10	3.60	3.00	3.75	2.80	3.15
30 ea. right-of-way markers	10.00	10.00	16.00	10.00	10.00	8.00
2 ea. R. C. project markers	25.00	15.00	20.00	35.00	25.00	100.00
1,524.6 cu. yd. Class B concrete	42.00	42.00	49.25	42.00	54.00	44.00
23.4 cu. yd. Class C concrete	42.00	42.00	73.00	100.00	54.00	45.00
152,826 lb. reinforcing steel	.12	.125	.110	.115	.14	.11
563,450 lb. structural steel	.13	.13	.147	.15	.146	.12
7,392 lin. ft. untreated timber piling	1.80	1.75	1.80	2.50	2.10	3.75
2,470 cu. yd. wet excavation for bridges	12.00	12.00	14.00	12.00	12.50	15.00
340 cu. yd. dry excavation for bridges	3.00	3.00	2.00	3.00	7.50	2.50
Lump sum, lighting system	$3,500	$3,500	$2,700	$3,500	$3,000	$6,000
Lump sum, removing existing structures	$18,000	$15,000	$10,000	$20,000	$17,037	$27,000
1 ea. providing and maintaining field testing laboratory building	750.00	900.00	650.00	900.00	$1,000	500.00
0.3 mi. detour obliteration	500.00	300.00	800.00	$1,000	250.00	500.00
Lump sum, removing and resetting cattleguard	.....	.....	.....	.....	.....	.....
1,100 cu. yd. mi. haul of binder	.20	.30	.20	.20	.25	.12
52.802 M.B.M. treated timber	210.00	225.00	240.00	250.00	235.00	300.00
1,932 lin. ft. treated timber piling	2.20	2.00	2.30	2 65	2.20	4.25
86.343 M.B.M. salvaging timber	15.00	30.00	40.00	38.00	36.00	80.00
69 ea. salvaging treated timber piles	12.00	20.00	26.00	20.00	20.00	20.00
33.541 M.B.M. untreated timber	140.00	180.00	150.00	200.00	180.00	280.00
880 lin. ft. standard right-of-way fence	.20	.17	.13	.18	.25	.20
1 ea. brace panels	10.00	12.00	13.00	12.00	10.00	12.00
3 ea. end panels	12.00	14.00	13.00	15.00	12.00	13.00

New Mexico—Otero County—Bur. of Public Roads—Conc. Lining

Henry Thygesen & Co., Albuquerque, New Mexico, with a bid of $76,504 (not including engineering and contingencies of $7,495) was low bidder before the Bureau of Public Roads at Denver, Colo., for the concrete lining of a tunnel over a 26-ft. wide roadbed on the Alamagordo-Cloudcroft Highway in the Lincoln National Forest. Unit bids were submitted as follows:

(1) Henry Thygesen & Co. $76,504
(2) M. C. Jacobs Construction Co. 78,377
(3) E. M. Silver $88,728

	(1)	(2)	(3)
Lump sum, miscellaneous force account work	$2,500	$2,500	$2,500
30 cu. yd. unclass. excavation for structures	6.00	6.00	46.00
22,000 lb. reinforcing steel	.15	.14	.12
20 ton. fine aggregate for mortar	26.00	29.00	26.00
27 bbl. white cement for mortar	43.50	42.50	44.00
860 cu. yd. concrete tunnel lining	78.00	78.50	90.00
30 sq. yd. concrete sidewalk	5.00	6.00	6.00
400 cu. yd. portal cushion material	4.00	8.00	7.30

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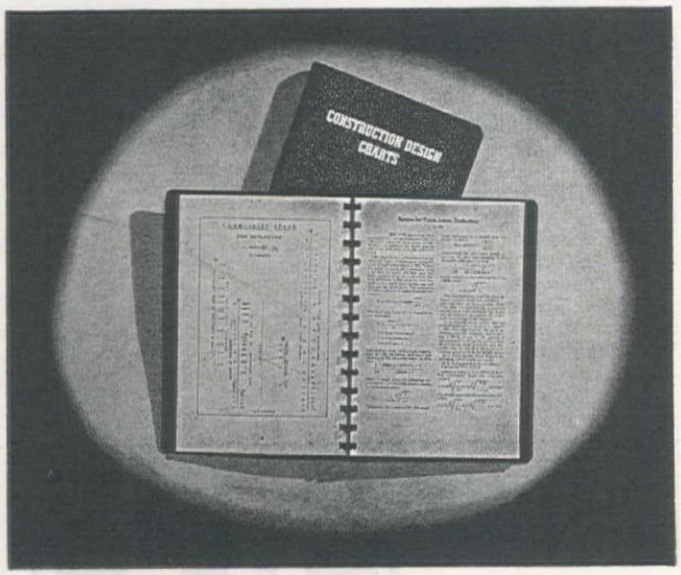

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1001

Loader and Snowplow Attachments

Manufacturer: Tractomotive Corp., Deerfield, Ill. (loader), and Baker Manufacturing Co., Springfield, Ill. (snowplow).

Equipment: Rear-mounted bucket loader and a V-type hydraulically-controlled snowplow.

Features claimed: Weight of the rear-mounted ⅝-cu. yd. loader is reduced and framework simplified by using the grader's channel framework as part of the loader frame. Eliminated is the cost and trouble of having to substitute a heavy-duty front end axle, wheel spindles and steering gears to properly carry a loader of this size. Normal steering characteristics of the grader are retained. Loader stability is improved by distributing the loader weight over the four tandem wheels of the grader. The new Baker-V-plow is 8 ft. wide at the bottom, 9½ ft. wide at the top. It is flexibly attached to the push bars and hydraulically adjusted for correct snow moving positions. At high speeds, the snow is lifted and discharged off the outer ends of the plow. These attachments are designed for use on an Allis-Chalmers Model D tractor.

1002

Mobile Arc Welder

Manufacturer: Hobart Brothers Co., Troy, Ohio.

Equipment: Self-propelled arc welder that can be used as a complete maintenance and repair outfit.

Features claimed: The "Weldmobile" is equipped to roll along to the job under its own power and make on the spot repairs with arc welding, oxy-acetylene welding and cutting and power tools. A universal coupler is provided on the rear to permit towing of additional equipment, such as trailer-mounted welders, air compressors, etc. Two new models are being produced —the GR-301-M with a 300-amp. welder for light to heavy welding requirements, and the GR-401-M with a 400-amp. welder for medium to extra heavy requirements. Either unit can be furnished with one or three kw. auxiliary D.C. power for supplying lights and universal power tools.

1003

Waterproof and Flameproof Canvas

Manufacturer: Wenzel Tent & Duck Co., St. Louis, Mo.

Equipment: Canvas designed to shed water and prevent fires.

Features claimed: FlameZel, the new tent and tarp material, overcomes the real fire hazard problem of ordinary waterproof canvas which, because of the type of chemicals used in waterproofing, often causes fires itself. Flames and incendiary action on the new canvas, in a recent test, were limited in effect to the immediate area with no spreading of flames or glow.

1004

Electrode Holder

Manufacturer: General Electric Co., Schenectady, N. Y.

Equipment: Miniature inert-arc electrode holder with flexible goose-neck.

Features claimed: The holder features a flexible front-end assembly made of malleable copper tubing surrounded by a sheath of silicone rubber so that it can be bent in any direction. Specifically designed for the fluxless welding of non-ferrous metals in the thinner gages from No. 16 to No. 40, the holder is available in two models, one for 0.010 and 0.020-in. tungsten electrodes and the other for 0.040 and 1/16-in. tungsten electrodes. It has a rating of 40 amp. continuous, and can be used with either a-c or d-c supply. The holder should be applicable wherever the metal to be welded is thin or the parts to be welded are small or hard to get at, where the flux corrosion and mess incidental to brazing are intolerable, or where the accessibility necessary for spot welding is lacking.

1005

3½-Sack Mixer

Manufacturer: Chain Belt Co., Milwaukee, Wis.

Equipment: The Rex Skipper Mixer.

Features claimed: This new Rex mixer is claimed to give 50% more production than the 3½-Sack Tilter Type Mixer. The Rex charging gate feature allows loading the hopper while another batch is in the drum. Non-clogging, it is mounted above the center line of the drum free from the spatter of mixing concrete. Grouped controls, easy to operate, add to the efficiency of the mixer. A skip lever acts as Skip shaker arm to get the batch into the drum. Concrete cannot build up in the skip throat.

1006

Round Endless Belts

Manufacturer: United States Rubber Co., Akron, Ohio.

Equipment: Belts of round cross section built without a splice.

Features claimed: The belts were designed for use on drills, high speed hammers, tappers, saws, valve refacers, wood working tools and other small machinery applications. Their construction helps eliminate vibration and cord pulling members keep stretch at a minimum. Bias-cut jackets protect the inner structure and insure flexibility. Available in sizes from 3/16 in. to 2 in. diameter and from 6⅞ in. to 156 in. inside circumference.

1007

Motor Grader

Manufacturer: Galion Iron Works & Mfg. Co., Galion, Ohio.

Equipment: Galion No. 303 grader, with either a gasoline or Diesel engine.

Features claimed: All operations of the blade, scarifier and leaning front wheels are completely hydraulic. Adjustments are instantly and accurately made by finger-tip touch on the control levers. The blade is adjustable 360 deg. horizontally for operation in reverse, and 90 deg. vertically for bank cutting. Eight overlapping forward and two reverse speeds assure maximum performance under all operating conditions.

1008

Dehumidifier

Manufacturer: Dryomatic Corp. of America, Baltimore, Md.

Equipment: Absorption type dry conditioner.

Features claimed: The new model is effective for humidity control in adaptable areas up to 8,000 cu. ft. It is extremely quiet in operation. Its 1/100-hp. motor operates a rotor type of fan which moves 32 cu. ft. of air a minute through the unit. Standard equipment also includes a removable air-filter which cleans out impurities before the air is dried.

1009

Service Set for Mack Trucks

Manufacturer: Owatonna Tool Co., Owatonna, Minn.

Equipment: Set of tools especially designed for servicing Mack trucks.

Features claimed: Included in the set are all tools required to remove and install bearings, gears, outer bearing races, pinions, etc., at a substantial saving of time and effort and without damage to costly parts. Each tool is adjustable and adaptable to a great many different jobs and will work equally well on other makes and models of trucks. They will not become obsolete with each model change.

1010

Heavy-Duty Motor Grader

Manufacturer: Huber Manufacturing Co., Marion, Ohio.

Equipment: Grader with blade pressure of 12,440 lb.

Features claimed: Outstanding features of the new grader include: 27½-in. front axle clearance; 87-in. shoulder reach; mechanical steering; Hercules 130-hp. full Diesel engine; 4-wheel hydraulic brakes, and easy accessibility to all operating parts for maintenance and service purposes. The grader, equipped with an Oliver transmission, has 8 forward speeds ranging from 1.31 to 20.63 mph., and two speeds in reverse. Circle, lifting arms and side-shifting are operated through Huber's hydromechanical system. An important advantage of the system is the fact that lifting arms can be held in any position simply by stopping the motor. Another feature of the grader is the manner in which the wheels remain perpendicular to the ground even when running over sizable objects. The grader can roll over obstacles up to 14 in. high or into a ditch 14 in. deep without changing the leaning angle.

1011

Ford Trucks

Manufacturer: Ford Motor Co., Dearborn, Mich.

Equipment: Line of trucks adapted to a wide range of operation.

Features claimed: Some of the important new items of the improved line of Ford trucks are the following: Availability of air brakes on 21,500 lb. gross vehicle weight rating F-8 series, the largest Ford trucks ever built; heavy-duty 3-speed transmissions as optional equipment for F-1, F-2 and F-3 series; a 176-in. wheelbase model added for the F-6 and F-5 series; the 145-hp. engines in both the F-7 and F-8 series now have new-type exhaust valves which are free to rotate in the valve guides when valves are lifted, aiding in proper seating and tending to prevent the formation of deposits on valve stems and in valve guides; and single speed rear axles now available for series F-6 and F-8 models. Gross vehicle ratings for Ford trucks now range from 4,700 to 21,500 lb. and power for the various capacities is provided by three truck engines—a 95-hp. six-cylinder engine, a 100-hp. V-8 and a 145-hp. V-8.

1012

Small Portable Air Compressors

Manufacturer: American Brake Shoe Co., New York City.

Equipment: Two dual-pressure piston-type compressors.

Features claimed: Two models, powered by ½ and ¾-hp. motors, operate at 150-lb. pressure delivering 2.4 cu. ft. per min. free air for tire inflation, operating a grease gun or air blow gun, as well as many other small uses. By shifting a lever, the compressors are continuous-running units at 50-lb. pressure delivering 3.2 cu. ft. per min. free air for paint spraying, insecticide spraying and similar uses. Both models are easily portable with or without a cart.

1013

Air-Acetylene Outfit

Manufacturer: Air Reduction Sales Co., New York City.

Equipment: Outfit for all kinds of small soldering, low-temperature brazing, heating or lead-burning jobs.

Features claimed: Torch assembly of the outfit, ruggedly constructed of brass, has five feet of 3/16-in. flexible hose, a soldering iron and soldering copper. It is sold

with the following four tips: Radiator Soldering Tip, a slender tubing that permits the flame to be used in confined places; No. 9 Tip, for when a medium flame is required; No. 10 Tip, that produces a pointed flame suitable for concentrated heating, and a No. 15 Tip, that gives a brush type flame suitable for heating broad areas.

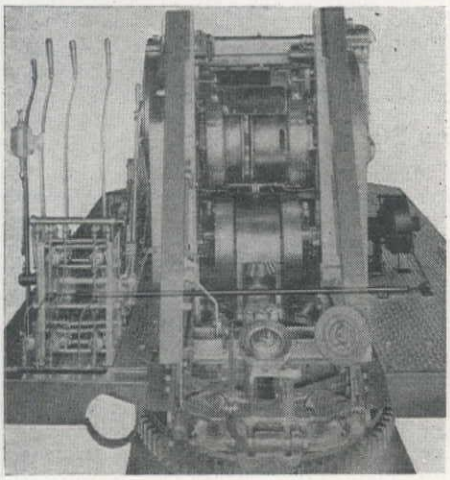
1014

Dipper Trip and Tagline Winder

Manufacturer: Quick-Way Shovel Co., Denver, Colo.

Equipment: Combination unit for Quick-Way Truck Shovels and Clamshells.

Features claimed: This unit is engineered for all "Quick-Ways" now in service. Advantages resulting from use of the attach-



ment as a Tagline Winder are: Accurate loading and casting without moving boom or machine, automatic tagline pull; uniform, adjustable pull at and below machine level, and instant acting manual control to manipulate clamshell or grapple. As a Power Dipper Trip for Shovel and Scoop attachment, this optional equipment saves time and operator effort. The unit is quickly installed, requiring no major changes.

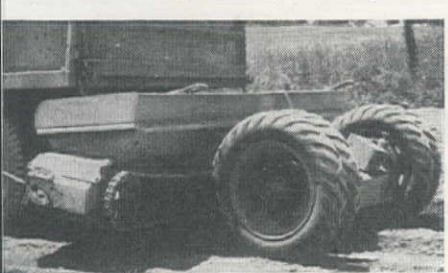
1015

Cement Spreader

Manufacturer: Hercules Steel Products Corp., Galion, Ohio.

Equipment: Spreader for use in soil-cement stabilized road building.

Features claimed: Built specifically to answer a demand for a piece of equipment that spreads from 5 to 10 ft. in width with only minor adjustment, the spreader



spreads any amount necessary for construction of soil-cement roads. The machine spreads smoothly and evenly from one end to the other through the use of a single chain with cross bars which drag the cement over a tapered plate from the broad end toward the pivoted end. The spreader is coupled to the rear of any dump truck.

When the dump body is hoisted, the cement is fed into a 10-ft. hopper provided on the machine. Its wheels furnish power for equal distribution of cement over any width to which the machine is set.

1016

Concrete Subgrade Paper

Manufacturer: Protective Papers, Inc., Union, Ill.

Equipment: Asphalt-saturated paper to cut evaporation losses into subgrade.

Features claimed: Leatherback Subgrade meets all specifications for a subgrade paper with A.A.S.H.O. designation M 74-38. It weighs a minimum of 40 lb. per 1000 sq. ft., the guaranteed asphalt content of the paper being at least 50% of the weight of the untreated paper. When heated for one hour to a temperature of 325 deg. F., the sample being heated will not lose in excess of 7½% of the weight of the original sample. Its pliability is demonstrated by the fact that the paper meets with ease the specification mandrel test.

1017

Tilt-Deck Trailers

Manufacturer: Rogers Brothers Corp., Albion, Pa.

Equipment: Trailer with a capacity of 7 tons.

Features claimed: Road clearance of the new tilt deck trailer is 16 in. The deck is 16 ft. by 8 ft., and 34 in. high. Air or vacuum brakes are optional. An interesing feature is the double acting hydraulic ram which cushions the deck when it is being raised or lowered.

1018

Pneumatic Concrete Placers

Manufacturer: Worthington Pump & Machinery Corp., Harrison, N. J.

Equipment: Machine to place concrete in inaccessible locations.

Features claimed: The Worthington-Ransome Pneumatic Concrete Placer is designed to place concrete in subways, tunnels, isolated bridge piers and wherever accessibility makes the ordinary methods impractical or too expensive. The 14-cu. ft. machine requires only 400 cu. ft. of air for 100-ft. shots at the rate of 60 per hour. Production of the placers is under way after being suspended during the war years.

1019

Bin Storage Units

Manufacturer: Johns-Manville Corp., New York City.

Equipment: Plastic spacer for asbestos-cement electrical conduit.

Features claimed: The new plastic spacer reduces inventories because its one basic shape accommodates one, two, three or four wide Transite Korduct assemblies. Any desired spacing can be obtained by cutting through slots provided at partial lengths of the spacer. The spacer supports any vertical loading of the conduit and retains its strength and shape at temperatures up to about 160 deg. F.

1020

Berm Shaper Attachment

Manufacturer: Galion Iron Works & Mfg. Co., Galion, Ohio.

Equipment: Attachment designed to fill worn spots and replace the berm flush with the surface of the pavement in one operation.

Features claimed: The attachment consists of a deflector plate, a distributor or strike-off blade and connecting parts. It is attached to and works in conjunction with the motor grader moldboard and circle. The deflector plate lines up squarely with the front and rear wheels of the grader, and rides on and parallel with the edge of the pavement. The grader blade reshapes the uneven berm. The excess material flows off the end of the grader blade against the deflector plate of the attachment, and passes on to the strike-off blade. The concentration of excess material in the corner of the deflector assures a complete filling and reforming of the berm against the edge of the pavement.

1021

High Head Self-Priming Pump

Manufacturer: Sterling Machinery Corp., Kansas City, Mo.

Equipment: Pump capable of pumping large capacities as well as against high heads.

Features claimed: Available now is the new Sterling 2-in. High Head Self-Priming Pump. It is especially recommended for pumping through long pipelines, to high levels and against comparatively high pressures.

1022

Ratchet-Type Load Binder

Manufacturer: American Forge & Mfg. Co., Pittsburgh, Pa.

Equipment: Tool for easy and safe binding of heavy industrial loads on trucks and trailers.

Features claimed: The compact, midget-size ratchet weighs only 13 lb. with a barrel length of just 10 in. It has a full 8-in. take-up, allowing the load to be retightened at any time enroute without having to release the tension or readjust the chain. A steady regulated amount of tension assures a well-bound load. When properly ratcheted to the load, there is little chance of shifting loads.

1023

Highway Side Ditch Digger

Manufacturer: Gar Wood Industries, Findlay Division, Findlay, Ohio.

Equipment: Buckeye Model 616 Hi-way Widener.

Features claimed: The machine cuts ditch to grade in one pass without disturbing the base. A clean ditch is left ready for the paving material. The operator sits in a comfortable swivel seat with a complete view of the digging wheel, highway edge and passing traffic. The heavy-duty digging wheel will dig up to 18 in. deep with cutting widths of 24 in., 30 in., 36 in., 42 in., and 48 in. A reversible conveyor deposits spoil on either side of the machine as desired.

1024

Fully Automatic Calculator

Manufacturer: Friden Calculating Machine Co., San Leandro, Calif.

Equipment: Machine offering fully automatic multiplication, division, addition and subtraction.

Features claimed: Exclusive operating features facilitate handling of payrolls, invoices, inventories and tax compilations, computing not only individual extensions, but also final results. All figure-work problems are handled, from elementary to the most complicated, with simplicity and ease.

1025

Small Arc Welders

Manufacturer: Hobart Brothers Co., Troy, Ohio.

Equipment: "Bantam Champ" DC arc welders.

Features claimed: Typical of the new line of low cost welders is the electric motor driven Model MZ-200-S. This model is rated at 200 amp. at 30 volts on 50% duty cycle. The current range is from 40 to 250 amp. at an operating speed of 3450 rpm. It is 25 in. long, 18 in. wide, 25 in. high (stationary) and weighs approximately 340 lb. The generator is a modified multi-range type with 4 laminated main poles and 4 interpoles, which are removable. Four heavy-duty generator brushes are held in a fixed neutral position by patented single unit brush rigging. Welding controls are modified multi-range dual control, with 5 ranges of welding current and 100 steps of volt-ampere adjustment in each range.

LITERATURE FROM MANUFACTURERS...

Copies of the bulletins and catalogs described in this column may be had by addressing a request to the Western Construction News, 609 Mission Street, San Francisco 5, California.

1026

TRANSPORT MIXER — **Concrete Transport Mixer Co.**, St. Louis, Mo., is featuring a bulletin describing the models 10H and 15H Transport Mixer with high discharge, the models 10 and 15 standard Transport Mixer, and the model 300 HI-LO Mixer. The colored, illustrated bulletin includes brief specifications of the models and the f.o.b. price list.

1027

ROAD EQUIPMENT — **Meili-Blumberg Corp.**, New Holstein, Wisc., has released an 8-page booklet in color describing the M-B model PG-10 power grader, model 30 maintainer, and models L and 2L front-end loaders for the grader and maintainer. The booklet features both closeup and action pictures of the equipment, and lists the specifications for each model.

1028

MIX AND PLACE CONCRETE — **Dumpcrete Division of the Maxon Construction Co.**, Dayton, Ohio, has for immediate release "Seven New Ways to Mix and Place Concrete at Lower Cost," a new 8-page folder that has action pictures of each job, a view of the plant, and a listing of equipment that goes to make up the plant. The name and address of the contractor and a brief description of the jobs are included. The folder describes a job in each of the following fields: Housing, paving, industrial, tunnels, bridges, canals, and sewage treatment plants, where scattered pours of concrete were required.

1029

PIPELINE JOBS—**Caterpillar Tractor Co.**, San Leandro, Calif., has just issued a 12-page booklet entitled, "It's Caterpillar All the Way." Clearing, ditching, stringing, stabbing, wrapping, laying-in, and backfilling operations on pipeline projects are pictorially presented. Text includes data on some of the 36,000 mi. of scheduled pipelines in the United States and Canada where Caterpillar earthmovers and powered pipe-laying equipment are on the job.

1030

CUSTOM AND STANDARD BUCKETS—**Owen Bucket Co.**, Cleveland, Ohio, has just released a 28-page book in color vividly showing the features of performance and construction of the various Owen buckets and grapples. Closeup views, field pictures, and sectional drawings of standard and special-purpose buckets are included in the book.

1031

MOTOR SCRAPER—**LaPlant-Choate Mfg. Co.**, Cedar Rapids, Iowa, have available a new four-page folder entitled, "Improved LaPlant-Choate TS300 Motor Scraper," and describing all improvements and original features now available in the equipment. Case histories of actual jobs, showing hours worked, yards hauled, and other data are also included.

1032

TRANSMISSION BELTS — **United States Rubber Co.**, New York, N. Y., have recently released a 28-page book of engineering and installation data on their transmission belting. The book has chapters on belt selection, belting materials, factors of belt performance, drive analysis, and complete service factors. The illustrated book features pictures of belting installations and sectional drawings, and includes the procedure for analyzing drives, utilizing flat endless belts.

1033

HIGHWAY REFLECTORS—**American Gas Accumulator Co.**, Elizabeth, N. J., has just released an 8-page colored booklet on the features and installations of their Stimsonite Reflectors, Signs, and Signals. Pictures in color are included showing the reflectors on highways, roadside signs, and other outdoor uses.

1034

HEAVY-DUTY TRANSMISSIONS —**Fuller Mfg. Co., Inc.**, Kalamazoo, Mich., has available a 12-page booklet in color describing the complete line of Fuller heavy-duty transmissions. Each model is pictured with a sectional drawing and has a list of the gear ratios together with the manufacturer's recommendations.

1035

WELDED WIRE REINFORCING—**Truscon Steel Co.**, manufacturer of welded wire and other steel products, has available

upon request a 22-page handbook on the installation and specifications of the mat for industrial pavements and driveways, slab and ribbed concrete floor construction, cement gun reinforcement, beam and column wrapping, city streets and alleys, and reinforcement for concrete pipe. The illustrated book features sectional drawings and field pictures of the welded wire in commercial practice.

1036

HYDRAULIC CRANE CONTROL—**Link-Belt Speeder Corp.,** Chicago, Ill., has a new 16-page illustrated catalog on the Link-Belt Speeder LS51 ½-cu. yd. shovel-crane, the first shovel-crane of its size on the market that is equipped with full hydraulic controls utilizing the Speed-o-Matic controls. All welded lower frame, fully convertible for all front end attachments, independent chain crowd, independent boom hoist, and other design features are illustrated in the catalog. Also included are charts and drawings, showing dimensions, capacities, and brief specifications.

1037

SHOVEL-CRANE—**Link-Belt Speeder Corp.,** Chicago, Ill., has just published an illustrated 16-page catalog on the LS-71 ¾-cu. yd. shovel-crane. Photographs and text point out the features of the LS-71 as a shovel, crane, dragline, and trench hoe.

1038

POWER PLANTS—**International Diesel Electric Co., Inc.,** Long Island City, N. Y., announces distribution of a new four-page folder describing the line of packaged power in the form of Diesel and gasoline engine-driven generator sets, designed for emergency or continuous service. These sets range in capacity from 5 kw. to 250 kw., and the illustrated folder shows 10 typical units to demonstrate the scope and application of these power plants.

1039

CRANE VALUE—**Bay City Shovels, Inc.,** Bay City, Mich., have available two catalogs on their two new rubber-mounted model 190 Bay City cranes, both having 25-ton capacities. The Cranemobile and Cranewagon are described, with their brief specifications.

1040

BULLDOZER APPLICATIONS — **Caterpillar Tractor Co.,** San Leandro, Calif., have released an illustrated 16-page booklet showing a variety of bulldozer operations ranging from pushing 4-ton boulders to feeding crude salt onto conveyors. Product photographs accompany the information describing rocky hillside cutting, stripping work for quarries and mines, road construction and maintenance, land clearing, and river channel diversion.

1041

SOCKETS — **Wire Rope Institute,** Washington, D. C., has just published Technical Bulletin No. 1 on wire rope sockets, giving the industry standards as compiled by the wire rope industry's engineers. WRI has made available the socket data without charge.

1042

MIXER EQUIPMENT — **Dewey & Almy Chemical Co.,** Cambridge, Mass., have available a 40-page book on their Darex AEA dispensers and air meters. The illustrations and text cover their fully and semi-automatic dispensers, manually operated dispensers, automatic supply tanks for dispensers, and air meters for central ready mix concrete or batching plants, pavers or mixers, portable job mixers, mixermobiles, and concrete products plants.

1043

SPIRAL-WELD PIPE—**Taylor Forge & Pipe Works,** Fontana, Calif., announce that their bulletin is available giving the sizes and wall thicknesses of spiral-weld pipe. Also listed in the four pages are many typical applications for the light weight, high strength pipe.

1044

CRUSHING PLANTS — **Caterpillar Tractor Co.,** San Leandro, Calif., have for immediate release an 8-page illustrated booklet, "The Right Combination for Crushing," showing the widespread use of Diesel power in the combination of drilling, loading, hauling, and crushing. Of particular interest is the announcement of four new Caterpillar engines and electric sets, the D397 at 500 hp., the D386 at 400 hp., the D375 at 335 hp., and the D364 at 265 hp.

1045

WAGON DRILLS — **Joy Mfg. Co.,** Pittsburgh, have available a 12-page booklet devoted to the light, medium, and heavy weight sizes of wagon drills made by Joy. One of the features is a series of line drawings showing how drilling costs are reduced with the highly mobile wagon mountings.

OPPORTUNITY SECTION

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