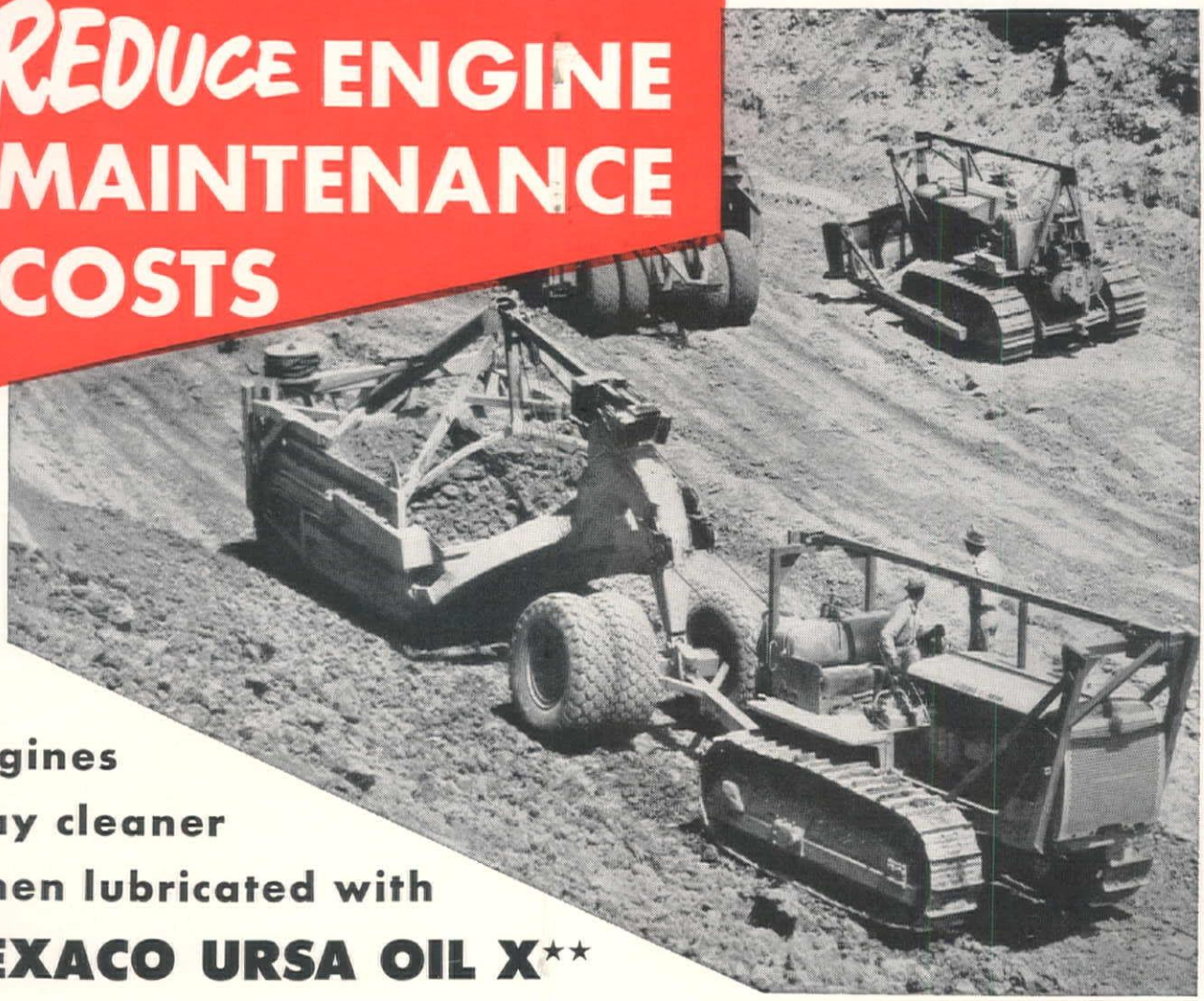
REDUCE ENGINE MAINTENANCE COSTS



Engines stay cleaner when lubricated with

TEXACO URSA OIL X★★

MORE power, more trouble-free performance for your heavy-duty gasoline and Diesel engines . . . less maintenance expense for you . . . when you use *Texaco Ursa Oil X★★* because it is fully detergent and dispersive and cleans at it lubricates.

Texaco Ursa Oil X★★ is highly resistant to oxidation . . . stands up under heat and pressure. It keeps rings free, assures proper valve action, protects bearings from corrosion. This means more efficient operation . . . longer life for parts . . . less fuel consumption . . . lower maintenance costs.

Use other Texaco Products to reduce other maintenance costs. *Texaco Marfak*, for example, will protect chassis bearings for extra hundreds of miles. *Texaco Marfak Heavy Duty* seals wheel bearings against dirt and moisture, requires no seasonal change.

Texaco Track Roll Lubricant guards crawler track mechanisms against dirt, water and wear for long periods.

To simplify lubrication procedures and reduce maintenance costs on all your machinery, follow the recommendations of your Texaco Lubrication Engineer. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

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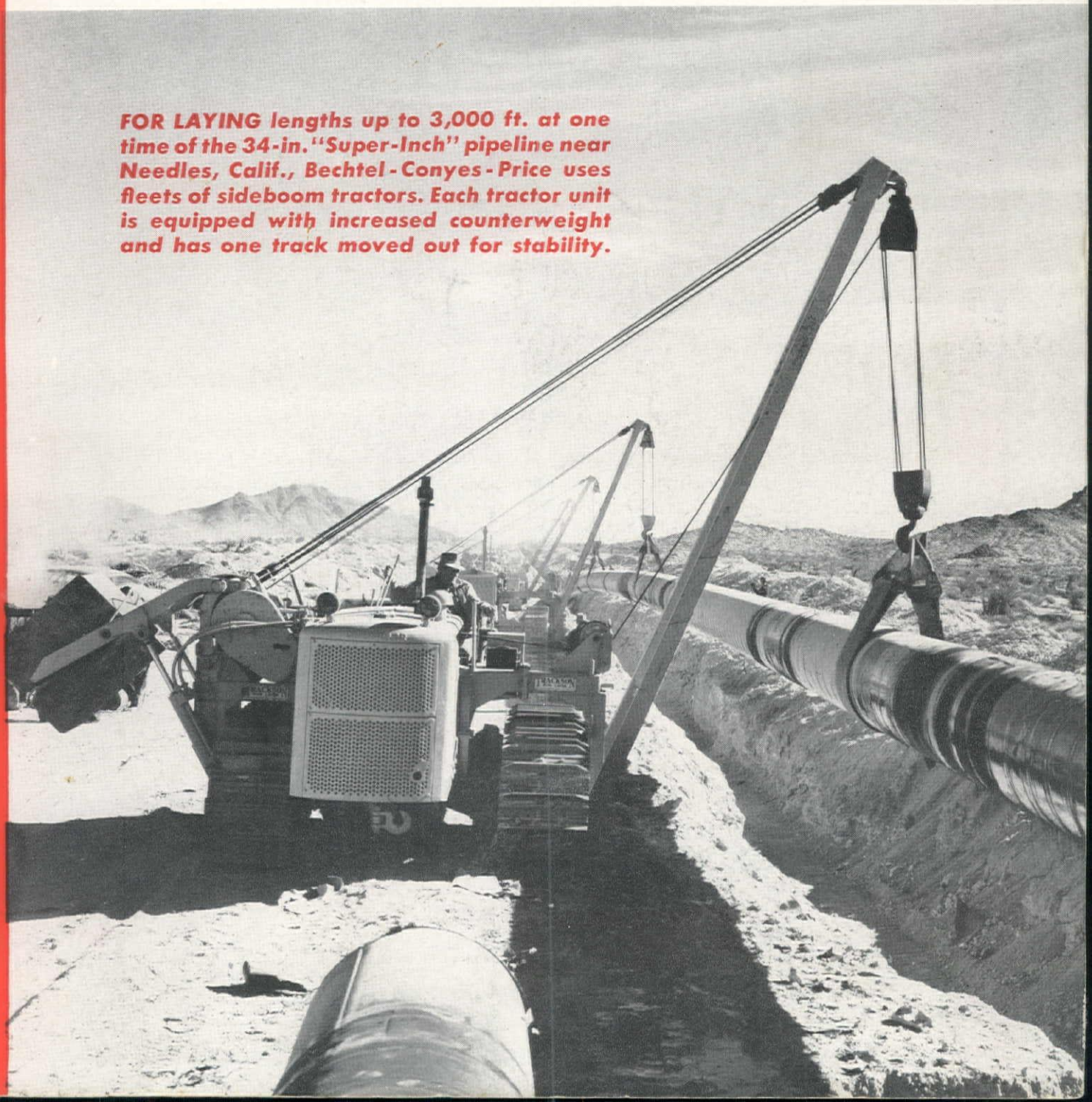
WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

PUBLISHED MONTHLY
VOLUME XXV, No. 2

FEBRUARY 15 • 1950

35 CENTS A COPY
$4.00 PER YEAR



***FOR LAYING** lengths up to 3,000 ft. at one time of the 34-in. "Super-Inch" pipeline near Needles, Calif., Bechtel - Conyes - Price uses fleets of sideboom tractors. Each tractor unit is equipped with increased counterweight and has one track moved out for stability.*

H'isting 'em High!

NORTHWEST HAULING CO. Seattle, Wash. can tell you about TRUCK CRANES!

Crane mobility has become an important item in making steel setting and other subcontract work in building erection pay. Not mobility on the job so much, as mobility from job to job. Northwest Truck Cranes give you that mobility in its most advanced and trouble-free form.

There is no crane and carrier combination like a Northwest. The high speed, power controlled Boom Hoist is independent of all other operations. Uniform Pressure Swing Clutches take the jerks and grabs out of swinging (important with high booms). The "Feather-Touch" Clutch Control makes operation easy and is free from delicate, complicated mechanism. The Carrier Frame is a box section and is braced and reinforced the full length as no other truck crane carrier is braced. Better positioning of outriggers, and the extension of outriggers the full width of the carrier, relieve the carrier of a greater amount of stress when crane is operating. The easily demountable rear outrigger trunk simplifies conversion to shovel or pullshovel without repositioning the lower base.

Northwest Hauling Co. (no connection with the Northwest Engineering Co.) can tell you what a Northwest Truck Crane can do. Don't buy a truck crane before getting the full story on the Northwest. Its advantages will mean money to you. Why not call our sales agent?

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WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER

Volume 25 **FEBRUARY 15 • 1950** Number 2

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Covering Construction in the Western Half of the United States

Published Monthly by
KING PUBLICATIONS
609 Mission Street
San Francisco 5, California
Phone YUkon 2-4343

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ABC

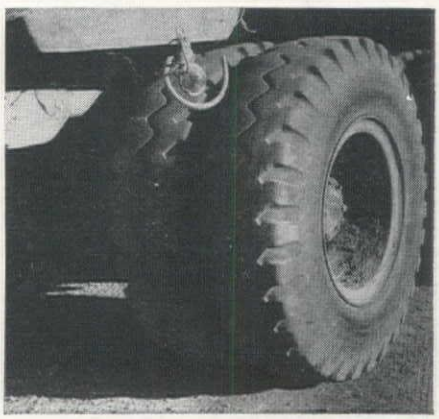
Subscription Rates

The annual subscription rate is $4 in the United States and countries in the Pan American Postal Union. To Canada, England, Australia and New Zealand, $5 per year; all other countries, $11.00 per year. Single Copies, 35¢

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

B.F.Goodrich

Universal all-nylon for jobs where traction is problem. Note 2-way tread, bulky wedge-shaped cleats.



These *Rock Logger all-nylons* were on a truck in extremely tough service for 2 years . . . are still going strong!

ALL-NYLON

tires give full service with no bruise or flex failures

THE B. F. Goodrich ALL-NYLON tire is now in use—and proving successful—on construction jobs and in other off-the-road operations throughout the country. The record speaks for itself: *no blowouts, no bruise breaks, no flex breaks* . . . and that includes severe operating conditions in mines where flex and bruise failures formerly were common. Now, all-nylon tires are giving operators full service with no bruise or flex breaks.

Along with nylon, B. F. Goodrich uses weftless construction. This means there are no cross-threads to hamper cord action and allow some cords to stretch out. Therefore, tire growth is reduced; tires last longer.

Nylon tires always provide big savings for contractors on jobs where heavy loads and rough terrain have made tire costs high.

The new, all-nylon construction is typical of the continuous improvements being made in truck tires by B. F. Goodrich. Long ago, BFG engineers developed special types of tires for off-the-road service. They constantly developed new improvements. One of these was the nylon shock shield, a major construction advancement now used in all B. F. Goodrich truck tires with 8 or more plies (double nylon shock shield in large, off-the-road tires).

For more information on the way B. F. Goodrich tires can do more work and save you money, see your BFG dealer or write us direct. *The B. F. Goodrich Company, Akron, Ohio.*

RESEARCH KEEPS
B.F.Goodrich
FIRST IN RUBBER
Truck Tires

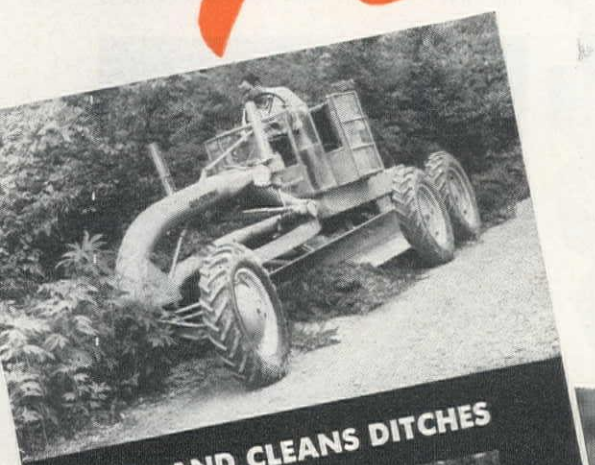
LOW in Cost... BIG in Performance

NEW ALLIS-CHALMERS MODEL D

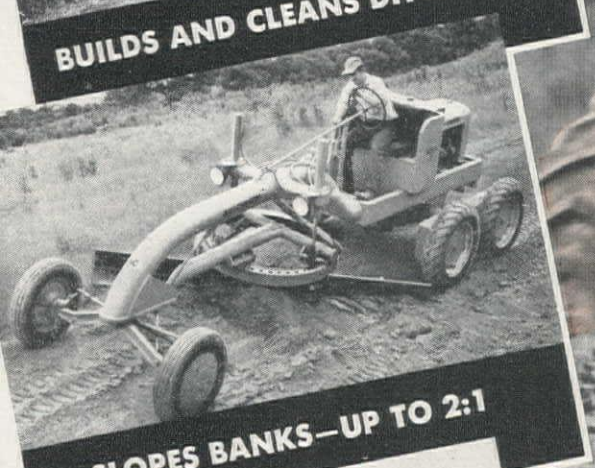
WEIGHT—8,500 lbs.

BRAKE HP.—34.7 (famous Allis-Chalmers gasoline engine)

SPEEDS—four forward, 2.40 to 18.61 m.p.h.; reverse to 2.37



BUILDS AND CLEANS DITCHES



SLOPES BANKS—UP TO 2:1

LEVELS SUB-GRADE; ideal for finishing

ALL-VIEW CAB lifted off or replaced in a jiffy.

HYDRAULIC BLADE LIFT . . . finger-play control—fast, positive, trouble-free. Blade angle set from platform.

HYDRAULIC SCARIFIER — does a surprising job ... rear-end weight keeps teeth ripping uniformly, at desired depth—smooth, positive steering.

LOADS MATERIAL into trucks with Tractomotive Loader — from windrows and stockpiles ... surplus dirt or snow.

PLOWS SNOW with specially designed Baker snowplow (backfills with interchangeable blade).

One-third the price of large motor graders

Yet has many big grader features — Tandem Drive, "Roll-Away" Moldboard, Tubular Frame, Hydraulic Blade Lift, Engine Over Drive Wheels, Drop Down Transmission, High Throat Clearance, Complete Operator Comfort, Full Visibility, Simplified Servicing . . .

. . . Plus special attachments that widen its usefulness — Rear-End Loader, Scarifier, V-Type Snowplow with interchangeable blade for backfilling and light 'dozer work. Also various other accessories.

Ask your Allis-Chalmers dealer for a demonstration.

ENGINEERED FROM THE GROUND UP— to bring you BIG grader design and performance advantages

MAINTAINS DIRT AND GRAVEL ROADS AND STREETS, CUTS SOD FROM SHOULDERS, HANDLES LIGHT CONSTRUCTION

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WYOMING
Casper—Studer Tractor & Equip. Co.

CHAMPION of

Contractors and Operators throughout the Country Proclaim the New TD-24 CHAMPION of Crawlers

The International TD-24 has proved itself CHAMPION of Crawlers. On job after job, the new TD-24 has won the admiration of operators for the ease with which it does work which other tractors cannot do. Contractor-owners are equally enthusiastic, for they see the TD-24 outworking and out-producing every other tractor in the field.

Greater power, and the weight and traction to match, plus new operator convenience and ease of control, give the TD-24 much more than an edge over any other tractor you might name.

Experienced operators and owners have this to say about the new TD-24: (names on request)

"In my estimation the TD-24 is the heavyweight champion of crawler tractors."

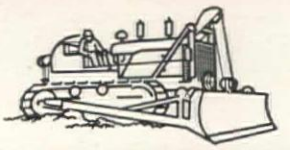
"The TD-24 works right along on slopes so steep we have to cut them down before other tractors can even navigate unloaded. TD-24's are fast tractors, easy to shift and have plenty of power. This combination really moves dirt . . . made us more money than any other tractor could."

"The TD-24 is a wonderful piece of machinery and I can't say enough for it. Our operators feel they are wasting their time when they run other tractors, for no other tractor built can compare with the work these TD-24's can do."

Visit your International Industrial Power Distributor and see what the TD-24 can do for you. You'll agree it's the CHAMPION of Crawlers—the one tractor you can't afford to be without, for profitable earthmoving.

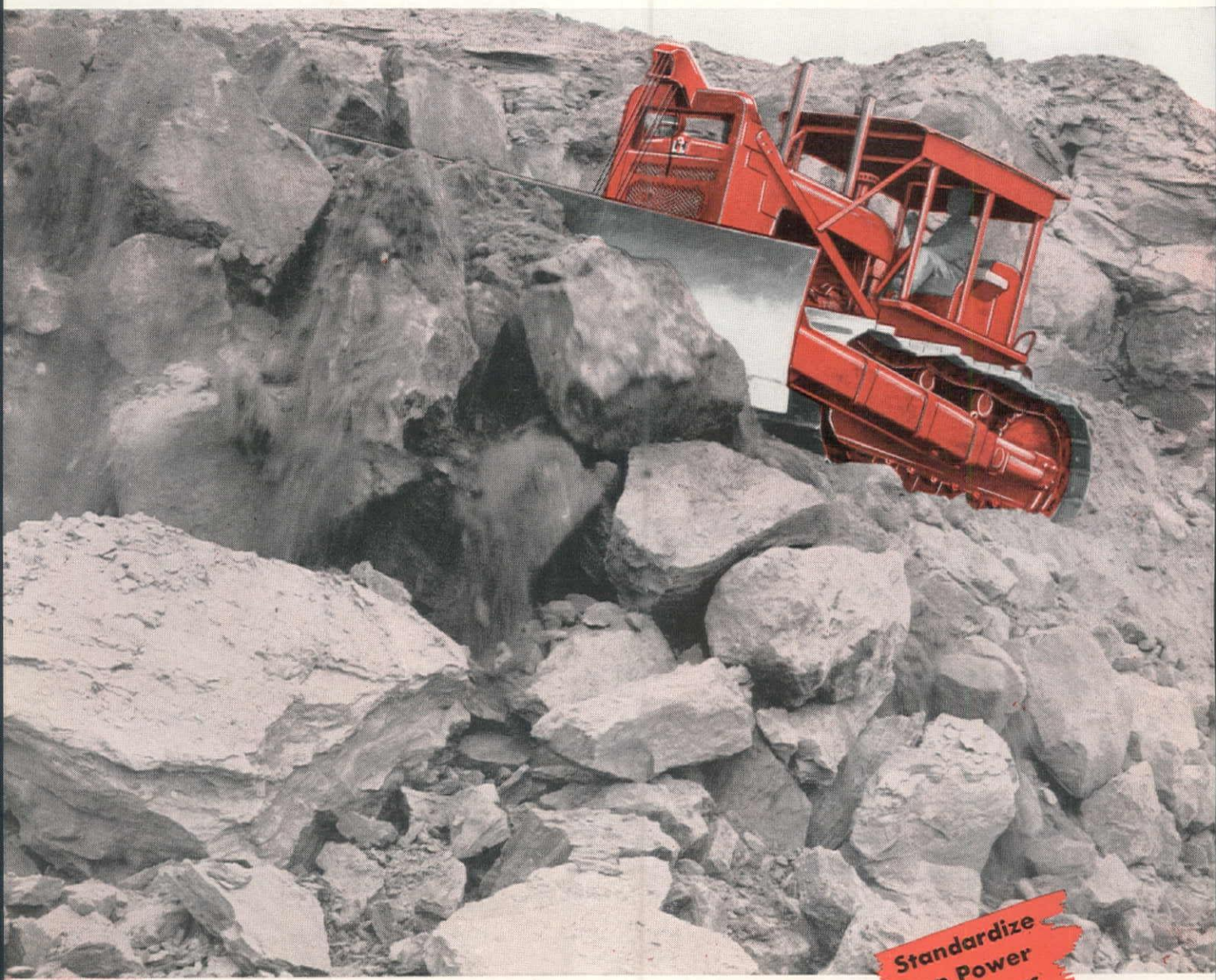
INTERNATIONAL HARVESTER COMPANY
Chicago

JOB FOREMAN REPORTS SAVINGS
"It (the TD-24) is definitely outhauling every other tractor on the job," says the foreman on this 247,000-yard stadium bowl job in Maryland. "It will do so much work that we are sure our job costs will show a great saving."



Crawlers

"Worth Two of Any Other Heavy Tractor," says Lindsey Belville, president of Greasy Ridge Coal Co., Greasy Ridge, Ohio, strip mine. "This is the best tractor I've ever used in my five years experience," says Warren Bare, the tractor operator shown working it in heavy rock. "It is the only one that will do everything I want it to," he claims.

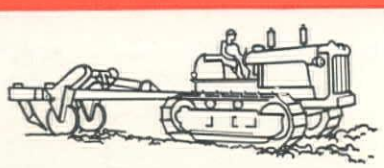


Standardize on Power that Pays

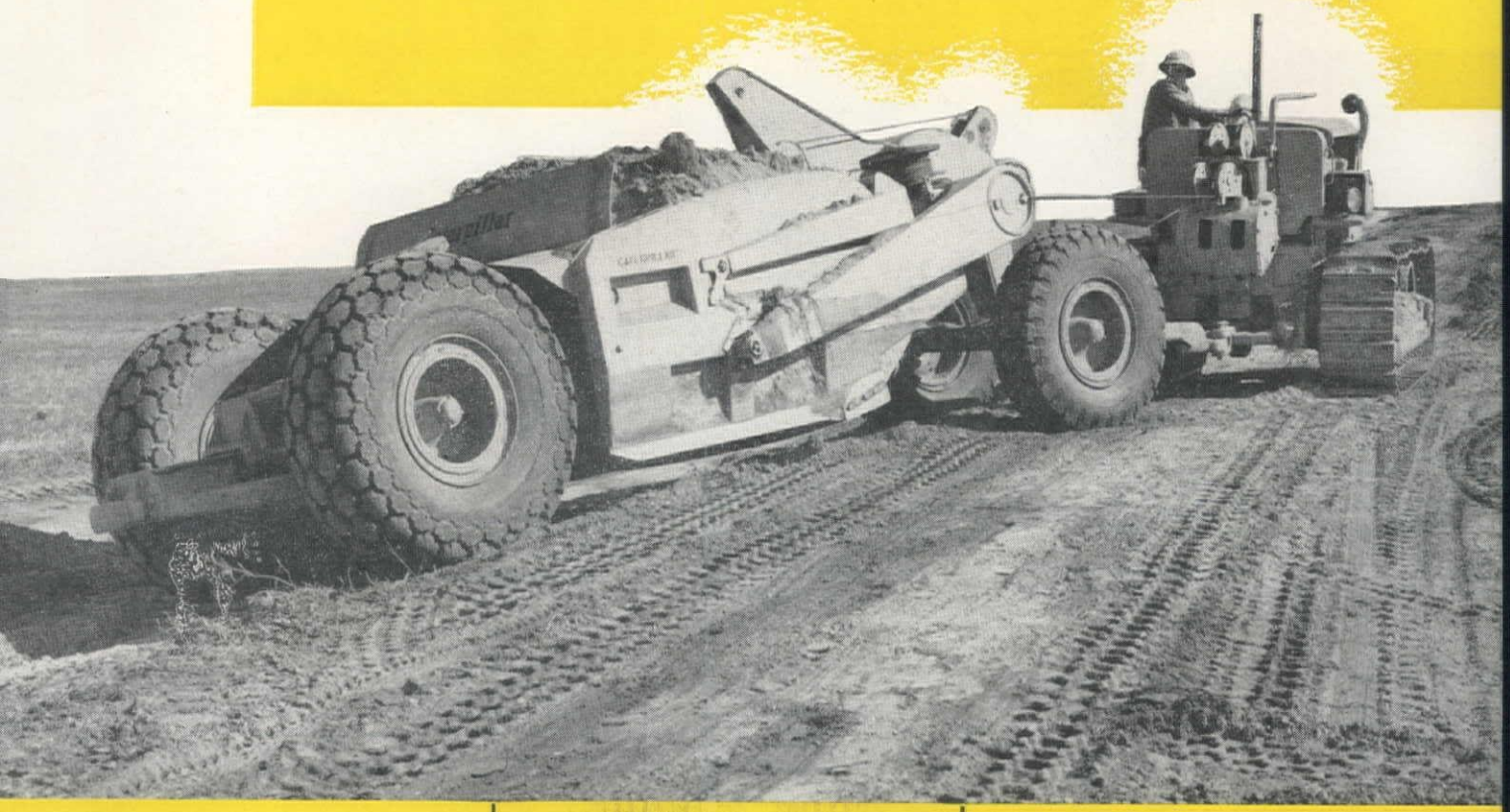
INTERNATIONAL HARVESTER

INTERNATIONAL
INDUSTRIAL POWER

CRAWLER TRACTORS • WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS



BOOST PRODUCTION



EASY LOADING

Blade angle and design are two points that contribute to good or bad loading characteristics. The tough "Caterpillar" blade is set to shear hard-to-dig material, then direct and guide it into the loading chute. With 3 inches of special hard facing alloy deposited on these cutting edges, the user is assured of a blade that sharpens to a keen edge.

BIG TIRES . . . MORE TRIPS

When ground conditions deteriorate, air pressures are usually reduced to keep tire penetration at a minimum. The big and oversize tires used on "Caterpillar" Scrapers are able to have their pressures greatly reduced without overloading. That means they stay on top, roll more easily, allow hauling in higher gears and aid in piling up real yardage records.

'DOZER-TYPE EJECTION

'Dozer-type ejection rolls sticky clay out of the bowl with ease and precision. Typical of "Caterpillar" finely engineered design are the ejector plate guide rollers. These heat-treated rollers are mounted on adjustable eccentric shafts so that proper clearance may always be maintained between bowl sides and ejector plate. Binding or rubbing problems are eliminated.

CATERPILLAR

REG. U. S. PAT. OFF.

ENGINES • TRACTORS • MOTOR GRADERS

AND CUT COSTS

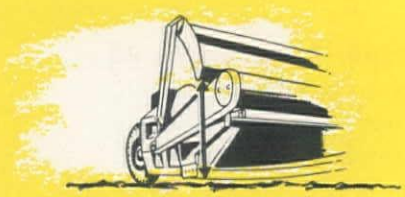
with "CATERPILLAR" SCRAPERS

WHEN the chips are down, you can count on a husky "Caterpillar" Scraper to come through for you. Stamina is built into every inch of its hide to stand terrific punishment. Its finely engineered design enables it to speed through jobs that slow down ordinary units. Pair it with its matching "Caterpillar" Diesel Tractor, and you've got a team that saves you money two ways—in higher production and lower maintenance costs.

Pictured here is a "Caterpillar" No. 80 Scraper rated at 18 heaped yards with its matching D8. Owned by Eau Claire County, Wisconsin, this team pays dividends every pay load. Making a trip every 7½ minutes on an 1800-foot round-trip haul, its average production is about 800 bank measure cubic yards per 8-hour day.

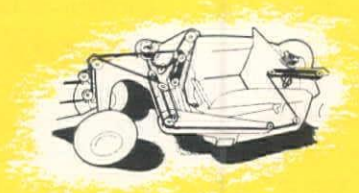
You can't talk quality into a machine. You've got to build it in—take a look at the "Caterpillar" Scraper's features and you'll see why this big yellow slugger really rates with men who know earthmoving. Better still, call your nearby "Caterpillar" dealer today for information and a demonstration!

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



GOOD APRON DESIGN

"The sky is the limit" when raising the aprons on "Caterpillar" Scrapers. Open-top scraper design combined with long apron arms located outside the bowl assure the free ejection of heaping sticky loads. When ejecting fine materials such as sand, the maximum apron height can be reduced to provide a smooth spread with no gaps.



ENGINEERED CABLE SYSTEM

The entire "Caterpillar" cable control system is finely engineered to give constant easy performance. Accurately aligned heat-treated sheaves prevent cable chafing and minimize power drain on the tractor engine. All cables are shielded against abrasive materials, yet one man can easily thread the entire unit while keeping both feet on the ground.

LOW MAINTENANCE COST

Typical of "Caterpillar" in-built quality is the ball and socket joint connecting gooseneck to front axle. The ball is induction hardened with a tough center to withstand both wear and breakage. Spherical design enables the scraper to be maneuvered into extreme positions without binding. Shims are removed as wear occurs and a bronze liner rides between ball and socket to prevent steel-to-steel contact. Lubrication is through a single Zerk fitting.

DIESEL

EARTHMOVING EQUIPMENT

CATERPILLAR TRACTOR CO.
Box WC-2, Peoria, Illinois

Send me, without obligation, booklet,
"'Caterpillar' Scrapers Are Profit Makers."

Name _____

Address _____

NEW RPM DELO OILS
cut engine wear-rate up to 85%

New RPM DELO Lubricating Oils contain advanced, special compounding. Proved in actual operation, they keep engines cleaner, increase protection and extend overhaul periods of all heavy-duty engines.

Cut liner wear rate up to 85%. In service under extreme operation conditions, these new RPM DELO Oils reduced wear-rates up to 85% over conventional heavy-duty type lubricants.

Reduced engine deposits as much as 75%. Superior compounding in new RPM DELO Oils kept top-ring grooves, oil rings, and skirt areas of pistons remarkably clean in high-temperature, high-output truck and tractor engines.

Saved 40% to 60% on maintenance. Records show that new RPM DELO Oils cut maintenance costs as much as 60%, reduced oil consumption 30% to 50% over the long run.

Proved in full range of engine service. This new line covers normal to extremely severe conditions. The grade that meets your needs will double protection against lubrication failures, give you all-around better engine performance.

RPM DELO Heavy Duty Lubricating Oil
A new, high quality-level compounded oil recommended for heavy-duty diesel or gasoline engines in normal to difficult service. (Meets U. S. Army Specification 2-104B.)

RPM DELO Special Lubricating Oil
Companion product to RPM DELO Heavy Duty Lubricating Oil. Has higher viscosity index for special operating conditions. (Also meets U. S. Army Specification 2-104B.)

RPM DELO Supercharged—1 Lubricating Oil
An entirely new product of higher quality-level than the products above. Fortified with new, more powerful compounding. Recommended for severe and abnormal engine service. (Meets U. S. Army Specification 2-104B, Supplemental List No. 1.)

RPM DELO Supercharged—2 Lubricating Oil
Highest quality-level oil, designed for extremely severe operating conditions. (Meets U. S. Army Specification 2-104B, Supplemental List No. 2, also the rigid requirements of Caterpillar Tractor Company's Superior Lubricants—Series 2.)

Send for the full report on new RPM DELO Oils. For complete information, call your local Standard Representative or write to Standard Oil Company of California, 225 Bush St., San Francisco 20, California, today.

Standard Oil Company of California

RPM DELO LUBRICATING OILS

New and more Efficient Compounding keeps engines cleaner, increases protection, extends overhaul period

IT'S P&H FOR ADDED VALUES!

WHERE "Swing Time" IS PAY-OFF TIME!

Yes, faster swing is the big pay-off when you operate a P&H Model 1055. Its *"Magnetorque" Electric Swing unit is 20% faster — delivers 5 cycles to 4 on other machines. It means more productivity — extra yardage that adds up fast.

It's smoother too — with velvety stops and starts that protect machinery against damaging wear. Simple, effortless control gives this big 3½ yard machine the easy operation that you normally associate with much smaller machines.

The best way to gain a comparison is to watch a P&H 1055 on the job. Drop us a line . . . ask for location of the one nearest you.

*THE P&H MAGNETORQUE transmits power for swing electro-magnetically. It does away with all frictions on swing and propel — eliminates the usual time-outs for adjustments. The P&H Magnetorque lasts the life of the machine.

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4490 W. National Avenue
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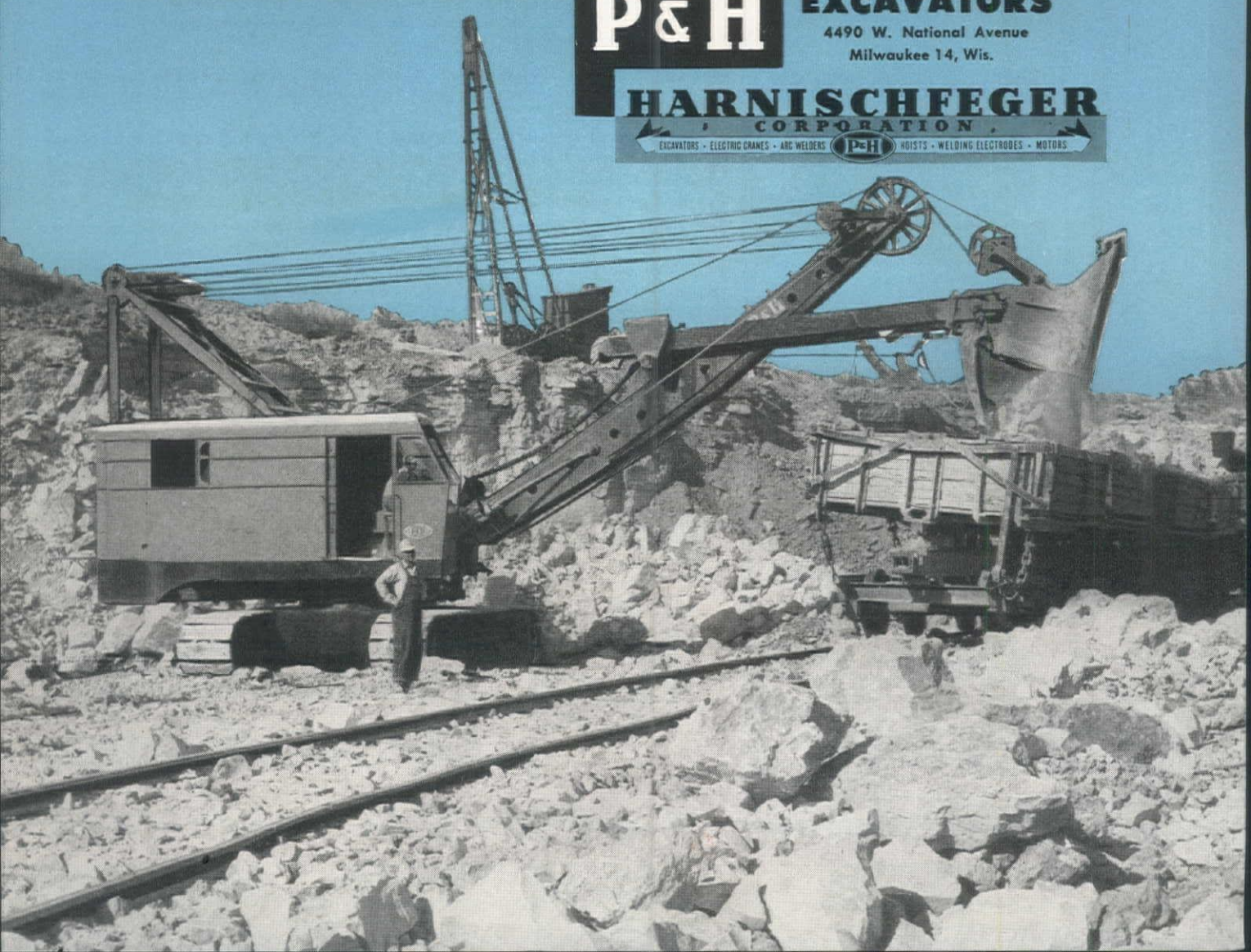


Tuffy
TRADE MARK ®

SLINGS
Entirely Unlike Any Other

Scores of wires, stranded into 9 parts, then machine woven into an interlaced wire fabric—that is the unique patented construction which gives Tuffy extraordinary flexibility and stamina.

Super TOUGH—On every kind of load, under all kinds of pulls and with every type of hitch, Tuffy Slings have proved their superiority and universal adaptability.

Super-FLEXIBLE—Tie Tuffy Slings into knots, kink them, flatten the eyes. Observe how many more times you can straighten Tuffy Slings out without material damage. Note too, that cutting any one of the 9 parts will not result in stranding the sling.

Tested Strength Twice Safe Working Load Limit

Each Tuffy sling is proof-tested to twice the safe working load indicated on its metal tag. Tuffy's interlaced construction makes possible eye splices averaging 95% of fabric strength.

9 Types—Factory Fitted Or Unspliced on The Reel

Try any one of the 9 factory packaged types — for choker, basket or bridle hitches. Prove to your own satisfaction their money saving worth to you. Or, if you're rigged for splicing—Tuffy interlaced wire sling fabric is available on the reel.

union *Wire Rope* **CORPORATION**

2146 Manchester Ave.,
Kansas City, Mo.
Send Tuffy Sling details.

FIRM NAME_____

ADDRESS_____

CITY_____ STATE_____

Now.... Tuffy
TRADE MARK ®

Tuffy
TRADE MARK ®
DRAGLINES

THE SINGLE ANSWER TO ALL DRAGLINE PROBLEMS

Just the Size, Length and Name . . . TUFFY . . . No More Confusing Specifications

Try this simple way of buying draglines. Put Tuffy draglines to any test. Watch them come out on top with unequaled, money saving service records.

Extra Flexibility. Wires of the finest steel in a construction designed for universal dragline service, gives Tuffy draglines the extra flexibility needed without sacrificing other qualities.

Maximum Abrasive Resistance is obtained by finer technic in construction with materials toughened to withstand more abrasive wear.

Easy To Handle because it is pliable. Tuffy Draglines spool better and ride better on grooves.

Hugs Drum When Casting because jerking, pulling and bending stresses do not distort its pliable construction.

Stamina Proved In All Operations. Operating in dry dirt, wet dirt, sand, gravel, rock and minerals and on all types of equipment, Tuffy Draglines stand up under more days of service and move far more yardage than the best previous average obtained by many operators.

Remember, Tuffy is the name to remember.

union *Wire Rope* **corporation**

2146 Manchester Ave., K. C., Mo. Send Complete details on Tuffy Draglines.

FIRM NAME_____

ADDRESS_____

CITY_____ STATE_____

union *Wire Rope*

The Ultimate Low Cost Wire Rope

Simplifies Wire Rope Buying!

Remember the name Tuffy and you can forget complicated wire rope specifications. Union Wire Rope Engineers have developed wire rope constructions and braided wire fabric constructions to serve universally in specific fields of operation. Now all you need to do is specify the diameter and the length and the name Tuffy Scraper, Tuffy Dragline or Tuffy Sling. It is just that simple to buy the ultimate low cost wire rope or sling.

BETTER LIVING
through
BETTER ROADS
LET'S FACE THE FACTS
GOOD AND BAD

Citizens of the U.S.A. have paid road builders $35 Billion for highways. Almost every citizen will agree it is about the best investment the U.S.A. ever made, i.e., they will when informed that it generates an annual income of more than $30 Billion in oil, rubber, motor cars, trucks, roadside services, etc.

In 1949 the U.S.A. bought $1.7 Billion worth of highways. That marked the highest rate of investment in the history of road building.

This brings the highway system up to a point adequate for handling the traffic of 1932 or 1933. Since 1930, the number of vehicles on the road has increased from 26½ million to nearly 44 million.

Road Builders Face a Selling Job

The deficiency in highways is enormous. Estimates of this deficit range as follows: $11 Billion by U.S. Bureau of Public Roads; $20 Billion by Joint Economic Committee of Congress; $30 Billion by American Association of State Highway Officials and $60 Billion by the American Road Builders Association. These estimates cover the building and rebuilding of mileages ranging from 38,000 to the whole system consisting of 3,300,000 miles.

This confronts Road Builders with a challenge to become better Road Salesmen concentrating on the job of selling all legislative bodies that the road deficit can be wiped out relatively cheap considering what is at stake—providing they are built by contract—the American way of giving the highway dollar the highest possible purchasing power.

Tuffy
TRADE MARK ®
Scraper Rope

Picks Up and Lays Down More Pay Dirt on All Types of Wheel Scrapers

"Two thirds fewer cuts due to drum crushing." "Wears out instead of breaking." "Gave 33-1/3 more service." "Half as much down time due to re-wiring." These are typical comments by users. Change over one scraper to Tuffy. Test its extra yardage handling ability and you'll change to Tuffy Scraper Rope on your whole fleet.

Tuffy is Tailored to Take:

- Greater Drum Crushing Abuse
- Sharper Bends Over Small Sheaves
- Angle Pulls Thru Swiveled Sheaves
- Crawling On Guide Roll Flanges
- Heavy Line Pull . . . Rapid Line Speed
- Multiplied Shock of Load On Slack Line

Tuffy—The Single Answer To All Scraper Rope Problems

For longer runs and lower costs, mount Tuffy reels on your scrapers. The name Tuffy, the diameter and the length—that's how simple it is to buy scraper rope for new yardage records. Remember, Tuffy is the name to remember.

union Wire Rope corporation

2146 Manchester Ave., K. C., Mo. Send Complete details on Tuffy Scraper Rope.

FIRM NAME_____

ADDRESS_____

CITY_____ STATE_____

union Wire Rope corporation

2146 Manchester Avenue, Kansas City 3, Mo.

Send information on:

- ☐ Slings
- ☐ Draglines
- ☐ Scraper Rope
- ☐ Union-formed wire rope

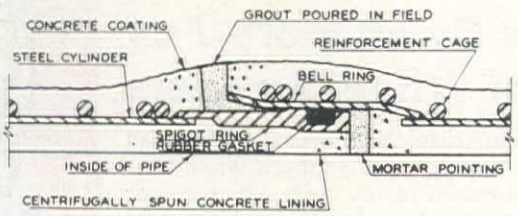
FIRM NAME _____

BY _____

ADDRESS _____

CITY _____ ZONE ____ STATE _____

CONSIDER THESE ADVANTAGES OF AMERICAN CONCRETE CYLINDER PIPE — for main water transmission lines



Manufactured in diameters of 14" through 42" in nominal laying lengths of 30', and for operating pressures from 100 psi upward.

This composite, modified prestressed pipe —

√ Combines the physical strength and characteristics of steel with protective features and permanency of well-made concrete.

√ Will, under normal bedding and backfill conditions, successfully withstand external or trench loads up to 10 ft. of cover or more. Excessive loads are safely provided for by special bedding or backfill.

√ Has ample strength for the occasional concentrated loading which is sometimes met in practice.

√ Will remain water tight under conditions of foundation settlement or soil movement within the limits generally met in water works practice.

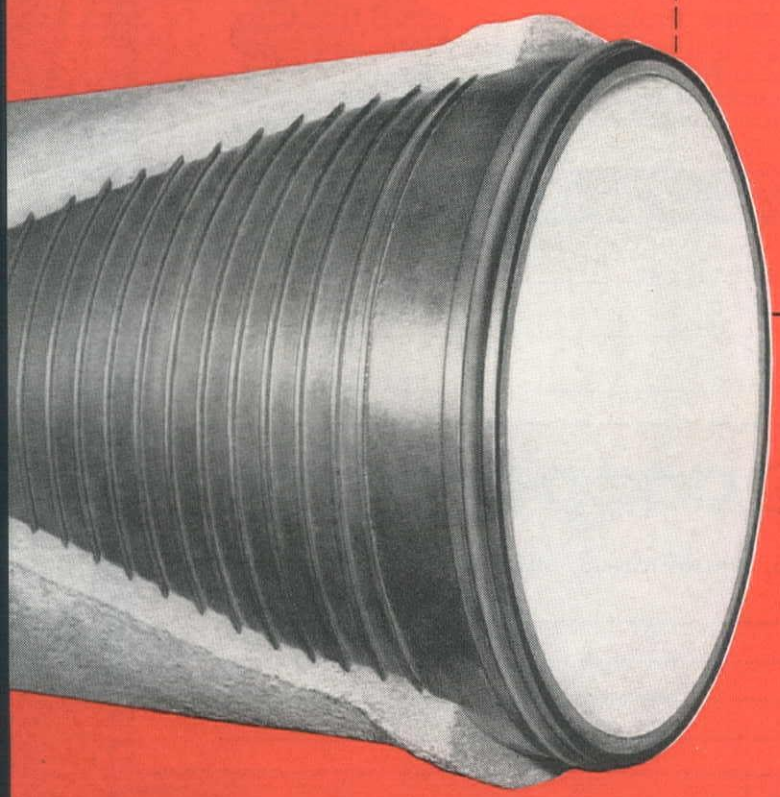
√ Has a long life with freedom from corrosion or deterioration. Concrete encasement protects steel cylinder and reinforcement from electrolytic action and deleterious ground water.

√ Has a conservative design basis and assumed unit stress which provide ample factor of safety for all normal conditions of service including surge and water hammer.

√ Will safely withstand sudden and extreme increases of pressure, or other disturbances, which might tend to burst or shatter ordinary types of pressure pipe having less elasticity.

√ Has ample strength to withstand all normal handling conditions.

The economies of American Concrete Cylinder Pipe are reflected in initial cost, ease of installation, sustained capacity, and trouble-free service. These, together with the above design features, mean substantial savings in the cost of delivered water. Complete information is available upon request.



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, Calif.

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

COMBINES strength of STEEL with the protection and permanency of CONCRETE

Cutaway illustration shows spigot end of 24" diameter American Concrete Cylinder Pipe. The round rubber gasket, upon closure, is compressed in the spigot groove in the manner shown by the above diagram. Note cement-concrete protection, inside and out.

OVER 60% OF ALL EUCLIDS SOLD ARE REPEAT ORDERS . . .

PROOF of CUSTOMER SATISFACTION . . . . . PROFITABLE PERFORMANCE !

BOTTOM-DUMP EUCLIDS
13 to 25 cu. yd. capacity. Top speeds loaded up to 34.4 m.p.h.

REAR-DUMP EUCLIDS
10 to 34 tons payload capacity. Loaded top speeds up to 35.4 m.p.h.

Leading contractors and industrial users buy "Eucs" because they are designed and built throughout for heavy off-the-highway hauling. And because Euclids are job proved for high production at the lowest cost per ton or yard moved, owners add to their fleets as more equipment is needed.

Nine out of every 11 Euclids built are still in use today. Their ability to stay on the job year after year under a wide range of operating conditions means more yards moved at greater profit.

Euclid owners also know they can depend on prompt, efficient service from Euclid's world-wide distributor organization.

Write for information on the complete line of Euclid equipment or see your Euclid Distributor today.

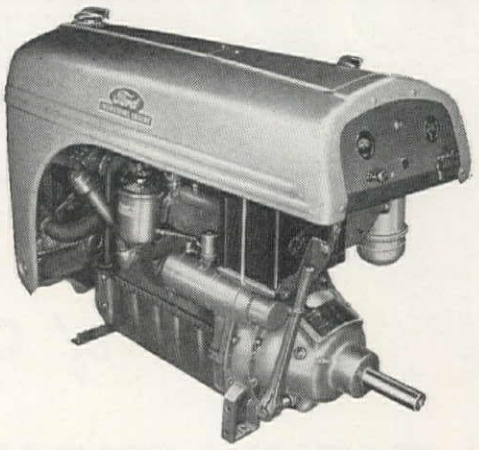
The EUCLID ROAD MACHINERY Co., Cleveland 17, Ohio

EUCLID THE PIONEER

EUCLIDS *Move the Earth*

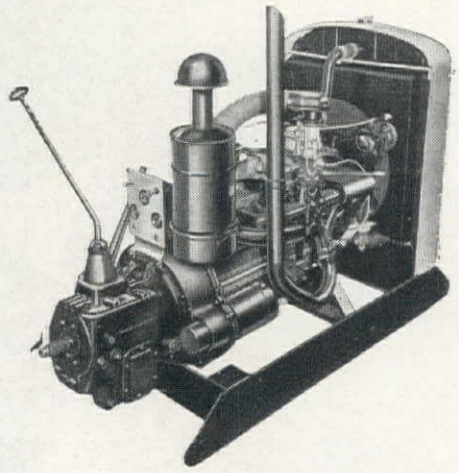
IT'S HERE...

NEW Ford "120" POWER UNIT



Removable dry cylinder liners . . . 3-ring pistons, chrome top ring . . . Moly-chrome valve seat inserts . . . Circulating cooling system with thermostat . . . Replaceable thin shell main and connecting rod bearings . . . Counterbalanced crankshaft . . . Magneto or battery ignition . . . Oil filter . . . Heavy duty oil bath air cleaner.

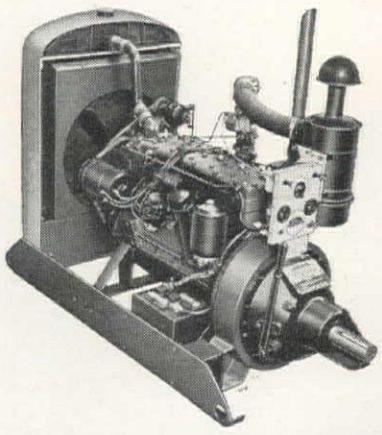
NEW Ford "226" POWER UNIT



Pad mounted oil filter . . . Full length water jacketing . . . Recirculating pressure cooling system with thermostat . . . Counterbalanced crankshaft . . . Heavy duty, replaceable thin shell copper lead bearings . . . High lift camshaft . . . Balanced carburetion (downdraft or updraft) . . . Heavy duty oil bath air cleaner.

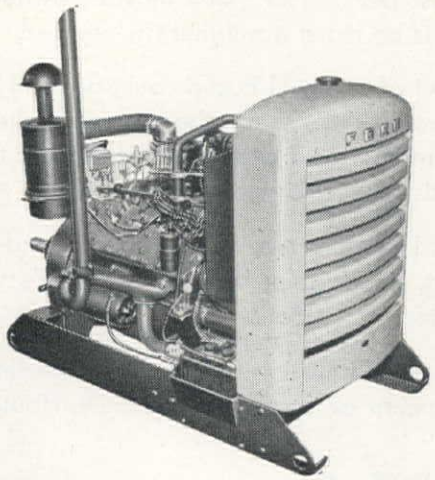
Complete

NEW Ford "254" POWER UNIT



Pad mounted oil filter . . . Recirculating pressure cooling system with thermostat . . . Autothermic pistons with chrome top compression ring . . . High lift camshaft . . . Hard faced cobalt exhaust valve (free type valves) . . . Counterbalanced crankshaft . . . Heavy duty, replaceable thin shell copper lead bearings . . . Balanced carburetion (downdraft or updraft) . . . Air cleaner.

NEW Ford "239" POWER UNIT



Dual water pumps . . . Full length water jacketing *plus* . . . Recirculating pressure cooling system with thermostat . . . Fully counterbalanced crankshaft . . . Replaceable thin shell bearings . . . Moly-chrome valve seat inserts . . . Dual downdraft carburetion . . . Oil filter and air cleaner.

RIGHT for Centrifugal Pumps . . . Arc Welders . . . Air Compressors . . . Cranes and Hoists . . . Winches . . . Railway Cars . . . Generator Sets . . . Crane Loaders . . . Feed Grinders . . . Mechanical Shovels . . . Portable Sawmills . . . Portable Well Drillers . . . Farm Combines . . . Street Flushers . . . Concrete Mixers . . . Portable Grain Mills . . . Irrigation Equipment . . . Log Yarders and Loaders—and many other applications.

Specifications of Ford Industrial Engine Power Units

Model	Cylinders	Bore and Stroke	Displ. cu. in.	Dyn. B.H.P.	Max. Torque	Equipment Available
120	4	3 3/16 x 3 3/4	120	38 @ 2400	92#' @ 1600	Clutch; SAE #5 housing; power take-off; Ford housing; 3- or 4-speed transmission; governor. (Available as closed type power unit or engine assembly.)
226	6	3.3 x 4.4	226	80 @ 2400	182#' @ 1200	Clutch; SAE #3 or #4 housing; power take-off; Ford housing; 3-, 4- or 5-speed transmission; governor. (Available as closed or open type power unit, or engine assembly.)
239	V-8	3 3/16 x 3 3/4	239	85 @ 2400	187#' @ 1600	Clutch; SAE #3 or #4 housing; power take-off; Ford housing with 3-, 4- or 5-speed transmission; governor. (Available as closed or open type power unit, or engine assembly.)
254	6	3.5 x 4.4	254	95 @ 2400	212#' @ 1200	Clutch; SAE #3 or #4 housing; power take-off; Ford housing; 3-, 4- or 5-speed transmission; governor. (Available as closed or open type power unit, or engine assembly.)
337	V-8	3 1/2 x 4 3/8	337	117 @ 2400	257#' @ 1600	Clutch; 5-speed direct-in-fifth transmission; overdrive transmission, direct drive power take-off. (Available as closed or open type power unit, or engine assembly.)

FORD

Industrial Engine Power Units

ARE RIGHT 3 WAYS

for your job!

1. **RIGHT POWER**—five great models in wide variety of units. Each one ready to run!
2. **RIGHT FEATURES**—all the latest advancements of Ford's famed progressive engineering.
3. **RIGHT SERVICE**—as near as your nearest Ford Dealer, clear around the world.

Line of NEW Ford INDUSTRIAL ENGINE POWER UNITS!

NEW Ford "337" POWER UNIT

Drop forged fully counterbalanced crankshaft, hardened journals . . . Heavy duty, replaceable thin shell copper lead bearings . . . Hard faced cobalt exhaust valves (free type valves) . . . Autothermic pistons, chrome top ring . . . Dual centrifugal water pumps . . . Full length water jackets . . . Recirculating pressure cooling system with thermostat . . . Dual downdraft carburetion . . . Oil filter and air cleaner.

YOUR JOB IS WELL-POWERED WHEN IT'S FORD-POWERED

● Ford Industrial Power Units are now available in five great models . . . four, six and V-type eight cylinder . . . 120 to 337 cu. in. displacement. *COMPLETE* with radiator . . . instrument panel and S.A.E. or Ford type housings. Foot or skid mounted. Closed and open types. Made throughout to Ford's famed hi-precision manufacturing standards. Completely tested and *READY TO RUN!*

Ford Dealers, Ford District Sales Offices and the Ford Industrial Engine Department are at your service in developing engineering recommendations showing how Ford Industrial Power Units can be most effectively applied to your job. *Mail coupon below for Ford Industrial Power Unit Folder.*

For Special Literature on Ford Industrial Power Units, use this coupon . . .

Industrial Engine Department

FORD MOTOR COMPANY

DEARBORN, MICHIGAN

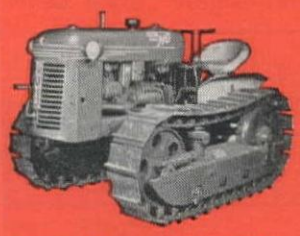
Send me comprehensive literature about the new Ford Industrial Power Units. Address:
Industrial Engine Dept., Ford Motor Co., Dearborn, Mich.

NAME_____
(*Please print*)

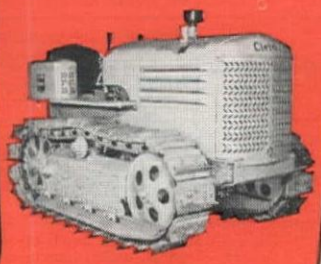
STREET_____

CITY_____ STATE_____

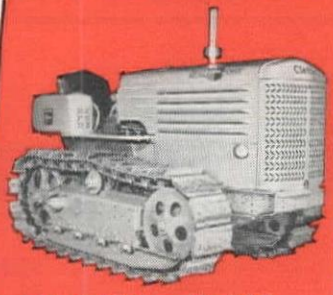
take your pick of PERFORMANCE



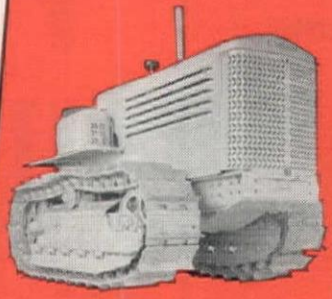
OLIVER-Cletrac Model HG



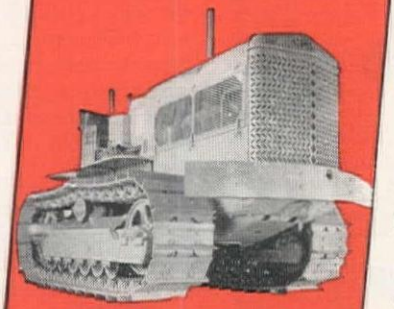
OLIVER-Cletrac Model A



OLIVER-Cletrac Model B



OLIVER-Cletrac Model D

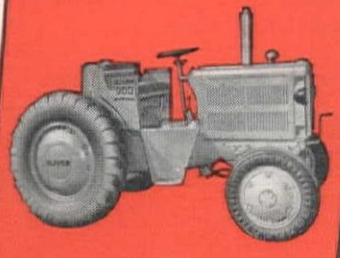


OLIVER-Cletrac Model F

OLIVER "60" Industrial

OLIVER "77" Industrial

OLIVER "88" Industrial



OLIVER "900" Industrial

• 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.

A Complete Line of Crawler and Industrial Wheel Tractors

OLIVER Cletrac SALES SERVICE

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.

For EXTRA performance... Roebling Preformed

Costs least—because it lasts longest

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

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

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

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

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

ROEBLING

JR ROEBLING

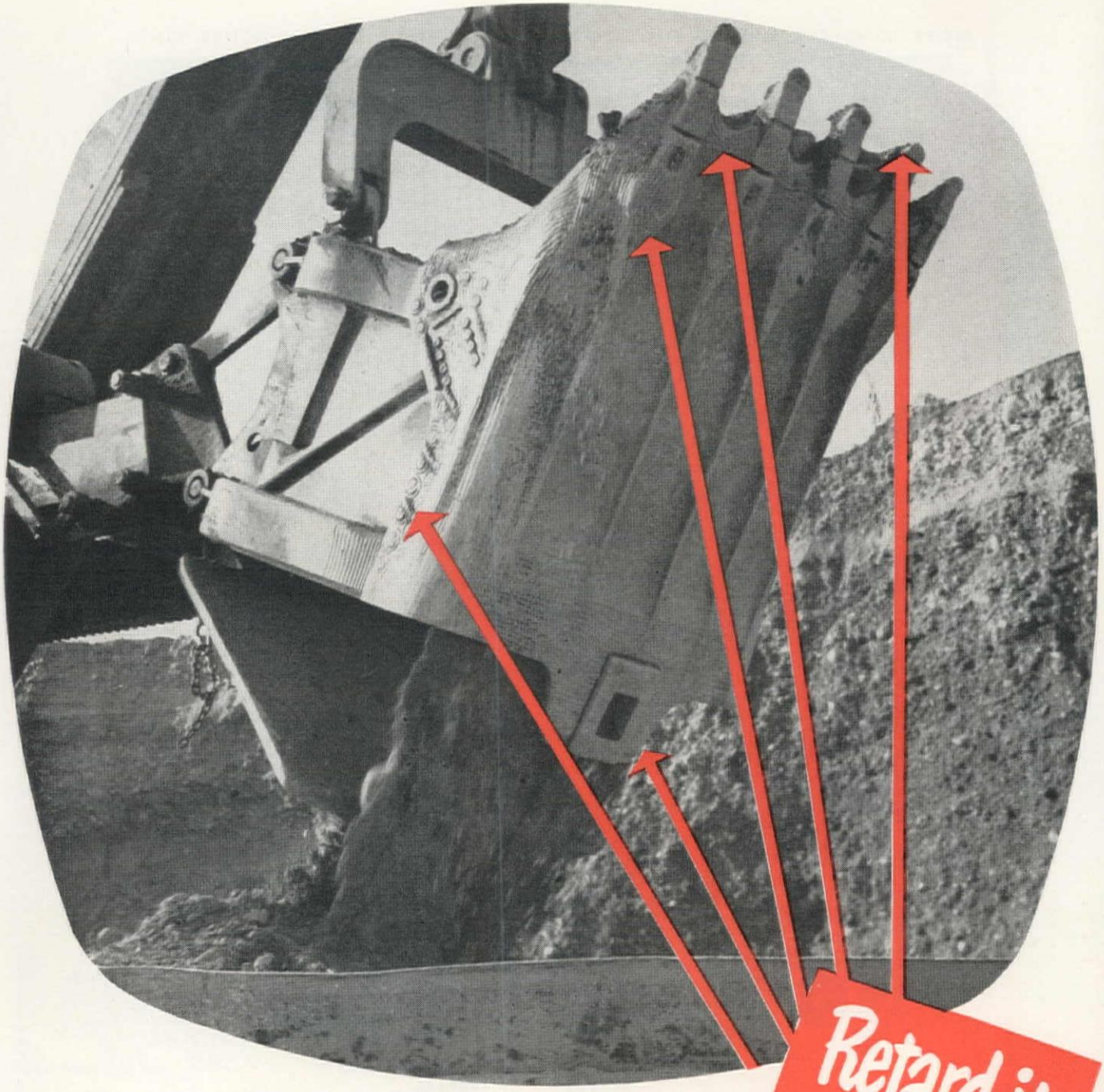
A CENTURY OF CONFIDENCE

PIONEERING *in Hydraulic* POWER -

The Pioneers - those who devoted their lives to the harnessing of one of nature's mightiest forces - water - contributed greatly to this nation's progress! For 75 years, we have built turbines for high, medium and low heads, many types of valves, hoists and gates, pumps, trash rack rakes and kindred hydraulic equipment. Put your problem up to us.

S. MORGAN SMITH Co.

YORK, PENNA. U.S.A.



Every bucketful means wear!

Each bite in old mother earth takes metal off your shovel components. Every load dumped reduces wall thickness and shortens bucket life. Good maintenance means good hard-facing. STOODY ALLOYS give you *most* protection for least expenditure.

Remember, there's a Stoody Alloy for every abrasive wear problem. Ask your dealer for recommendations or write direct. We're glad to help.

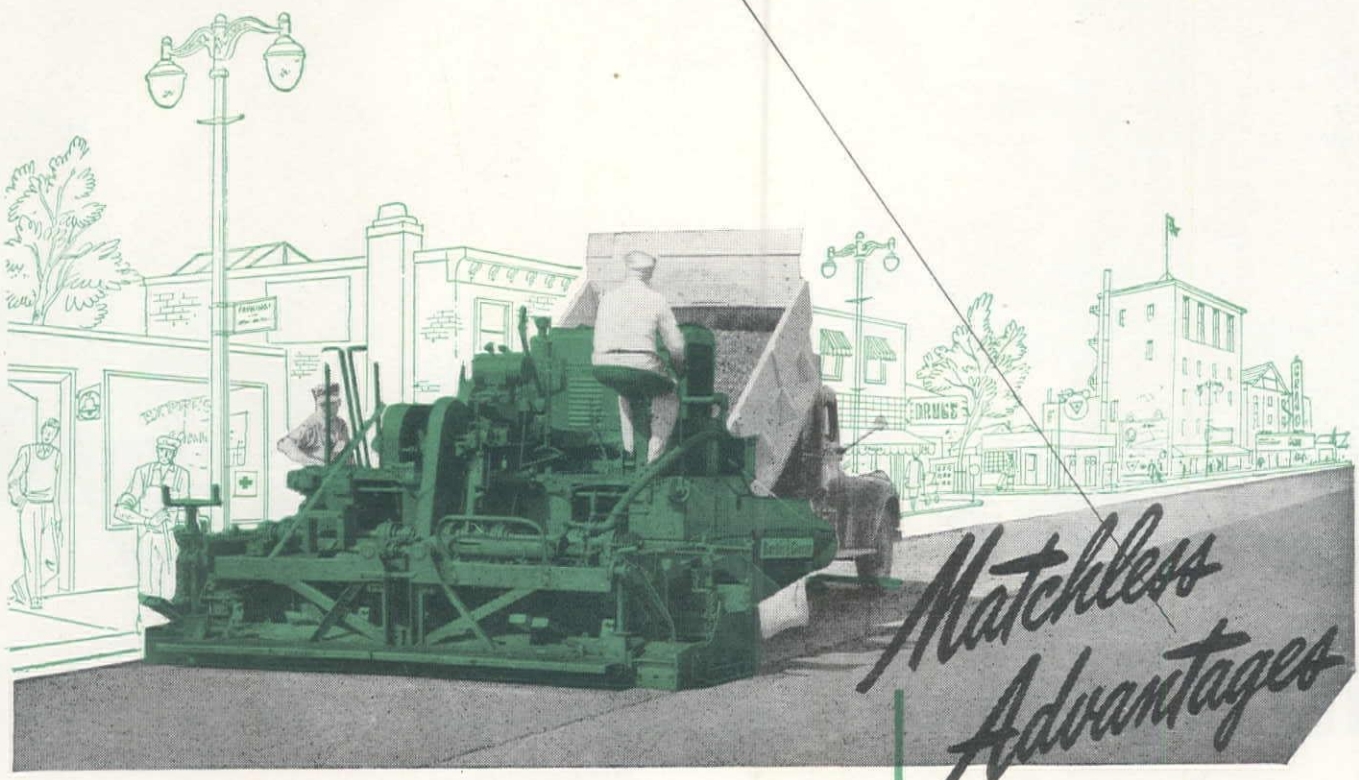
For best all-around shovel protection we recommend Stoody Self-Hardening **21.** Besides possessing good impact strength, its high alloy content insures excellent abrasion resistance. These features coupled with low price give most protection per dollar. Try Stoody Self-Hardening **21** today

STOODY COMPANY

11956 EAST SLAUSON AVENUE, WHITTIER, CALIF.

Barber-Greene

• the finisher that offers



Built into the B-G Tamping-Leveling Finisher are advantages that combine to assure superior performance on the widest variety of bituminous paving jobs. For instance . . .

The B-G Finisher *tamps, levels* and *"strikes off"* simultaneously — automatically measures the correct amount of compacted material for the depressions — leaves a level surface that is maintained under rolling and traffic. The B-G Finisher *automatically* adjusts to differences in the sub-grade and lays to the established grade.

There are other important advantages. For the whole story of B-G Finisher performance, see your Barber-Greene distributor.

Positive Traction

Crawlers have the traction to push loaded trucks up grades while unloading . . . plus adequate control of steering necessary on any job.

Large Hopper

Five-ton hopper saves delays, allows Finisher to operate between truck loads.

Dual Controls

The B-G Finisher may be operated from either side — for easier control while matching previous mat.

Wide-Range Utility

For all bituminous jobs — from sheet asphalt to stabilized mixes — the B-G Finisher is economical, efficient and adds to the quality of the road.

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.

Safe Steering in Emergencies with

When forced off the road onto rutted, soft, rocky or snow-banked shoulders, your driver will be grateful for Vickers Hydraulic Power Steering. The steering mechanism is then hydraulically locked against road condition reaction . . . the vehicle cannot swerve from road reaction. There is no "wheel fight" to wrench the steering wheel out of the driver's hands. Pull back onto the road requires only the "force of a finger" on the steering wheel.

Vickers Hydraulic Power Steering is safer . . . effortless . . . provides hydraulic power at instant command of the driver to meet any and all steering requirements. This extra-quick steering greatly increases the ability to maneuver in an emergency. Another important advantage . . . the driver is less tired, more alert.

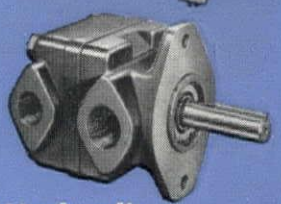
Vickers Hydraulic Power Steering can be used as original equipment, or adapted to most trucks and other vehicles now in service. Write for Bulletins 47-30 and 49-52 covering additional advantages and specifications.

VICKERS Incorporated
DIVISION OF SPERRY CORPORATION
1498 OAKMAN BLVD. • DETROIT 32, MICH.

Application Engineering Offices: ATLANTA • CHICAGO • CINCINNATI • CLEVELAND DETROIT • HOUSTON • LOS ANGELES (Metropolitan) • MILWAUKEE • NEW YORK (Metropolitan) • PHILADELPHIA • PITTSBURGH • ROCHESTER • ROCKFORD ST. LOUIS • SEATTLE • TULSA • WASHINGTON • WORCESTER

VICKERS Hydraulic POWER STEERING

Vickers Hydraulic Steering Booster with Integral Overload Relief Valve. Bulletin 47-30a.



Vickers Balanced Vane Type Pump is Engine Driven. Bulletins 36-12 and 49-52.

Vickers Hydraulic Power Steering is Effortless, Positive, Shockless

4068

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

New Paver-Type Aggregate Spreader, first low cost, self-propelled spreader that operates entirely on the subgrade, accurately lays all base and surface aggregates, plant-mixed stabilized soil and free-flowing bituminous mixtures up to 12½′ (25′ in tandem).

Model BP-5 Bituminous Paver, the automatic leveling, precision paver you've been waiting for, that lays all bituminous materials up to 12½′ with almost instant width adjustability — no adding or removing parts.

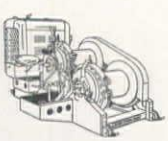
Jaeger offers new ways to cut paving cost on 1950 jobs

Diagonal Screed Finishers and Concrete Screw Spreaders to "team" with your dual-drum paver. Also cost-saving Combination Spreader-Finisher for single screed work.

"Air Plus" Compressors in new standard sizes (75 to 600 ft.) that do 4 days' work in 3 with the same men and tools.

"Sure Prime" Pumps
Many 1950 improvements for lower cost pumping.

"Speedline" Mixers
More mixing action, advanced construction in 1950 models.



2-Speed Hoists
and new model Hoister Tower with platform or bucket.

Don't figure new jobs with old tools: See your Jaeger distributor or send for Catalogs on the new equipment you'll need to bid and build successfully in 1950.

Sold, Rented, Serviced by:

EDWARD R. BACON CO. — San Francisco 10	CENTRAL MACHINERY CO. — Great Falls and Havre
SMITH BOOTH USHER CO. — Los Angeles 54	TRACTOR & EQUIPMENT CO. — Sidney, Miles City, Glasgow
A. H. COX & CO. — Seattle 4 and Wenatchee	WORTHAM MACHINERY CO. — Cheyenne and Billings
NELSON EQUIPMENT CO. — Portland 14	J. D. COGGINS & CO. — Albuquerque
ANDREWS EQUIPMENT SERVICE — Spokane 9	SCHRIVER MACHINERY CO. — Phoenix
WESTERN MACHINERY CO. — Salt Lake City and Denver 2	IDAHO MACHINERY CO. — Boise

RED' Team

Get acquainted with the combination that's matched for championship dirt moving: the "BIG RED" team — new International TD-24 tractor and Bucyrus-Erie B-type scraper. Owners are proving its superior performance on earthmoving jobs everywhere . . . are completely revising accepted time cycles for crawler tractor-scraper combinations.

Look over this team of matched equipment. See for yourself what the "BIG RED" team can do to cut your dirt costs. The tractor is the most powerful in the world; it is built by the largest company manufacturing crawler tractors. The scraper takes full advantage of tractor power, is built by the world's largest and oldest manufacturer of earthmoving equipment. This unequalled experience means sound design, money-making "BIG RED" performance!

184T50C

BUCYRUS-ERIE COMPANY, South Milwaukee, Wis.

Industrial Tractor Distributor

SHOCK STRENGTH

Without shock strength—or, for that matter—without all of the strength factors listed opposite—no pipe laid 100 years ago in *city streets* would be in service today. But, in spite of the evolution of traffic from horse-drawn vehicles to heavy trucks and buses—and today's vast complexity of subway and underground utility services—cast iron gas and water mains, laid over a century ago, are serving in the streets of more than 30 cities in the United States and Canada. Such service records prove that cast iron pipe combines all the strength factors of long life with ample margins of safety. No pipe that is provably deficient in any of these strength factors should ever be laid in city streets. Cast Iron Pipe Research Association, Thos. F. Wolfe, Engineer, 122 So. Michigan Ave., Chicago 3.

CAST IRON

Strength factors of Long Life!

No pipe that is provably deficient in any of these strength factors should ever be laid in city streets

SHOCK STRENGTH — The toughness of cast iron pipe which enables it to withstand impact and traffic shocks, as well as the hazards in handling, is demonstrated by the Impact Test. While under hydrostatic pressure and the heavy blows from a 50 pound hammer, standard 6-inch cast iron pipe does not crack until the hammer is dropped 6 times *on the same spot* from progressively increased heights of 6 inches.

CRUSHING STRENGTH — The ability of cast iron pipe to withstand external loads imposed by heavy fill and unusual traffic loads is proved by the Ring Compression Test. Standard 6-inch cast iron pipe withstands a crushing weight of more than 14,000 lbs. per foot.

BEAM STRENGTH — When cast iron pipe is subjected to beam stress caused by soil settlement, or disturbance of soil by other utilities, or resting on an obstruction, tests prove that standard 6-inch cast iron pipe in 10-foot span sustains a load of 15,000 lbs.

BURSTING STRENGTH — In full length bursting tests standard 6-inch cast iron pipe withstands more than 2500 lbs. per square inch internal hydrostatic pressure, which proves ample ability to resist water-hammer or unusual working pressures.

CAST IRON PIPE SERVES FOR CENTURIES

wherever air is needed

Supplying ample compressed air for any location, the CP Portable Air Compressor has a gradual speed regulator that adapts engine speed to air demands to hold fuel consumption to a minimum. Available in gasoline-driven models of 60, 105, 160, 210 and 315 c.f.m. actual capacity, and in Diesel-driven models of 105, 160, 210, 315 and 500 c.f.m.

protect your profits with CP time-cutting equipment

for fast cuts in hard wood

Helical gearing, high blade speed and a powerful motor give the rugged CP Hi-Speed Electric Saws plenty of reserve power. Available in three sizes: 7½", 8¼" and 9½" blades. Special blades can be furnished for cutting metal, ceramic or concrete products.

for every demolition job

In the world's largest line of demolition equipment, there is a CP tool exactly suited for every type of demolition work. Five sizes include the light CP-111 (25 lb. class), the general utility CP-115 (60 lb. class), and the heavy-hitting CP-117 (80 lb. class) illustrated, for which no job is too tough!

air tools for construction jobs

The wide range of CP air-powered drills, wrenches and other construction equipment enables the contractor to secure just the right CP tool for any particular job. CP Corner Drills speed erection work; heavy-duty CP-365 Wrench easily runs nuts up to 1¼" bolt size.

CHICAGO PNEUMATIC TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Distributors

BALZER MACHINERY COMPANY, 2136 S.E. Eighth Ave., Portland, Oregon; WESTERN MACHINERY CO., N. 808 Division St., Spokane, Washington; HALL-PERRY MACHINERY CO., 812 E. Iron St., Butte, Montana; YUKON EQUIPMENT, INC., Seattle-Alaska. HONOLULU IRON WORKS COMPANY, Nuuana and Queen Streets, Honolulu 2, T. H.

EASY MAINTENANCE! OPERATION!

...that's what CHAPMAN Standard Sluice Gates Can Mean to You!

You'll find Chapman has designed these sluice gates with your problems in mind. That's why each one is standardized throughout . . . why stems and couplings are completely interchangeable in the field without alterations. What's more, there's no operation problem for they can be supplied with either manual, hydraulic cylinder or motor operating control. Available in a complete line to meet all usual conditions, these Chapman Sluice Gates can also be supplied in special patterns. It will pay you to write today for Bulletin No. 25.

THE CHAPMAN VALVE MFG. CO.
INDIAN ORCHARD, MASSACHUSETTS

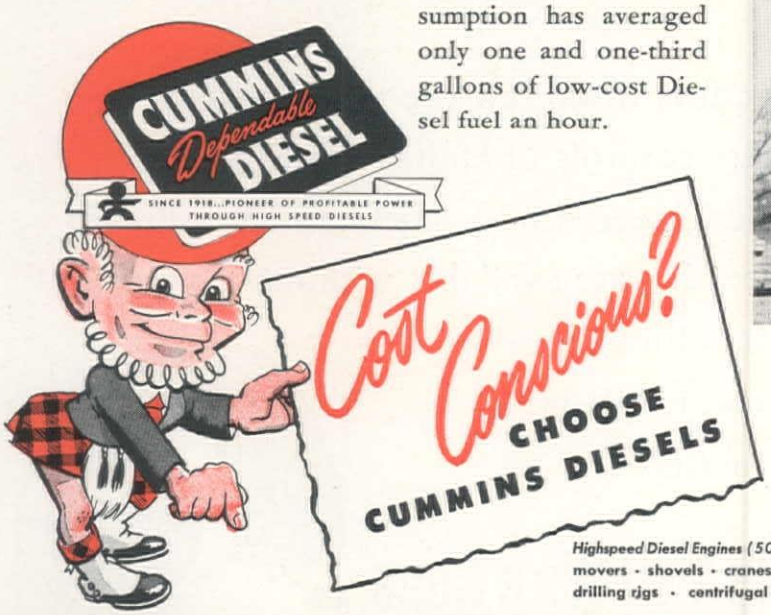
Cummins-Powered Cranes Pour 50.7 YARDS AN HOUR AT 96 FEET

High-lift Pouring Records Set on Penrose Ferry Bridge Job

Records for high-lift concrete pouring are being established by two Cummins-Powered Model 3500 Manitowoc Speedcranes used by Foley Brothers of Pleasantville, N. Y., on the Penrose Ferry Bridge job in Philadelphia, Pa.

For example, one of the Cummins-Powered cranes poured 507 cubic yards of concrete in 10 hours with the lift at a 96-foot height. At this height a 125-foot boom and a two-yard bucket were used. Above this height—to a maximum of 130 feet—pours were made with a one-yard bucket and main boom plus a 20-foot jib.

Since early in 1948, the only maintenance required for the two supercharged 200 hp Cummins Diesels has been the replacement of filter cartridges and gaskets—and fuel consumption has averaged only one and one-third gallons of low-cost Diesel fuel an hour.



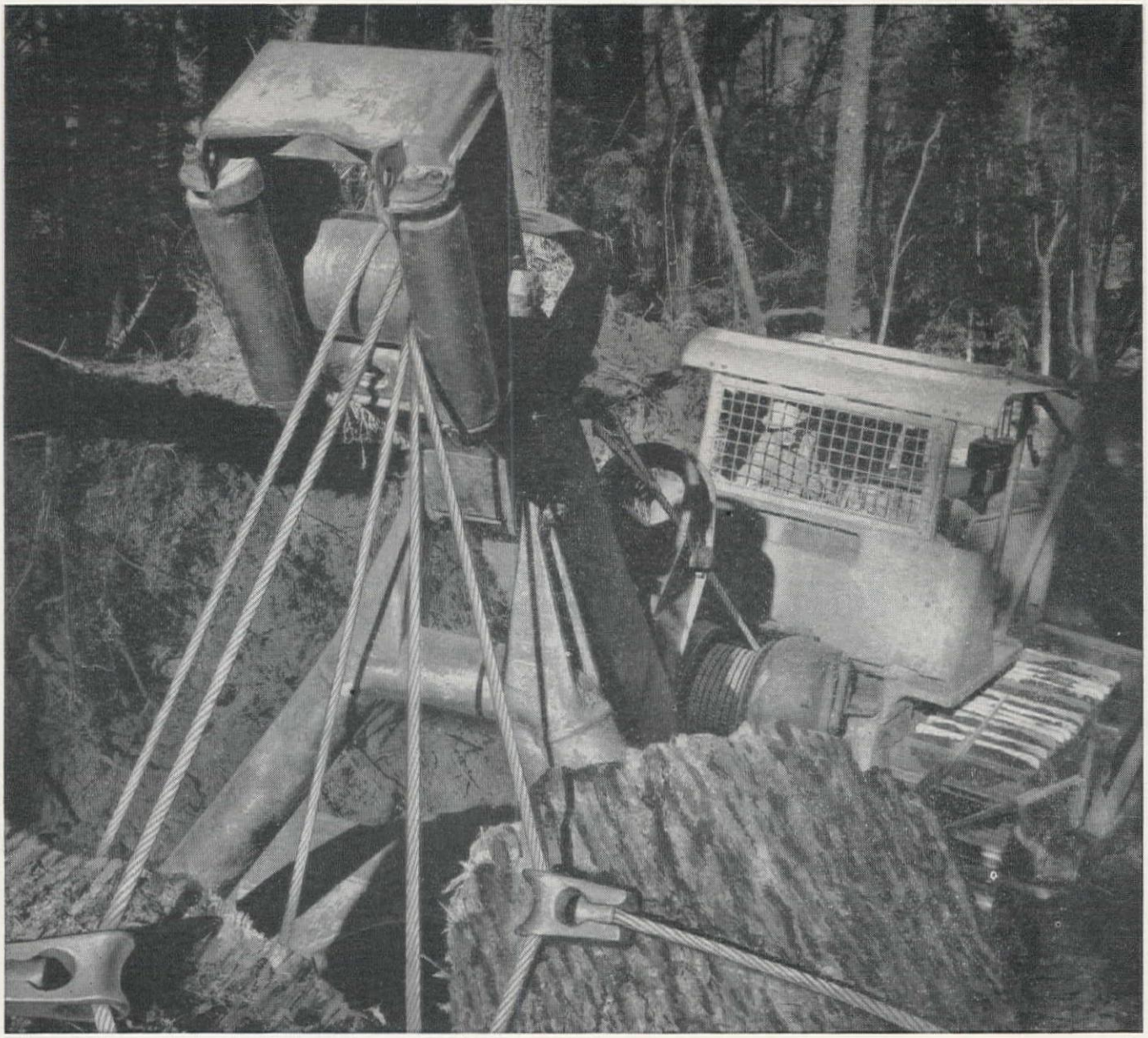
Service

One of the more than 200 Cummins Dealers is as close as your phone!

Highspeed Diesel Engines (50-550 hp) for: On-highway trucks • off-highway trucks • buses • tractors • earth-movers • shovels • cranes • industrial locomotives • air compressors • logging yarders and loaders • drilling rigs • centrifugal pumps • generator sets and power units • work boats and pleasure craft.

CUMMINS ENGINE COMPANY, INC. • COLUMBUS, INDIANA

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



Tractor arch logging using Tiger Brand Wire Rope at Jensen Lumber Co., Willits, California.

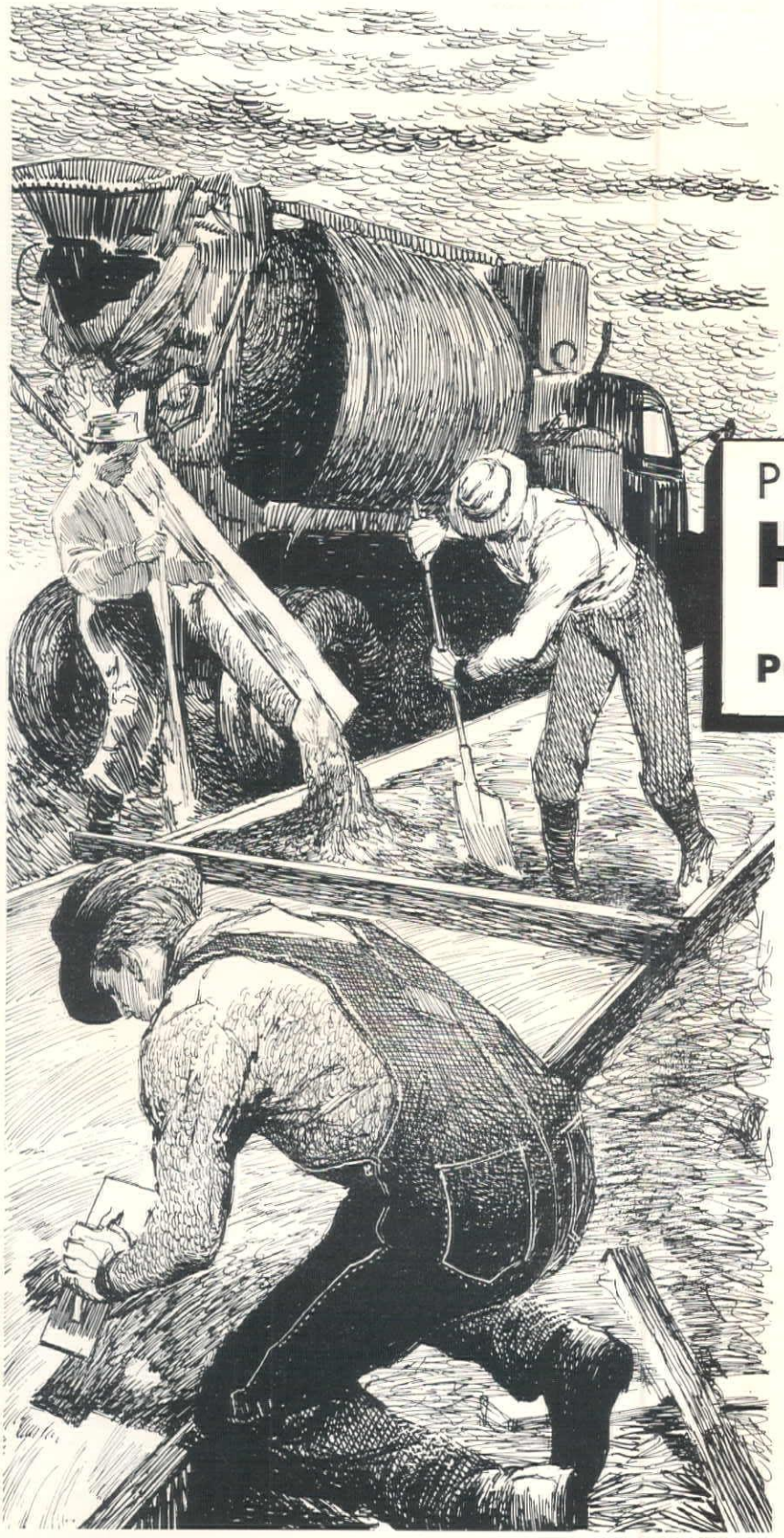
Tiger Brand Wire Rope is manufactured from raw ore to finished product under the strict quality controls of United States Steel. To help you get all the stamina engineered into American Tiger Brand, the services of a Field Specialist are available without charge.

Contact your Tiger Brand distributor or write Columbia Steel Company, Room 1422, Russ Bldg., San Francisco 4.

U·S·S TIGER BRAND Wire Rope

UNITED STATES STEEL

STANDARD • PORTLAND • MODIFIED PORTLAND • HIGH EARLY • LOW HEAT • BRICK MIX
SULFIATE RESISTANT • PORTLAND • POZZOLAN • PRONTO • PLASTIC • TYPES CS & D OIL WELL



What Cement

FOR COLD WEATHER CONSTRUCTION?

PERMANENTE
HIGH-EARLY
STRENGTH
PORTLAND CEMENT

For concrete work placed in cold weather, rapid setting is the most important requirement. Low temperatures slow down the chemical reactions through which concrete gains its strength. Even the use of heated aggregates and warm water often fails to bring about proper setting of concrete mix made with regular cement during cold weather.

PERMANENTE HIGH-EARLY STRENGTH Portland Cement, because of its extremely fine grind, sets up rapidly. Because of this rapid setting time, the heat generated by the hydration process offsets to a great extent low outside temperatures.

PERMANENTE HIGH-EARLY-STRENGTH Portland Cement sets up in approximately 3 hours—attaining in 24 hours, a strength equal to that reached in 7 days by Standard Portland Cement. Permanente High-Early conforms to ASTM and Federal Specifications for Type III Cement.

on the job on time

PERMANENTE

PERMANENTE, SANTA CLARA, YOSEMITE AND KAISER BRANDS OF PORTLAND CEMENT AND PERMANENTE LIME PRODUCTS

CEMENT COMPANY

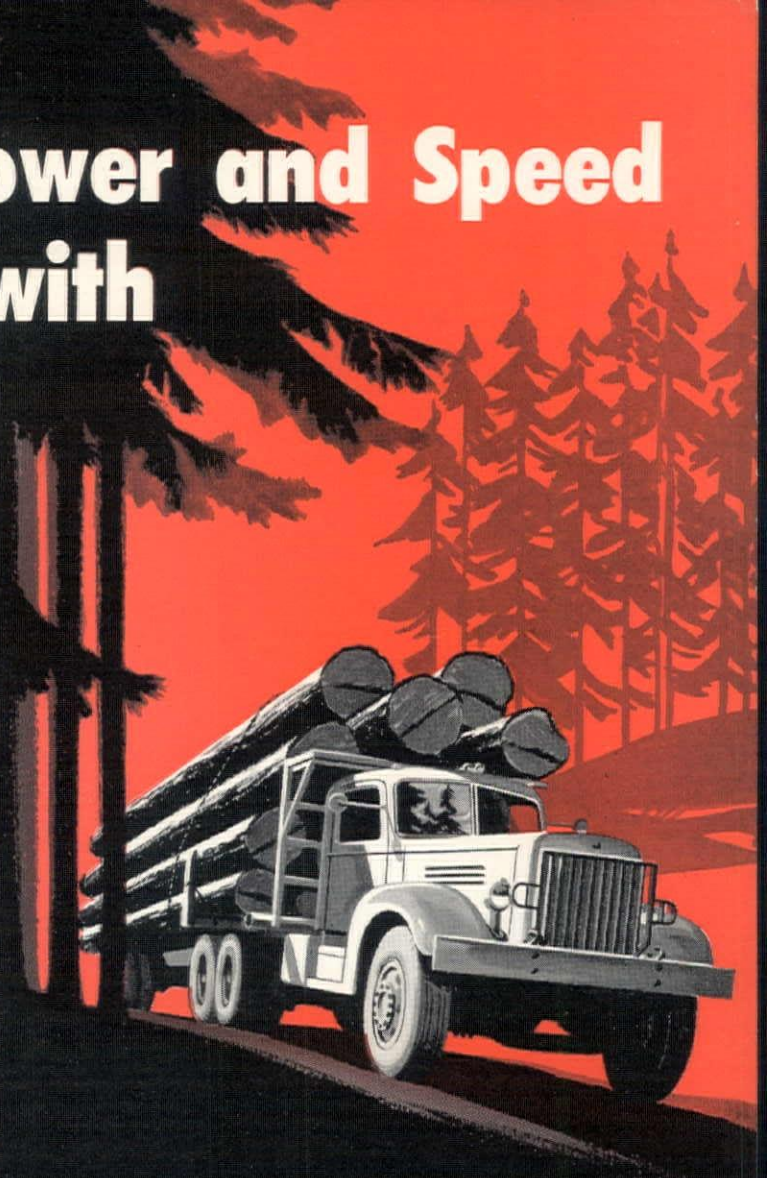
OAKLAND • SEATTLE • HONOLULU

Extra Pulling Power and Speed in Your Trucks with

EATON

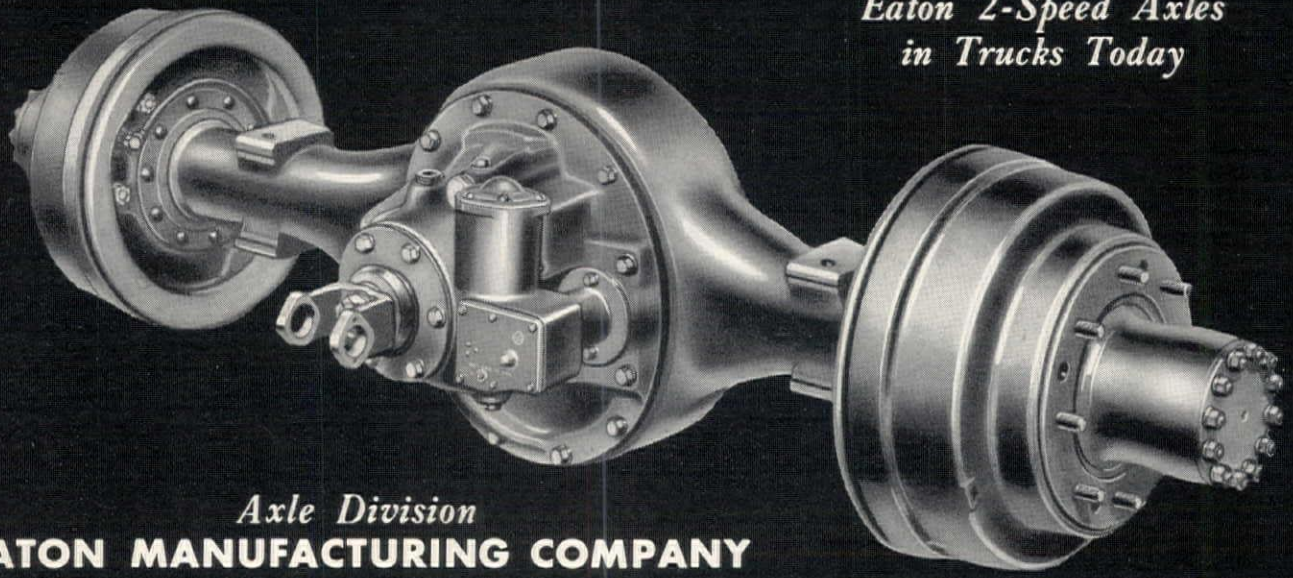
2-Speed Truck

AXLES



In the kind of service that requires extra pulling power and extra speed to make time on the open highway, Eaton 2-Speed Axles provide the perfect balance of power and speed. On trucks that must "take it," Eaton Axles reduce stress and wear—not only on the axles themselves, but on engines and all vital vehicle units. Longer axle life with minimum maintenance cost is assured because Eaton's exclusive forced-feed oiling system provides positive lubrication at all vehicle speeds. Eaton Axles are available for most trucks of 1½ tons and larger. Ask your truck dealer for a road demonstration.

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



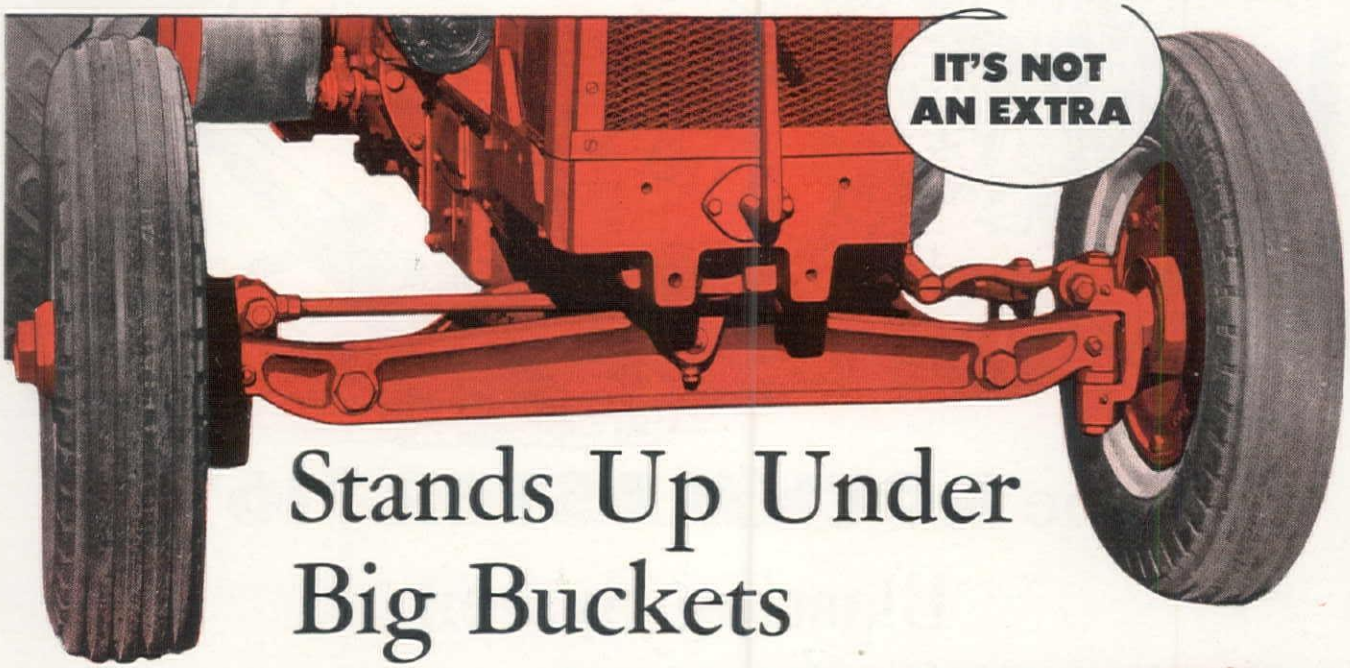
Axle Division

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

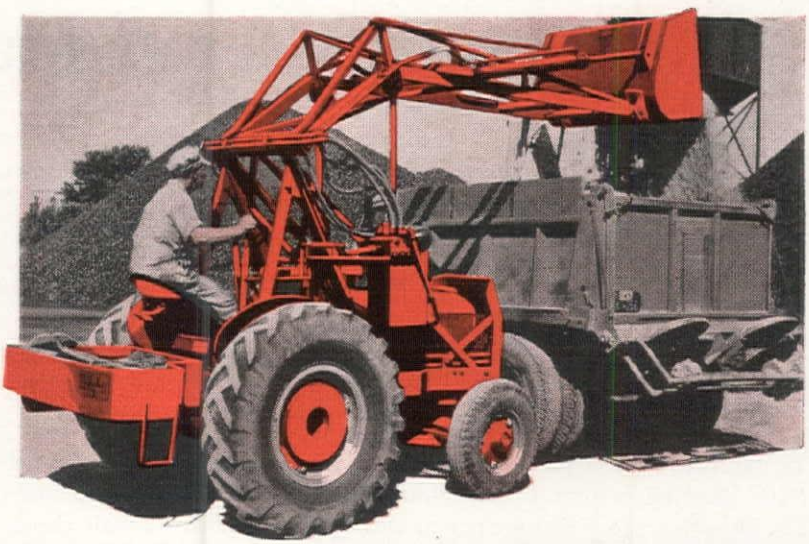
What an AXLE!



Stands Up Under Big Buckets

● This lusty steel-forging axle is not something to put on later, or to come with a special added charge. It's regular equipment at the regular price on every Model "DI" Case industrial tractor. It's not only brute-strong to bear the weight and working stresses of mounted equipment—it's also trim-lined to leave clearance where clearance counts.

Notice also the rigid base-block casting above the axle, with 5/8 and 3/4-inch tapped holes on front and side flat faces — positive anchorage for loaders, dozers, snowplows, etc. From radiator to drawbar, Case industrial tractors are built like that—to welcome the loads of fast-working modern mounted equipment.



LIGHTS AND STARTER STANDARD, TOO

Complete electric system, with headlights and tail light, is included in regular equipment and price of the Model "DI." Case-built magneto assures utmost reliability of ignition regardless of battery condition. J. I. Case Co., Racine, Wis.

CASE
INDUSTRIAL TRACTORS

State Tractor & Equipment Co.	Phoenix, Arizona
Brown-Bevis Equipment Co.	Los Angeles, California
Coast Equipment Co.	San Francisco, California
Mitchell's	Bakersfield, California
Liberty Truck & Parts Co.	Denver, Colorado
Western Equipment Co.	Boise & Idaho Falls, Idaho and Spokane, Wash.
Hilton's, Inc.	Las Vegas, New Mexico
Growers Supply & Equipment Co.	Fresno, California
Electric Tool & Supply Co.	San Bernardino, California
Growers Tractor & Implement Co.	Sacramento California
Nelson Equipment Co.	Portland, Oregon - Seattle, Washington
Robison Machinery Co.	Salt Lake City, Utah
Wortham Machinery Co.,	Cheyenne, Sheridan and Greybull, Wyoming - Billings, Montana

The ROCKMASTER "16" Blasting System Cuts The Cost Of Handling Rock!

The story could be summed up in two words: *improved fragmentation.* Or you might prefer *better breakage.* However, the details of the ROCKMASTER "16" story make interesting reading for blasters.

This better breakage has increased loading machine and shovel production as much as 40% in mines, pits, quarries, and construction jobs. Many operators have cut secondary shooting in half . . . others have eliminated it. Time once wasted in uncovering and setting aside big rocks now goes into productive work. There's a sequel to this story! Better breakage means lower costs in milling—less work for the crusher and less wear and tear on equipment.

Better breakage is just one of the many advantages of the new ROCKMASTER "16" Blasting System. It helps you produce more material per pound of explosive . . . gives you more footage per round. Sixteen periods—a wide choice of short or long milli-second delays—add up to better control over throw, backbreak, and material size . . . better control over noise and vibration. Sixteen delay periods fire in 550 milli-seconds! There is less strain on timbers and roof . . . less dust and a quicker return to the face.

From the face and the front office you hear: "ROCKMASTER "16" *is the greatest improvement in blasting methods since Atlas introduced milli-second blasting.*" Write for new booklet showing you how ROCKMASTER "16" fits into your operation.

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

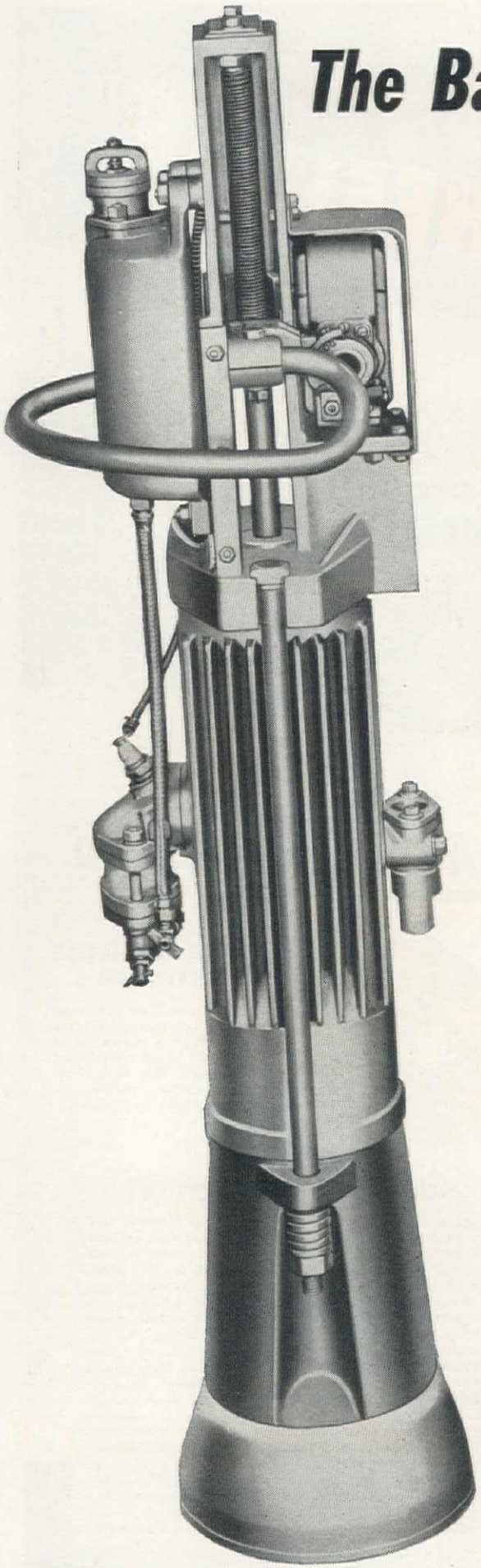
ROCKMASTER: Reg. U. S. Pat. Off.

Offices in Principal Cities

ATLAS EXPLOSIVES *"Everything for Blasting"*

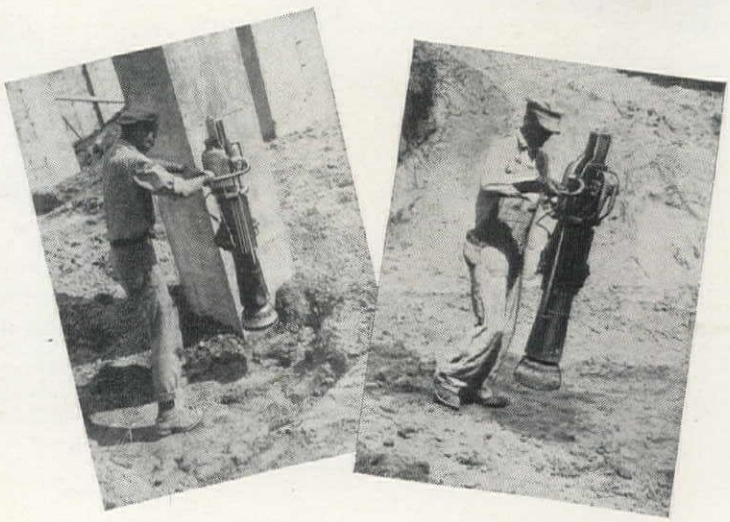
CHEMICALS ATLAS EXPLOSIVES

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



The Barco Pegson Rammer

Lets one man do the work of five



Barco revolutionizes soil compaction! By actual tests, certified by Government agencies, one man using the new Barco Rammer performed 97% soil compaction with lifts of 12" to 20" refilling ditches as contrasted to the 4" lift obtained by conventional methods. One man doing the work of 5! The Barco Pegson Rammer is entirely self-contained, requires practically no maintenance. Anyone can learn to operate it skillfully and safely after only a few minutes instruction. No lifting, no straining, no carrying. A slight tilt on the handle will "walk" the Rammer where you want it to go.

Especially adapted to tamping close to abutments and other wall structures, and in narrow ditches and hard-to-reach places, where rollers can't reach. Don't tie up your funds in expensive equipment. Let the Rammer cut your costs. For more information write for catalog or demonstration, Barco Manufacturing Company, 1819C Winnemac Avenue, Chicago 40, Illinois. In Canada: The Holden Co., Ltd., Montreal, Canada.

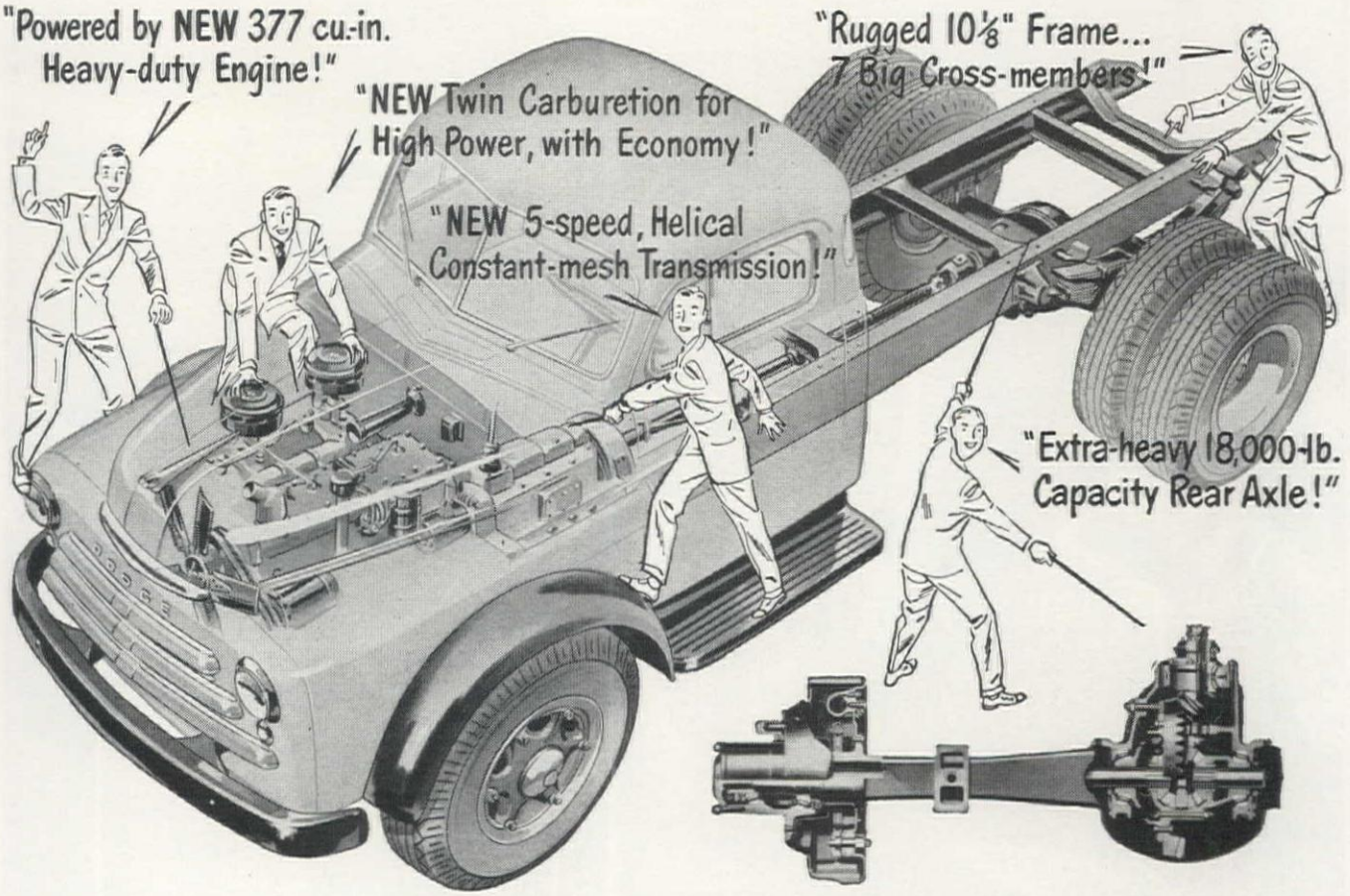
THE BARCO
Gasoline Rammer

FREE ENTERPRISE . . . THE CORNERSTONE OF AMERICAN PROSPERITY

BIG NEWS for haulers of BIG LOADS!

New Heavy-Duty 4-TON

DODGE "Job-Rated" TRUCKS



There's a *new* champion in the HEAVY-DUTY truck field. It's the new Dodge truck rated at 28,000 pounds G.V.W. . . . 50,000 pounds G.C.W.!

Ample "*Job-Rated*" POWER flows from one of the finest-performing, and most economical truck engines ever designed. It develops 154 gross horsepower, and 330 pound-feet gross torque.

This remarkable engine contains such advanced long-life features as Silchrome intake valves and inserts. Exhaust valves are Stellite-faced and sodium-filled to resist warping, wear longer.

Hydraulic lifters insure perfect valve operation. Rustproof water distributor tube provides maximum valve seat cooling, and lengthens engine life.

High power output and economy result from two downdraft carburetors. Features are numerous: Dual intake manifold; dual exhaust system; high anti-vapor-lock pump; ceramic fuel filters; velocity-type governors; oil-bath air cleaners, and many others.

This "*Job-Rated*" load lugger has a new and rugged constant-mesh, 5-speed helical transmission, direct-in-fifth, with an extremely high torque input. A 5-speed overdrive transmission is available.

This 4-tonner has a rugged 10⅛-inch frame, with 7 and 8 big crossmembers; extra-heavy 18,000- and 22,000-pound capacity rear axles, and many other HEAVY-DUTY features you'll want to study and compare.

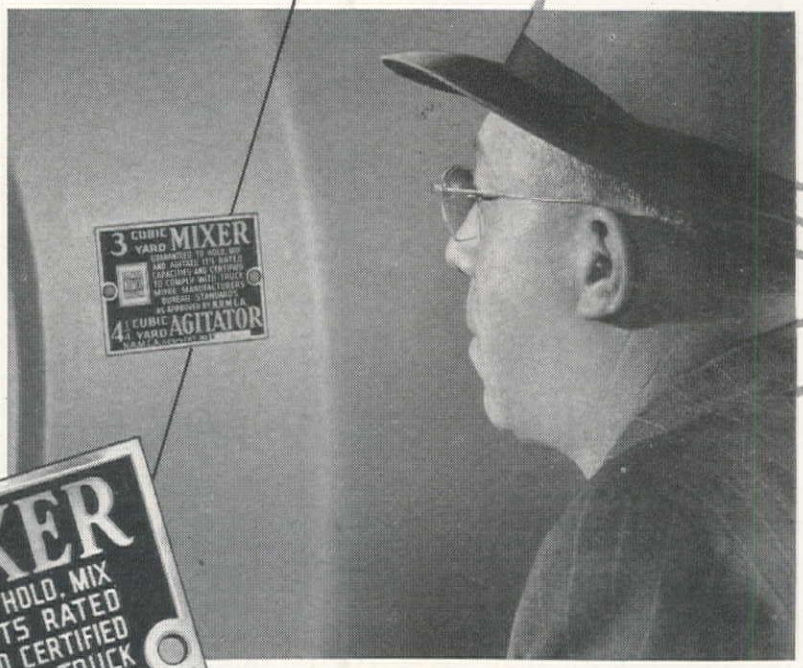
If *your* transportation requirements fall in the 28,000-pound G.V.W. range (up to 50,000 pounds G.C.W.), we believe you'll find this 4-ton heavyweight your long-awaited answer to . . . *lower cost hauling!*

See your Dodge dealer at your earliest convenience.

For low-cost transportation...switch to

DODGE "Job-Rated" TRUCKS

you can't fool a knowing customer



The Bureau rating plate is available to any manufacturer who meets its quality standards and requirements.

The truck mixer that supplies your job either bears this rating plate — or doesn't.

If you see this plate, then you can be sure that the mixer has the proper drum design, accurate water control, speed of revolution and full specified amount of ***free mixing space*** proved necessary to thoroughly mix or agitate its rated load.

It is customer's protection against questionable concrete delivered from non-standard truck mixers. It assures you of the best quality concrete on the job.

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.
Dunellen, N. J.
THE T. L. SMITH COMPANY
Milwaukee, Wis.

Truck Mixer Manufacturers Bureau

Today more and more tunnels are being driven with Du Pont "MS" Delay Caps

And for good reasons. Early field reports show Du Pont "MS" Delay Electric Blasting Caps frequently reduce the amount of explosives used per foot of tunnel advance. With a decrease in explosives per round, there is a corresponding decrease in fumes. In addition, "MS" Caps permit fewer drill holes in certain types of rock.

. . . and here's why so many blasters prefer Du Pont "MS" Delays

Easier to handle—a big help on most jobs. All 14 clearly marked "MS" Delay periods (25 to 500 milliseconds) have short-length cap shells that facilitate priming.

Greater Safety—Du Pont "MS" Caps pull the rounds clean . . . leave no dynamite in the muck. Also, "MS" Caps substantially reduce vibration and concussion.

Improved fragmentation—even from badly fractured rock. With "MS" Caps, you can often reduce the explosives load and lower the cost per yard.

Other features of "MS" Delay Electric Caps include these three important points: (1) clean, brightly colored nylon insulated wires. (2) double-crimped, water-resistant rubber plug closures. (3) protective Cellophane-lined aluminum foil shielded shunts that reduce the risk of premature firing due to stray currents.

The Du Pont Explosives representative is the man to see for complete information about "MS" (millisecond) Delay Electric Blasting Caps, and other widely used Du Pont blasting supplies and accessories. He'll be glad to give you any help you may need. E. I. du Pont de Nemours & Co. (Inc.), Hoge Bldg., Seattle, Wash.—Midland Savings Bldg., Denver, Colo.—111 Sutter St., San Francisco, Calif.

DU PONT EXPLOSIVES

BLASTING SUPPLIES AND ACCESSORIES

DU PONT "NITRAMON"* AND "NITRAMEX"**

"Nitramon" is the safest blasting agent made. It is detonated with a "Nitramon" Primer, itself relatively insensitive. "Nitramon" is packed in watertight metal containers; thus it can be loaded well in advance of firing time. Ideally suited for well-drill jobs.

"Nitramex"—companion product to "Nitramon"—is a stronger blasting agent designed for toe shooting where excessively hard rock is encountered. Ask your Du Pont Explosives representative about these two popular blasting agents.

*"Nitramon" is a registered trade-mark for Du Pont nitrocarbonitrate blasting agent.

**"Nitramex" is a trade-mark for Du Pont ammonium nitrate blasting agent.

DU PONT "DETECT-A-METER"

. . . a stray current detector that's also a blasting galvanometer. With this instrument you can test a working area for stray currents before connecting up electric blasting caps . . . test the circuit for continuity with the galvanometer . . . and finally test the blasting line for stray currents immediately before the shot is connected to it.

DU PONT BLASTERS' HANDBOOK

. . . just revised—with over 470 fact-filled pages. A fine reference book to carry along with you on every job.

DU PONT "SERIES B" DELAY ELECTRIC BLASTING CAPS

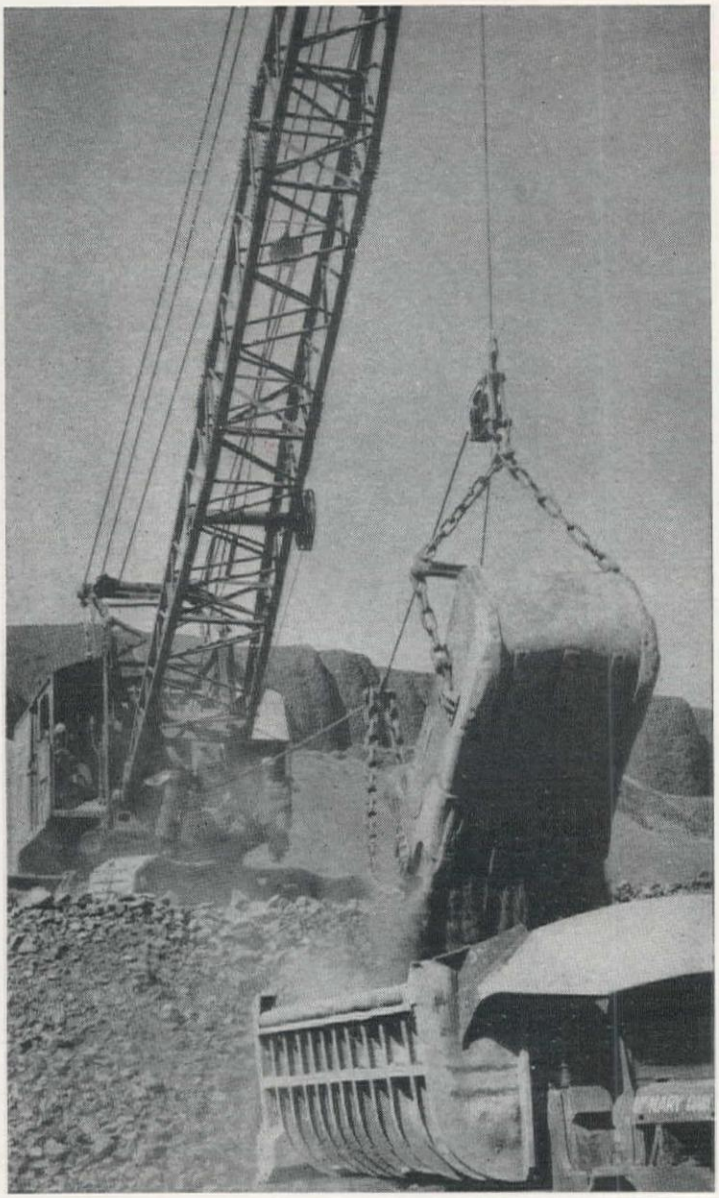
. . . promote safety by eliminating misfires due to arcing or "water hammer." You'll find they function properly under the most adverse conditions.

Listen to "Cavalcade of America"
—Tuesday Evenings—NBC

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

Workhorse ON TOUGH DIGGING JOBS



ESCO Standard 2½-yard dragline bucket on No. 54B machine excavating footings for McNary Dam on the Columbia river in Washington.

Balance for smooth carrying...*control* for accurate spotting . . . *design* for quick dumping...*rugged construction* for absorbing the punishment of tough going—these are the qualities of *ESCO* dragline buckets that have made them the accepted workhorses on the most productive digging teams.

These buckets frequently are oversize for their machines. They give more passes an hour, and more payload with every pass. Here's why:

Lighter weight with wear resisting manganese steel and hollow arch construction.

Streamlined cutting lip with flaring outside teeth gives clean, full bite and lower resistance.

No excess weight, but extra strength where it is needed.

To meet the requirements of every digging job, *ESCO* dragline buckets are made in four types—medium, stripping, standard and heavy duty; sizes range from 3/8 yard to 20 yards. It will pay you to let us give you detailed information about these buckets. See your nearest *ESCO* representative, or use the coupon.

ESCO DRAGLINE AND DIPPER BUCKETS

ELECTRIC STEEL FOUNDRY

2163 N. W. 25th Avenue, Portland 10, OREGON

SALES OFFICES AND WAREHOUSES:

CHICAGO, ILL. — LOS ANGELES, CALIF.
EUGENE, OREGON — NEW YORK CITY, N. Y.
HONOLULU, T. H. — SAN FRANCISCO, CALIF.
HOUSTON, TEXAS — SEATTLE, WASH.
SPOKANE, WASH.

IN CANADA — ESCO LIMITED, VANCOUVER, B.C.

ELECTRIC STEEL FOUNDRY
2163 N.W. 25th Ave., Portland 10, Oregon
Please forward information on ESCO dragline buckets of following types: ☐ Medium, ☐ Stripping, ☐ Standard, ☐ Heavy Duty.

Name_____

Address_____ Zone_____

City_____ State_____

Make, model and boom length of machines used_____

1800 YARDS MOVED EVERY 10 HOURS ON A ROAD THAT *runs through a lake...*

After discharging material on the lake fill, the Motor Scrapers turned around by backing the rear wheels off the fill and into the muck forced up from the bottom of the lake. At all times they pulled out easily under their own power.

LaPLANT-CHOATE MOTOR SCRAPERS SPEED MINNESOTA ROAD RELOCATION PROJECT . . .

HERE'S the way to lick a tough fill problem. On the road relocation of highway 96 between White Bear and Stillwater, Minn., Kimmes Construction Co. of Hastings used *high speed* earth-moving equipment to move a total of 496,000 yards, including 72,000 yards of rock and earth as fill through the middle of a small lake. Two LPC Motor Scrapers and two C-114 tractor drawn scrapers have moved the bulk of the material, finishing 90% of the project which was scheduled for completion by August 1, 1950. Each Motor Scraper moved an average of 90 yards each hour of a 10-hour shift, on a 6000-ft. cycle.

Like Kimmes Construction Co., you'll find it pays to put powerful, high speed LPC equipment on the job when the going is tough. Get the full story of LPC profit-making advantages from your nearest LPC distributor. LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa—West Coast Branch, 1022 77th Ave., Oakland, Calif.

CHECK WHAT THESE ADVANTAGES CAN MEAN ON YOUR NEXT JOB

Speeds up to 21.2 mph • Big Capacity—14 yds. struck—17.5 yds. heaped • Over 16 H.P. per struck yard of capacity • Positive Forced Ejection plus High Apron Lift • 225 H.P. Buda Diesel • 45 H.P. Continental Starting Engine • 12 Cu. Ft. Westinghouse Compressor • 32 Amp. Autolite Generator • Lipe Rollway Clutch—17" • Fuller Transmission—4A112 • 4-Wheel Timken-Detroit Air Brakes • Double Acting Hydraulic Steering.

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

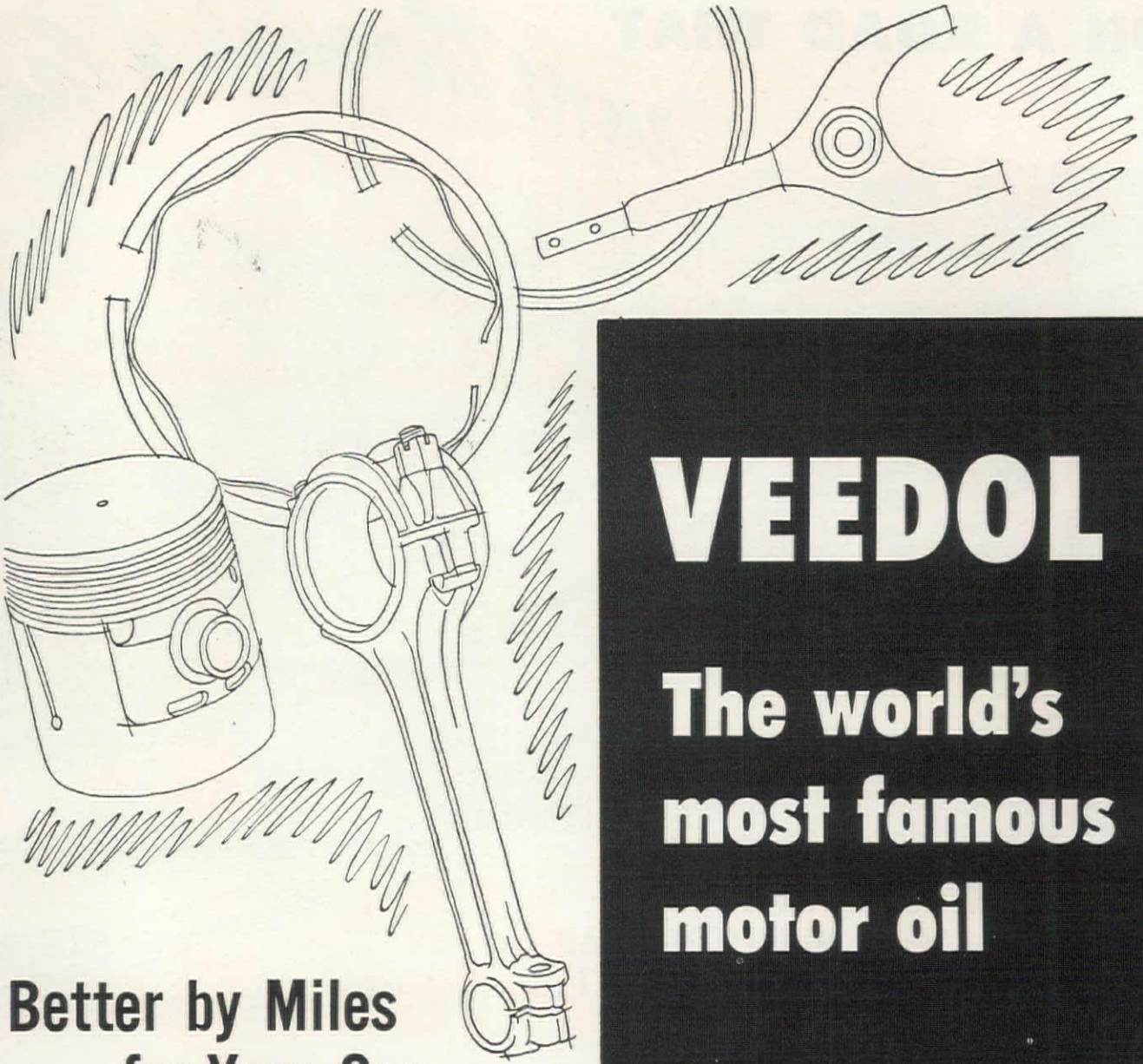
HEINER EQUIPMENT & SUPPLY CO.
501 W. Seventh Street South, Salt Lake City, Utah

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 C CHOATE



VEEDOL

The world's most famous motor oil

Better by Miles for Your Car

Because it's longer lasting—doesn't break down even under tough winter driving conditions—Veedol means more miles of better driving. Low pour-point Veedol, 10W and 20W, flows freely at the lowest temperatures. That means you get faster cold weather starting and warm-up, smoother engine performance, complete lubrication, and real winter protection for your car.

Veedol, famed as "The Aristocrat of Motor Oils," is made from 100% pure Pennsylvania base stocks. It is additive treated for extra premium quality. The Veedol film of protection means longer engine life. Veedol is available in SAE Grades 10 to 70.

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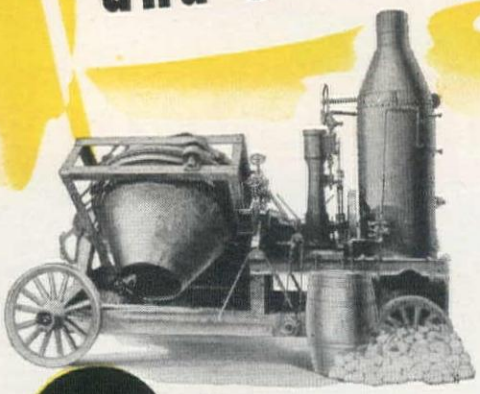

1900

The first duo-cone, tilting-type mixer.

Back in 1900, the first duo-cone, tilting-type mixer went to work . . . the product of the inventive genius of the late Thomas L. Smith. Judged by today's standards, it was a crude machine, but "TOPS" for mixers in those early days . . . the forerunner of the famous Smith line of concrete mixers that has made history in the construction industry.

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Today, Smith still leads the parade with the World's finest and most complete line of mixers . . . from the small 3½-S Mascot to the huge 6 yard Tilter . . . the World's largest concrete mixer. Also truck mixers in 2, 3, 4½ and 5½ yard sizes and agitators in 3, 4¼, 6⅛ and 7⅜ yard sizes. Write for catalogs.

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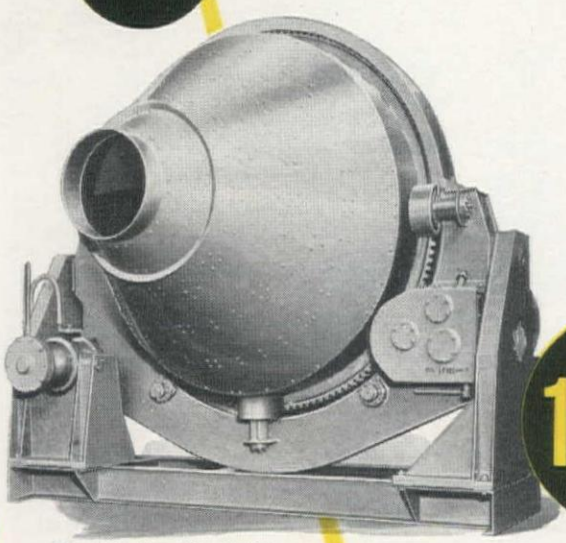
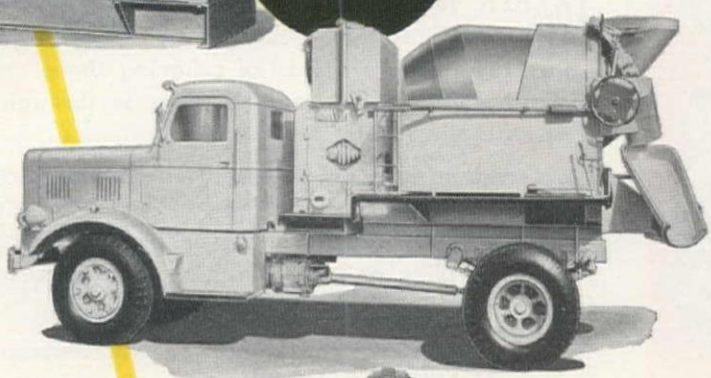


1950

One of the big Smith Tilters developed for modern central mixing plants.



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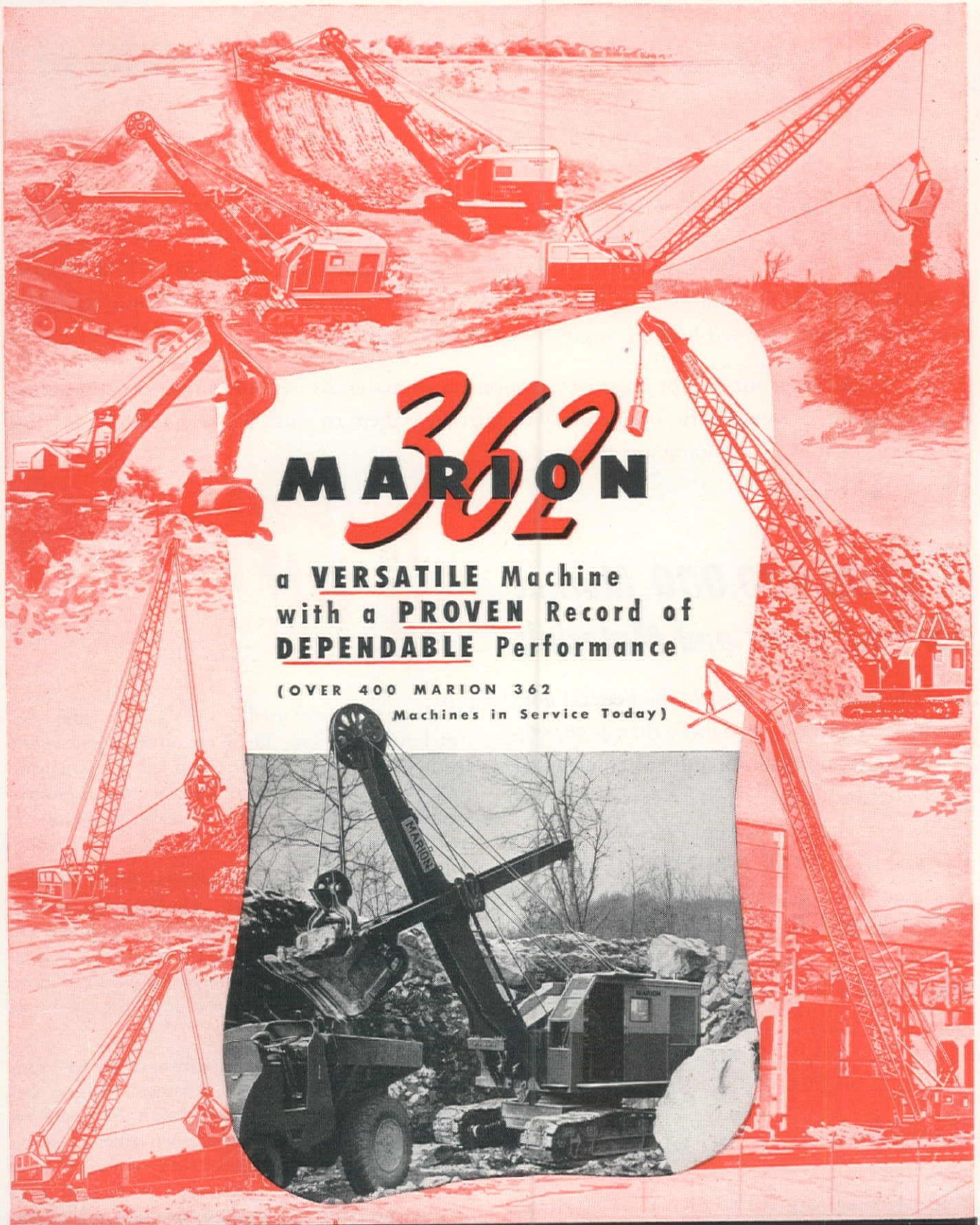
The Combination that's "TOPS" today

Smith Tilters for mixing concrete and Smith-Mobile Agitators for delivering the mixed concrete to the job. This winning combination assures bigger pay loads . . . more trips per day . . . increased profits.

1900 *Our 50th Anniversary* 1950

A Half Century of Progress Building Better Mixers



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Highways here are used to a far greater extent for trucking operations. There are no navigable rivers with their barge routes; no Great Lakes, or intricate railroad networks in the West, so the highways carry tremendous and ever-increasing tonnage of truck traffic.

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Bleed top, bottom or outside	20% extra	15% extra
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Inserts billed at earned black and white page rate. No extra charge for backup either single leaf or spread (4-page form).

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Write for availability of cover positions and rates.

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Space May Be Used in Any of the Following Forms:

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Halftone Screens

110- or 120-line preferred.

Closing Dates

First forms close for *Western Construction News* on 10th of month preceding issue date. Final forms close on 20th preceding issue date.

For *Western Industry* first forms close on 5th of month preceding issue date, final forms on the 12th preceding issue date.

Plates

Plates should be shipped mounted, and with proper mortise. All plates not called for in 14 months will be destroyed.

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Here's real "big" truck performance in the middle duty hauling range . . . here are GMC's new 470 models . . . trucks for over-the-road and off-the-highway operators that set new standards in 2½-ton hauling ability.

These GMCs are all truck-built from exclusive bumper-bar grille to tough, rugged rear axle . . . offered in single, double reduction or 2-speed types. They have big GMC valve-in-head engines and are available with air brakes . . . features that make them highly desirable for both truck and tractor use

GMC 470s, in ten models, are built to provide an extra margin of performance . . . to haul bigger loads at less cost in the construction transport field.

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TRUCKS

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Twenty Years Ago...

Items of Interest from WESTERN CONSTRUCTION NEWS

February, 1930

Progress and construction methods on the $12,000,000 Suisun Bay Bridge project for Southern Pacific Co. near Martinez, Calif., were described by **H. I. Benjamin,** assistant engineer of bridges.

●

H. W. Bashore, construction engineer for the U. S. Bureau of Reclamation at Vale, Ore., presented an article on the driving and concrete lining of 8,483 ft. of 10.5-ft. horseshoe-shaped tunnels on the Vale Irrigation Project in eastern Oregon. **F. W. Case** was superintendent for the Cement Gun Construction Co. on concreting operations.

●

Walter N. Frickstad, formerly senior highway engineer in the Western Region for the Bureau of Public Roads, was reported as the new city engineer of Oakland, Calif., to succeed **George N. Randle,** resigned.

●

F. A. Banks, construction engineer for the U. S. Bureau of Reclamation on the Owyhee Project, discussed at length the desirability of constructing large public works by the competitive bidding and contract method.

●

P. C. Thurmond, resident engineer for the Colorado State Highway Department at Pueblo, described the construction of 26 mi. of Colorado State Highway No. 1 between Pueblo and Colorado Springs.

●

F. W. Hanna, chief engineer and general manager of the East Bay Municipal Utility District at Oakland, Calif., discussed design and construction features of those portions of the East Bay Aqueduct that crossed the San Joaquin River.

●

A. M. Morrison, project engineer for the New Mexico State Highway Department at Carlsbad, described methods used on construction of 14 mi. of the highway between Carlsbad and Lakewood Highway.

●

Construction of a timber and concrete bulkhead for the outer harbor at Long Beach, Calif., and of a pleasure pier and auditorium building on filled land were discussed in articles by **R. G. McGlone,** chief engineer of the Long Beach Harbor Department, and **C. M. Cram,** marine construction engineer of the Long Beach Public Service Department.

●

Ralph L. Parshall, senior irrigation engineer with the U. S. Department of Agriculture at Fort Collins, Colo., was honored by having the name of the improved Venturi flume changed to the "Parshall Measuring Flume."

What can research do for a specification product?

We manufacture a "specification" product—cast iron pressure pipe. It is purchased under standard specifications set up by engineering organizations representing users of the product, consultants and manufacturers. Meet the specifications and the customer is satisfied. The question is whether the manufacturer should be satisfied.

About 20 years ago we decided to find out what research could do for a "specification" product. The function of Industrial Research was then, as it is now, to develop a better product at the same, or if possible, at lower cost. We built and equipped a Research Laboratory.

What research has since done for our product is a result best known to our customers! After all, specifications only establish a "floor" beneath which quality standards must not fall. Through research we have steadily elevated those standards and, through quality control, have seen to it that they are adhered to.

Progress made by individual companies eventually leads to higher standards which must be met by all makers of the product. And progress in the production of cast iron pressure pipe is important to water, gas and sanitation utilities as well as to the public they serve. The key to such progress is Research.

To further our Research program we recently dedicated a new, even larger and finer research laboratory and developmental foundry at our plant and main office in Burlington, New Jersey.

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America's largest producer of cast iron pressure pipe

WESTERN CONSTRUCTION NEWS
WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER
February 15, 1950 Vol. 25, No. 2

Construction Goes to College

THE BUILDING of engineering structures involves the related but separate functions of design and construction. It is generally recognized that the former represents the science of civil engineering, while the latter is commonly considered to be the business of contracting. For generations a knowledge of civil engineering has been acquired by academic study, whereas contracting has been something to be learned-by-doing, without much regard for aptitude or formal training. For various reasons—including an over-crowded course of study, as the science became more complex—colleges have found it expedient to consider the second section of the broad field of construction as outside their educational limits. This was logical during days when contracting and construction "know-how" consisted mainly of understanding men and mules.

However, with the arrival of mechanization in construction, contracting soon developed into a highly specialized business, demanding a knowledge of such factors as production methods, managerial techniques, personnel, time study and cost accounting. At about the same time the science of civil engineering had progressed to designing structures of such size and complexity that engineering talent was required in the operations carried out by contractors. In many ways the work of the design office and the field organization had become more and more interdependent. As a result, an increasing number of engineering graduates were recruited by contracting organizations. This, in turn, attracted more students toward such job opportunities and careers.

Reluctantly, and with a realization of the many complex problems presented, the engineering colleges are now beginning to study this situation. The pressure is two-fold: students desiring careers "in the field" are asking for courses which will aid them in securing work with contractors, and contractors are seeking engineering graduates who are better equipped for starting jobs. The resulting new trend in engineering education will be a slow one. There is little precedent and there will be few guideposts. Contractors must be patient in their desire to see innovations in such an established routine as engineering education. Further, it will be to the advantage of contractors to offer counsel and direct assistance if a logical program is to advance with a minimum number of false steps. Consider these problems facing engineering educators.

First, the course for a student electing to specialize in construction must retain basic engineering studies. As civil engineering has become more complex the normal course has become so filled with essentials that little time remains for specialities. However, the contractor-employer will expect some knowledge of structural design, sanitation, highway technique and soil science, to mention a few fundamentals, because the graduate will be hired as "an engineer." Further, the student should know something about cost keeping, contract law, and management methods, if he anticipates advance into administrative positions. Obviously, some provision should be made to introduce courses relating to modern construction equipment and its use. The planning of such a four-year course appears formidable.

Second, the providing of physical facilities for the study of equipment, with the problems of cost and the availability of land will be beyond the reach of many institutions. Perhaps this is where the contractors must take over and offer juniors and seniors a chance to work on equipment for six months or a year. It would be a logical contribution to the general program. It would also provide a contractor with an opportunity to look over and appraise candidates for his organization.

Lastly, the most difficult problem will be to find men with proper qualifications to set up and direct such programs in engineering colleges. The requirements for these positions are as obvious as they are difficult to meet.

All in all, the problem of introducing a program of courses in construction to engineering education will require the thoughtful cooperation of colleges, engineers, contractors and the manufacturers of equipment. It is a problem with elements of mutual interest which deserves attention.

Why the Lag in Estimates?

ENGINEERS' ESTIMATES have a serious tendency to lag behind the ups-and-downs of contractors' bidding. Since these bids represent the going cost of construction, the discrepancy implies a lack of essential information on the part of the engineers. Immediately following the war, bid prices rose so fast that estimates were always much below the contractors' proposals. This made the engineer appear unrealistic in the minds of public officials, disrupted financial planning and caused needless delay in the start on much needed projects. New calls for bids—often with similar results—meant new delays and aggravated the public in its attitude toward financing improvements.

Today, the situation is reversed; bids have been showing a wide gap below the estimates. In fact on some recent jobs the highest bid has been below the estimate. Although this condition is not as serious in its effect on construction timing and planning, it continues to place the engineer in the unfavorable position of seeming to be unfamiliar with conditions within his own industry. Contractors, of necessity, must be closer to the cost trends than engineers. If they are not, they are not contractors for long. Their figures represent a most sensitive index on the fluctuations in the prices of labor, materials and services. However, there is no reason why the lag between bids and estimates needs to be so long and so large. Engineers should be more familiar with current costs. Too many times they are inclined to assume prices to remain stable from one of their jobs to the next, and estimate accordingly. Costs move too fast for this assumption and recourse should be taken to studying all bids from all jobs available as a means of noting trends. Engineers should take pride in having their estimates in close agreement with current bidding.

Ingenuity on Small Jobs

WHEN REQUIREMENTS of providing a movable span were dictated for a bridge on a county highway over a little-used waterway along the Oregon Coast it demanded real ingenuity. That the engineers were able to solve the problem with proper regard for economy is indicated in an article in this issue, which describes the design and operation of a retractable section of decking. The problem is not a common one for most county engineers, but a review of the problem and its solution provides stimulating reading as it shows the degree of engineering ability which can be developed on small projects. In proportion, the smaller jobs represent the greater opportunities for exercising the skill of "making one dollar do the work of two."

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"50" The "50" Plant illustrated is one of the many smaller sizes of Austin-Western Portable Plants. Bins, Crushers, Screens, Elevators and Conveyors are available in a wide variety of sizes and may be easily combined to meet any individual production problem.

"81" A 1036 Roller Bearing Jaw Crusher, combined with perfectly matched screens and conveyors, make the compact, efficient "81" the ideal plant for many installations. It's engineered from end to end for continuous "low-cost tonnage."

"101" The unrivalled production of the "101" is due to its high-speed Jaw and Roll Crushers, and its completely "balanced" design which provides unusually wide conveyors and extra-large positive-throw type vibrating screen.

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WESTERN CONSTRUCTION NEWS
FEBRUARY 15 · 1950

Problems of Safety Solved by a Conservatively-Designed—

Multi-Layer Lining for Reservoir

Layers of asphaltic membrane, porous concrete, compacted earthfill and asphaltic concrete, along with an elaborate system of drains, provide an 18-ac. impervious lining for a water supply reservoir at Los Angeles

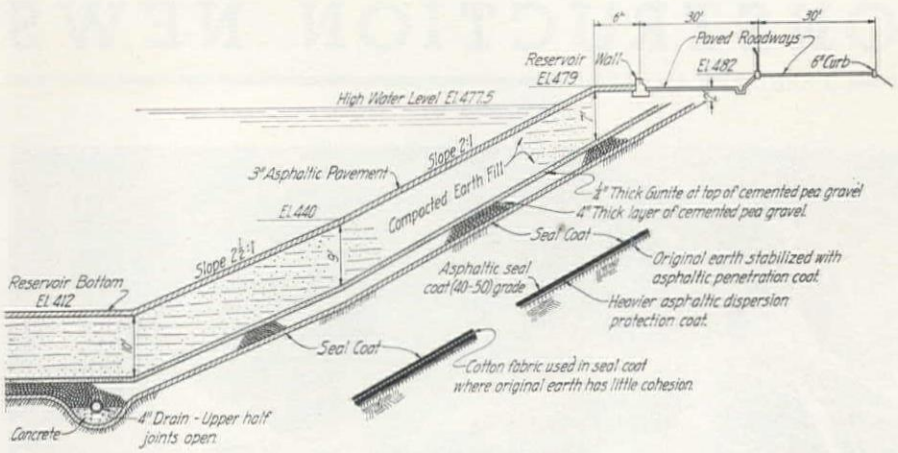
APPROACHING the ultimate in the design of impervious linings for water supply storage, the Baldwin Hills Reservoir of the Los Angeles Department of Water and Power provides these major elements below the 65-ft. depth of water: (1) A 3-in. asphaltic pavement, (2) a 10-ft. thickness of compacted earthfill, (3) a 4-in. layer of porous concrete to collect and direct possible seepage in an elaborate system of drains, and (4) an asphaltic membrane as a final water-seal against the earth of the subgrade. This multi-layer lining will cover an area of 18 ac., representing the bottom and slopes of the reservoir, which will have a storage capacity of 900 ac. ft.

The storage site was developed by widening a small canyon along the top of the Baldwin Hills and building an earthfill dam across the downstream end. The general arrangement of the site is shown in the air view at the top of the page. In addition to the main dam, five other small fills were required around the edge of the reservoir. The main dam is a compacted earthfill rising 165 ft. above the bottom of the canyon, with an 892-ft. length of crest. Construction of the dam and general features of the project were reviewed briefly in *Western Construction News*, May 15, 1949, page 81.

Site problems

This improvement in the distribution works of the Los Angeles water system was made necessary by the rapid increase in population and demand in an area near the southern limits of the city. This area is served by long feeder lines, and a reservoir for emergency storage and to equalize supply-and-demand has been under consideration for several years. The problem was to find an adequate site, and particularly one with sufficient elevation to aid in maintaining proper water pressure. Baldwin Hills is an isolated feature of topography forming a small plateau, cut by numerous small canyons, with elevations reaching nearly 500 ft. The construction of a reservoir at this site with a capacity of 900 ac. ft. and at Elev. 477.50 had advantages of proper location, size and elevation, but the material forming the geological feature of the hills constituted a serious problem. Utmost safety was demanded because the surrounding area represented a district with rapidly increasing population. Building necessary safety into the reservoir represented increasing costs for the storage, providing another serious design problem. However, need for terminal storage at this particular point on the system resulted in the decision to build the Baldwin Hills Reservoir in 1948.

Water will be delivered to the reservoir through a 57-in. inlet line from



CROSS-SECTION of slope shows relative thickness and position of the layers.

HORIZONTAL rough grading proceeded from top to bottom of the inside slopes.

TRACTOR-GRADERS handled accumulated material for grading near the bottom.

HAND-TRIMMING finished inside slopes preparatory to membrane application.

Franklin Reservoir, and will be withdrawn into the present distribution system, through a 66-in. outlet line. No local run-off will enter the reservoir.

Fill and grading

The hills are composed of sand, sandy loam and silt, and the strata of unconsolidated pervious material constituted the basic engineering problem in storing 900 ac. ft. of water with a maximum depth of 65 ft.

Rough excavation of the site, which was completed some months ago, placed the final cut and fill sections (including the upstream face of the dam) from 1 to 2 ft. inside the final subgrade. The first operation of the contractor in the construction of the lining was to grade the sides and bottom to final line. This required cutting the undisturbed material and the sections of fill back to an average of about 2 ft. The possibility of cutting this material from top to bottom was discarded in favor of horizontal operations starting at the top and continuing to the bottom of the slopes.

Starting around at the top, motor graders were used on 2:1 slope and it was necessary to hold the grader at the proper elevation by a cable attached to a tractor which moved along the top at the same relative speed. As the loosened material began to accumulate, bulldozers could be used to move the material down the slope. Near the bottom of the slopes this accumulated material was of sufficient quantity to permit the use of carrying scrapers to load and haul the material outside the reservoir. This material was classified as it was removed and the "selected material" was stockpiled for the final lining. Grading of the bottom did not involve the problems encountered on the side slopes and was carried out with scraper equipment. The final preparation of the slopes was hand trimming to the established grade line. The floor of the reservoir has a 1% slope toward the center and the tower.

Asphaltic membrane

The design calls for an initial asphaltic membrane sprayed on the slopes and bottom as a water stop for any seepage. As a prime coat, slow-curing asphalt was applied at a rate of 1 to 2 gal. per sq. yd. The slow-curing grades used ranged from SC-1 to SC-6, the exact grade selected depending on the porosity of the soil. Quantities used depended on the same factor, and penetration ranged from ¾ to 2½ in. The prime was sprayed directly on the dry soil in several applications of from ¼ to ½ gal. per sq. yd. each. After a minimum curing period of three days, a coat of SC-5 penetration asphalt was applied at the rate of ½ gal. per sq. yd. The regular membrane was completed by a seal coat of 40-50 asphalt.

Extensive areas of the sides were excavated through unstable layers of sand and gravel. These areas, mostly on the sides opposite the dam, totaled almost 50% of the side slopes. Special consideration was given to the asphaltic membrane covering these areas. The problem was to secure a seal which would not be disturbed, or ruptured, by men walking and working on the membrane. The so-

lution was the introduction of a cotton fabric between two applications of the 40-50 asphalt.

The fabric was a loose-weave cotton sheathing 60-in. wide, which was laid in strips down the slope with a lap of 3 in. On this cotton was sprayed the final seal coat, penetrating the fabric reinforcing and building up a total thickness of about ¼ in. The seams were given a final brush application.

This fabric-reinforced membrane was applied over about 300,000 sq. ft. of area, and proved successful in making it possible for men to work on the unstable slope material.

Cemented gravel and drains

Since the asphaltic membrane was designed to stop the last penetration of any seepage coming through the compacted earth lining, a system of drains is provided on top of the membrane to collect and deliver any possible seepage to the outlet works at the downstream side of the dam. As a further protection, this system of drains is divided into eight separate areas with individual outlets so that any large flow can be established as coming from an individual area in the reservoir.

The drains are placed in trenches excavated in the bottom of the reservoir and lined with the same asphaltic membrane. Originally, these trenches were not lined with the fabric, but the contractor elected to put in the fabric lining to keep the sides of the trenches from being disturbed by men and equipment.

In the bottom of the drainage trenches, regular concrete was placed up to the mid-point of the 4-in. clay sewer pipe, which was installed along with the bottom concrete. The top half of the joints were left open. With the drains installed, the bottom of the reservoir was ready for the 4-in. layer of cemented pea gravel, which also filled the drainage ditches above the half-way point on the drain tile.

LAYING cotton cloth reinforcement before spraying of the final seal coat.

VIEW across the reservoir area showing part of the asphaltic penetration coat.

SPRAYING final asphaltic seal coat on an inside slope to complete membrane.

SPRAYING seal coat on reservoir floor preparatory to placing gravel blanket.

SPRAYING final seal coat on cloth reinforcing in ditch at toe of inside slope.

DRAINS in the reservoir floor on top of the membrane will collect and deliver any seepage to the outlet works.

To conduct any possible seepage to the trench system, without disturbing the lower side of the earthfill lining, a 4-in. layer of cemented pea gravel was placed on top of the asphaltic membrane. This material consists of ¼-pea gravel designed for maximum porosity, with 1½ sacks of cement used per cu. yd.

This material was delivered to the floor of the reservoir by truck from a mixing plant located on the rim. Trucks dumped it into a tilting bucket, which was handled by a crane, and had a controlled gate to deposit a 4-in. thickness of the porous concrete, with final spreading by hand.

To protect the asphaltic membrane during this operation, a thin layer of loose gravel was spread to provide a surface for men and equipment.

To keep the earthfill lining from penetrating into this porous concrete and reducing its ability to handle any seepage, it is covered by a ¼-in. layer of gunite. This gunite is applied with standard equipment in the usual manner, but has a mix designed to provide a porous crust over the cemented gravel.

Compacted fill

The basic feature of the impervious lining is a layer of compacted earthfill which is 10 ft. thick over the bottom and tapers to a 7-ft. thickness at the rim of the reservoir. This compacted earth lining is designed to be the "impervious" feature of the complete lining.

It will be built up with carefully selected material, observing proper rules for moisture content and will be compacted in 6-in. layers by sheepsfoot-rollers of a design approved by the Los Angeles Bureau of Water. Every precaution will be taken to make this earthfill impervious to passage of water from the reservoir.

Asphalt paving

The final feature of the lining is a 3-in. layer of asphaltic pavement which completely covers the earthfill over the bottom and sides of the reservoir. This asphaltic pavement is of rather standard design and is not intended to provide water tightness. It is intended to make possible cleaning and maintenance operations by wheeled equipment, and to prevent any erosion of the earthfill from wave action at water level. This paving will be placed by standard construction procedure.

Organization

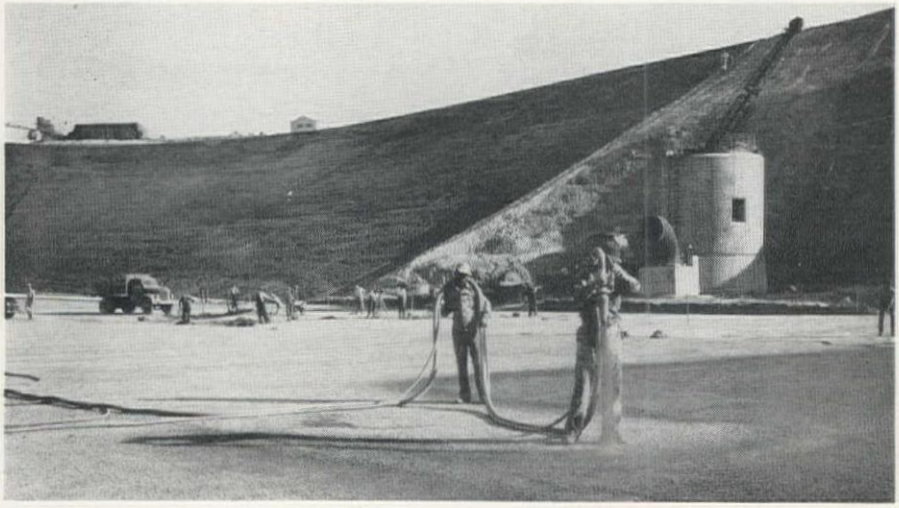
Design and construction of the Baldwin Hills Reservoir is being carried out by the Los Angeles Department of Water and Power under the general direction of Samuel B. Morris, General Manager and Chief Engineer, and Laurance E. Goit, Chief Engineer of the Water System.

R. R. Proctor, who is head of the Field Engineering Division and is a pioneer in the field of rolled-earth dams and applied soil mechanics, designed the unusual compacted fill structures and has engineering supervision of the work.

N. M. Imbertson is Engineer of Construction and Inspection, and Loring E. Tabor is Supervising Engineer of Inspection.

Contract for the construction of the lining and the outlet works, which include a 400-ft. length of tunnel, is held by M. F. Kemper Construction Co. of Los Angeles. The asphalt lining was placed by Warren Southwest, Inc. of Torrance, under a subcontract. This work was under the direction of Frank L. Holloway. Bruce Kemper is in charge of the contracting operations.

PEA GRAVEL blanket spread on top of membrane will conduct seepage to drains.



GUNITE applied to the gravel blanket will prevent penetration by the earthfill.

THE BRUTAL and uncompromising battle between Arizona and California over the waters of the lower Colorado River has cost the Lower Basin area another big loss, according to Sen. Pat McCarran of Nevada.

The Air Force has decided to locate a new supersonic experimental station in Tennessee rather than near Las Vegas, Nev., which had received favorable consideration in the early stages of the planning. The Air Force sought assurance that a considerable volume of water be available for the station, and engineers reported that the eastern site was "safer" because the final disposition of the water in the southwest might result in reducing the available quantity.

Unique Drawbridge Saves County $$

Douglas County, Oregon, utilizes limited funds to construct 122-ft. flat retractable span for a drawbridge that will seldom be opened — Prefabricated spans floated to bridge site

By
FLOYD C. FREAR
Douglas County
Engineer
Roseburg, Ore.

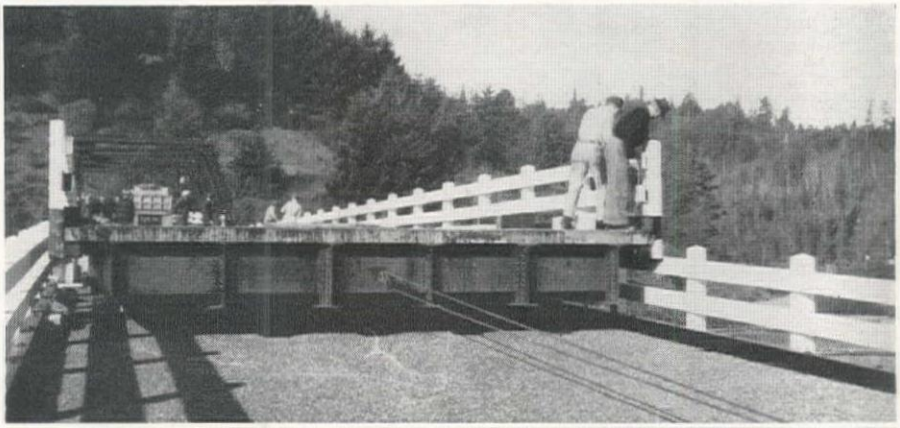
FOR THE FIRST TIME in the 80 years that Oregon's Smith River Valley has been populated, a bridge will connect the residents to Gardiner and U. S. 101, the main coast highway. Crossing the main channel of the Smith River, the $150,000 Douglas County bridge is noteworthy for the fact that it saved many thousands of dollars in county funds by utilizing a flat, retractable span for 122 ft. of the total 556 ft. of bridge. Tom Lillebo, Reedsport, Ore., was general contractor on the recently completed $124,000 contract, which included erection of a 183-ft. timber truss span.

The problem

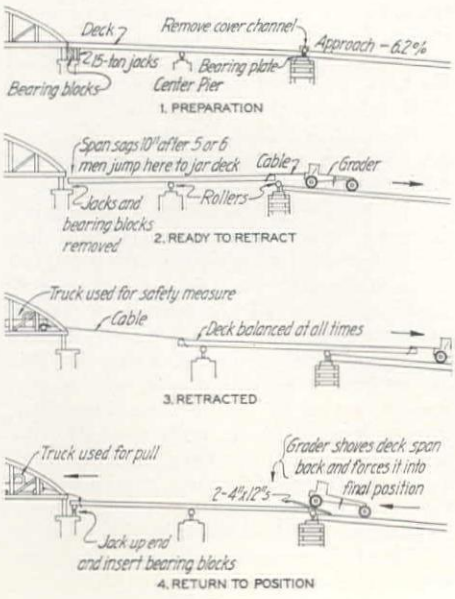
The Smith River at the bridge site is a navigable stream. Therefore, the bridge had to have a span sufficiently high to clear normal traffic and a drawspan to give clearance to vessels with high superstructures. A bowstring timber truss provided ample height for normal traffic on the river, but the problem of a drawspan remained. The cost of a lift span or bascule was far too high, yet the War Department would not approve a low, fixed span for a bridge crossing a navigable stream. It is quite possible that the span will never be opened, but provision had to be made according to law. Of the two retractable-span bridges in Oregon, the Smith River Bridge is the newer and longer. Both bridges are in western Douglas County, and the first, on U. S. 101 across the Schofield Slough at Reedsport, has been opened only once or twice since it was built by the State 20 years ago.

The retractable span consists of six 27-in., 94-lb. I-beams, with the necessary guides and rollers. Universal nailing cleats hold the 5½ x 7½-in. T & G decking directly to the I-beams. To open the bridge (refer to sketch), one end of the span is lifted up and over to the abutting deck of the permanent approach. Using heavy trucks or road equipment, the retractable span is simply tilted at its center pier and hauled onto the 251 lin. ft. of trestle bridge approach. The clear width of the trestle section of the bridge is 22 ft., or 2 ft. wider than that of the drawspan, to give a clearance of 1 ft. on each side when the bridge is opened. The 122-ft. deck span retracts half of its length.

Upon completion of the bridge, the span was tested by the county to see if this type construction, giving the county high savings in initial cost, was practical. The job fell to the contractor, who used the county's A-W 99 grader and a gravel



THREE STEPS in retracting the span are illustrated at right. Top, the span has been tilted at its center pier and the forward end hauled onto the trestle approach by means of a cable and grader. Center, the grader slides the span across rollers on the center pier and the first trestle bent. Bottom, the span is sufficiently retracted. A 6-man crew using county road equipment can do the job in 2 hr. The sequence of operations is shown diagrammatically below.



truck to do the shoving and pulling. At the head end, the grader retracted the span with ease on the slight down grade. To shove the span back in place, the grader was helped at the far end by the truck, which was cabled to the span. To open the bridge, it required 6 men working 2 hours using planks, blocks, and jacks along with the grader. To close it, 6 men required 30 minutes with the grader and truck.

As a matter of safety, the truck helps to support the cantilevered end of the span when it is being moved in either direction. A cable from the truck is tied to the deck's felloe guards through two eye bolts for this purpose. Although 24 hours' notice is required for the opening, the new bridge is a great improvement over the 20-year old similar one at Reedsport, where it is estimated to take several hours of hard labor by a large crew and two trucks to do the job.

Span floated to site

The retractable span was assembled at Reedsport on barges, then floated the 5-mi. distance to the site and hoisted into position, eliminating the need of any falsework. The hoisting was done with a large gravel dredge, owned by the Umpqua River Navigation Co.

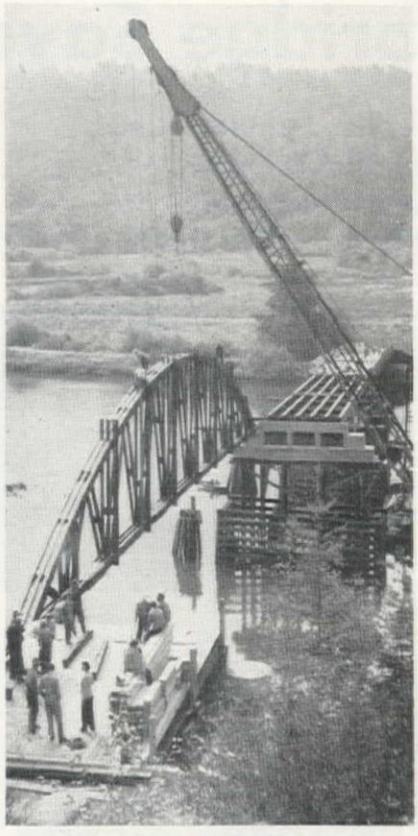
The north abutment, as well as the north pier, consists of concrete footings, pedestals, and a concrete pier on good sandstone bedrock. All footings were poured at low tide, eliminating the need for a tremie pour. The rest of the foundation consists of piling, due to the depth of the river. Under the main river pier, where soundings are —17 to —19 at low water, 90-ft. piling was used. All piling was jetted and driven with a 5,600-lb. hammer to the lowest elevation of —50.2.

Two timber cribs were constructed around the center pier and retractable span pier, and were filled with 1,883 cu. yd. of large rock. These cribs are protected at the upstream ends by two 17-pile dolphins that head off the large log rafts frequently passing under the main span.

Rock placed from dredge

The rock for the cribs was floated to the site on the gravel dredge, quickly and with no difficulty. The main problem was in the placing of rock from the dredge to the cribs. At first, the contractor used the dredge company's ⅜-cu. yd. shovel. This did the job, but required too much time. The contractor then experimented with a Hough Payloader and barges. The loader was cramped into the barge at the borrow site and floated to the cribs with the rock. At the unloading end of the run, it took a little time for the loader to "eat" its way clear of the piled rock, but after getting a good start, the loader far outperformed the shovel at unloading. In wet weather, the loader placed 100 cu. yd. per hr. from the heaving barge up 8 ft. into the cribs, as compared to 60 cu. yd. placed hourly by the shovel through the same lift.

Because the bridge was built from both ends towards the center, several 300-ft. base lines were established, and measurements were taken by triangulation. This took more field engineering, of course, but rewarded the county in the long run, since the bowstring trusses were placed in less than five hours and fitted nicely over the anchor bolts placed in the piers. Only two men were needed to spot it in place.



THE TRUSS ASSEMBLY was floated to the bridge site on two barges lashed together, and lifted into place on the piers by a floating crane. Eugene Division of Timber Structures, Inc., designed and fabricated the truss.

Timber truss prefabricated

The main span of the bridge is 183 ft. long, and was designed and fabricated by the Eugene Division of Timber Structures, Inc., to provide standard H-15, two-lane loading. The bowstring trusses, including the laminated deck, were treated with a 15% creosote, 85% petroleum oils mix, with an additive of pentachlorophenol in the amount of 5% of the total. This treatment was done under a retention of 8 lb., giving the span and deck a life expectancy of 40 years.

The trusses are made up of a three-leaf top chord, glued and laminated from net sizes 5¼ in. thick and 16¼ in. deep. The laminated sections are mostly 40 ft. in length, with short starters at either end. There are three of these top chord segments, assembled with two webs between them to make up the complete top chord.

The lower chord of the truss consists of regular sawn material, with a standard surfacing of three 6 x 16-in. material, and with two webs going in between the three lower chord members. All splicing and web connections are made with the use of standard Teco 4-in. split ring connectors, and bolts and wooden splice plates are used between and on the trusses at the panel points, which are approximately 20 ft., 4 in. apart, with two 12 x 28-in. beams placed at each panel point and the beams being to 38 ft. long. On the top of the floor beams, a laminated deck of 2 x 10's laid edgewise and spiked together makes up and completes the deck structure.

Vertical curve

The splices are mismatched at intervals throughout the length of the bridge, in such a way that no two splices come immediately opposite each other unless they are separated by four laminations. On each edge of the deck itself, there is a sill followed by a riser, permitting the water to run out under a felloe guard placed on top. Bracing of the bridge span is obtained by overhead girts running across the top of the bridge from one truss to the other, with "X" bracing between and a series of rod braces running from panel point to panel point. The deck system itself gives stability to the lower portion of the bridge.

An interesting design feature of the main span is the fact that the grade on the bridge changes from a minus 2% to a minus 4.2% at the center line of the truss. This required a vertical curve, which was built into the truss by an increase in camber. There is a normal camber put into the bridge to offset the sag due to dead load, as well as most of the live load, but in this case it was necessary to add 6¼ in. additional camber to get the right vertical curve.

The laminated members are glued with a phenolic, resorcinal glue, which has been found to be waterproof. The gluing takes place before pressure-retort treatment, and shows no signs of delamination.

Barges deliver truss assembly

The truss assembly was conducted to the wharf in Reedsport, where the bowstrings were put together on two barges lashed to each other. This took one week to accomplish. Actual erection was done by the contractor, who floated the barges to the site and then lifted the trusses to the piers by a floating crane.

The necessary data, sounding, surveys, and preliminary designs were submitted to G. S. Paxson, bridge engineer, Oregon State Highway Department, who later prepared the plans and called for bids. The work was started in March, 1949, and completed recently.

The 183-ft. timber truss span cost $27,930 f.o.b. the bridge site, making the entire cost of the structure $151,923.

The bridge will open up a rich dairy, farming, and timber country that has heretofore had no transportation except by boat since it was first settled over 80 years ago. The road connecting with the bridge up the south side of the Smith River was laid out by the writer in 1940, as well as the bridge site which was staked out at the same time. However, due to lack of funds, only a small crew was employed for several months each year on the grading and clearing. The County Court, consisting of D. N. Bushenbark, Judge, and Lynn Beckley and R. G. Baker, Commissioners, plans to complete the 5-mi. road early in 1950.

Tracing a Modern Highway Development—

Cement-Treated Base in California

Cement-treated base has been used extensively in California during the past decade with increasing breadth of application—The experience record shows that it is a proven engineering material with demonstrated economic advantages

IN THE LAST ten years the California Division of Highways has put down more than 5,000,000 sq. yd. of cement-treated base, which is about 90% of all this type of construction in the West, and 20% of the U. S. total. In addition to the extent of these operations, a review of this work indicates that: (1) The state has used this procedure long enough and consistently enough to demonstrate conclusive results, (2) it has pioneered in phases of laboratory control, (3) it has developed several original ideas which depart from generally accepted practice, and (4) this year marks the introduction of cement-treatment into the state's Standard Specifications for the first time. In all, there is good reason to consider that a milepost has been reached in this field of highway development, and that a review would be helpful in bringing to date the experience record and the current practice of the California Division of Highways in the treatment of base materials with Portland cement.

A word of history

In 1937 the use of Portland cement to treat road materials was first tried in California as an experiment by the U. S. Forest Service in San Bernardino National Forest. This was followed by the building of two experimental sections by the state with its own forces. In the spring of 1938, the Division of Highways concluded that this experimental work justified the preparing of specifications which would permit a call for bids and contract operations on additional sections of highway. These operations and the field methods and equipment involved were reviewed frequently in the pages of *Western Construction News* during these two years and an accompanying table provides reference to these articles. At this early stage the field work was carried out with equipment "borrowed" from the farm. The cement was spread by the sack over the roadbed material, and mixed in place dry. Water was added and the mixing completed, followed by blading to grade and compaction with steel rollers. Finally, a thin wearing surface of bituminous material was added to resist abrasion.

This type of construction was considered, at that time, to be one of the answers to the need for "low cost roads" carrying relatively light traffic. This concept was in line with the general idea prevalent in those eastern states first developing this method of using "soil-cement." The mixture of cement and native road material was designed to produce a low-strength concrete averaging about 1,500 lb. in 28 days. The cement content was from 6% to 8% and the strengths varied extensively, ranging from 1,000 to over 2,000 lb., depending on the aggregate and field conditions.

Two problems

As the process was continued and extended in California, it became more and more evident that two basic problems must be considered—one technical and the other involving highway economics.

On the technical side, the "soil-cement" was rich enough to develop serious shrinkage cracks as it hardened, and at the same time was strong enough to have these cracks spaced at fairly long intervals with resulting widths and movements of serious dimension. These contraction cracks were too wide to be bridged by the bituminous top-coat and they extended through to the surface, with resulting problems.

On the economic side, the Division of Highways could not justify the cost of this type of construction for secondary routes carrying light traffic, as compared to the use of a bituminous mix on selected base. So that this new development could be extended and improved in usefulness, California highway engineers came to the conclusion that it would have to be modified into a procedure which would make it suitable and adequate for use on primary highway roads carrying reasonably heavy traffic. Only by this modification in the general program would the idea of cement-treatment develop in usefulness and justify its cost.

Evolution of cement-treatment

The first cement-treatment in California was accomplished by the road-mixing method, using farm equipment. This was in line with reports of work in the eastern states. However, the superior work obtained in California by plantmixing bituminous mixtures compared to the roadmix procedure suggested that plantmixing would also be an improvement for the cement-treatment process. Therefore, plantmixing was generally adopted for the majority of projects around 1940. At the same time, it became evident that a substantial thickness of bituminous surfacing was desirable. Very thin layers displayed a tendency to loosen and slip on the surface of the cement-treated base and it is now the general practice to provide a wearing surface of bituminous mixture ranging from 2½- to 3-in. thickness.

As time passed and it was possible to observe the performance on the various projects, it became evident that cracking in the bituminous surface was less in evidence over the weaker bases and therefore the cement content was gradually reduced from the 6% to 8% originally used to about half that amount. The resulting cement-treated base was weaker and developed more shrinkage cracks at closer intervals, but the individual cracks were smaller.

On most of the projects, the selected aggregate had to be hauled to the site from an acceptable pit or quarry developed by the contractor. Experience demonstrated that putting it through a

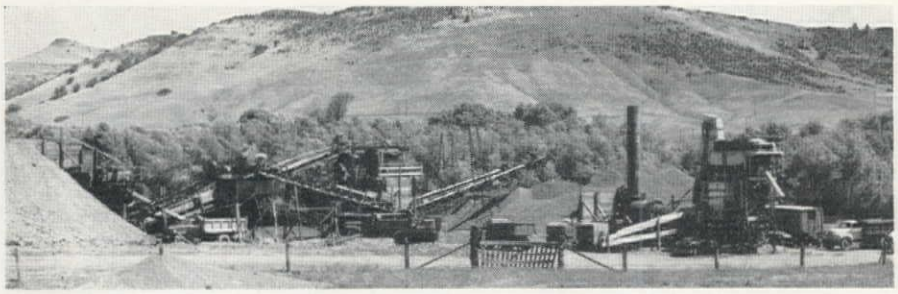
Articles Describing Early Developments

	Issue
Portland Cement Soil Concrete Used on First Western Highway Project	Nov. 1937
Soil-Cement Highway Base Advanced to Contract Stage	May 1938
Soil-Cement Roads Feature Highway Work of 1938	Jan. 1939
Contractors Methods on a 3½-Mi. Soil-Cement Highway Base	Aug. 1939
Cement-Treated Base Run Through Mixer	Nov. 1940
Double-Duty Mixing Plant	Mar. 1941
Summary Table of Cement-Treated Base Roads in California	July 1941

Record of "Soil-Cement" Use in California

Year	Sq. Yd.
1938	127,553
1939	158,138
1940	93,829
1941	1,186,074
1942	1,902,343
1943	539,975
1944	1,274,868
1945	482,140
1946	1,223,685
1947	837,247
1948	2,695,182
Roads	4,989,662
Streets	1,061,780
Airports	2,757,462
Miscellaneous	1,737,652
Total	10,546,556

Source: Portland Cement Association.



SCREENING and crushing plant used to prepare aggregate and mix cement-treated base for a recent California highway project. This plant was also used to mix bituminous top course.

mixer (rather than mixing in place) did not increase the cost materially, as compared to the advantage of better control. Occasionally, the native metal on the road was of proper quality and mixing-in-place was the process selected.

As a result, this type of highway construction evolved into a cement-treated base of selected materials with standard bituminous top course.

The cement content was gradually reduced to the 3% to 4%, as already mentioned, and the strength requirement was reduced to 650 lb. at 7 days. Field experiments were tried at further reducing the cement content in the interest of determining the minimum amount which would produce a uniform mix and consistent strengths. Cement additions as low as 1% of aggregate produced satisfactory results as to consistency, and one roadmix experiment was tried at ½% with surprising results as to uniformity, contrary to expectations. However, these extreme mixes have not been used except experimentally and the standard specification strength remains at 650 lb. in 7 days, which calls for 3% to 4% cement with average aggregate materials.

These developments have been carried out in conjunction with extensive research by the Materials Laboratory covering the characteristics of suitable materials, simplified tests, and field procedure and control. In fact, laboratory investigations form the basis for advancing much of the technique of cement-treatment.

Stabilization—

A TERM being discarded by the California Division of Highways as too vague and lacking in definition. The word has been used to apply to the treatment of highway materials with a wide range of products and processes with results which are too variable to justify engineering use.

Weight vs. Volume

MEASUREMENT of materials by absolute volume has advantages in engineering calculations and is generally favored in laboratory determinations. However, in the field the practical advantages are in favor of weighing aggregate, cement, asphalt and other materials. For this practical reason the California Division of Highways uses weight as the system of measurement. Thus, all references to cement used for treating base are in terms of "per cent of dry weight aggregate"; actually the figure can be considered the proportion of weight of cement to weight of dry aggregate.

To improve bearing value

An off-shoot from this development has been the use of cement to bring unsatisfactory base and sub-base material up to permissible standards. For example, some native materials located at economical distances from project sites might be found to have low bearing values and/or a high plasticity ratio, which could be improved by the addition of small amounts of cement. This treatment, usually as mixed-in-place, would result in material up to the standard for "crusher run base." In fact, there have been occasions when contractors faced with state disapproval of material from a convenient pit would elect to go through this procedure at their own expense to secure a resulting product up to specifications. In the past, such materials would not be measured in terms of strength per square inch, but by the California Bearing Ratio test for the approval of base material. In the future, such low-cement combinations will be evaluated in the Stabilometer test.

Outline of present practice

Materials—a wide range of mineral aggregate has been used successfully for cement-treated base, including: fine silty sands, disintegrated granite, streambed gravels, reasonably clean sand and aggregate suitable for concrete. On many projects the material is similar to crusher run with a 1-in. maximum size. Although modified to suit local materials in the interest of reducing costs, a satisfactory typical grading of the aggregate would usually meet the following limits:

		Per Cent
Passing	1-in. sieve	100
"	¾-in. "	90-100
"	No. 4 "	40- 75
"	No. 30 "	15- 40
"	No. 200 "	3- 15

Cement requirement for treatment is based on laboratory tests and is designed to produce the stated minimum of 650 lb. in 7 days.

Proportioning—Plantmixing is the preferred practice in California. Since most of the aggregate is carefully selected and trucked to the site, the cost of putting the material into bins and through a mixer is reasonable considering the better control of the final product.

On those projects where the material on the road is found adequate for treatment, the cement is applied in bulk from a distributor, which is geared to place a pre-determined amount per square yard of base to be treated.

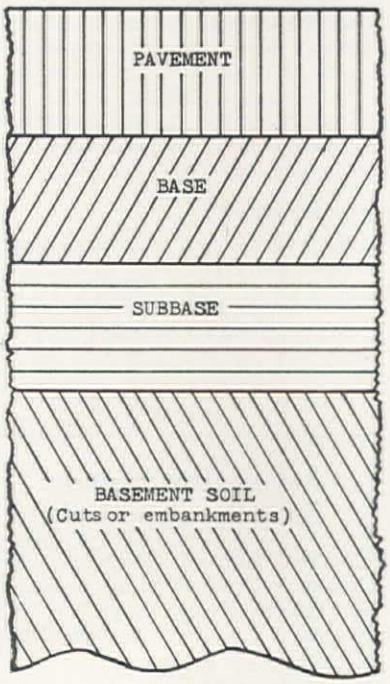
The aggregate, when mixed at a plant, is separated at the No. 4 sieve size and stored in two bins. Proportioning of aggregate and cement is by weight with variations limited to 2%. The cement is added with the aggregate to hasten its distribution through the batch, and is not added separately.

Mixing—A pugmill with conventional rotating blades (either batch or continuous) is the standard unit now used for mixing. Early experiments with a concrete mixer with revolving drum did not prove successful in fine material because the batch was too dry and stiff to mix thoroughly, and the drum was too hard to keep clean. Minimum time in the mixer is 45 sec. after charging.

Water content is not specified by definite quantity, but by the amount which will "permit maximum compaction of the treated material on the roadbed."

A further requirement relative to mixing is the specification that the mixer capacity provided by the contractor be sufficient to turn out at least 100 tons

Levels of Highway Substructure



Definitions of various levels in a highway substructure according to recommendation of a subcommittee of the Committee of Materials, American Association of Highway Officials. Base and/or Subbase may be introduced between Pavement and Basement Soil in amounts and thickness which are determined by the supporting value and character of Basement Soil.

These definitions have not been officially adopted by the California Division of Highways but are used to illustrate terms used in this article.

per hour. This construction requirement results from the improvement obtained by having placing proceed at a rapid rate for effective rolling and finishing.

Placing—Trucked to the road, the material must not be dumped, but should be spread out over the full width of the moistened roadbed not more than 30 min. after mixing. The spreading unit commonly used is a crawler tractor with special dozer blade. Tracks of this equipment are not considered serious, as they are removed during subsequent compaction, but tracks of a blade grader are found objectionable if they are filled in before or as part of the compaction process. The filled in tracks then contain more material than the adjacent areas, which results in uneven compaction.

Shaping or blading after spreading has been found undesirable as it develops horizontal planes in the material. The initial spread must be smooth and uniform.

Compacting—A three-wheeled steel roller of minimum 12-ton weight is used for the first stage of compaction, which must start within 30 min. from depositing on the roadbed. This equipment must secure the required degree of compaction in the time specified and the surface must be kept moist during this operation.

If the surface does not conform, after this initial compaction, it can be bladed but the cut material must be wasted.

Final compaction is by pneumatic-tired roller with a weight per tire of not less than 400 lb., accompanied by water applied in a fine spray. This second type of rolling improves the surface hardness and provides a surface texture which improves the bond of the bituminous top course.

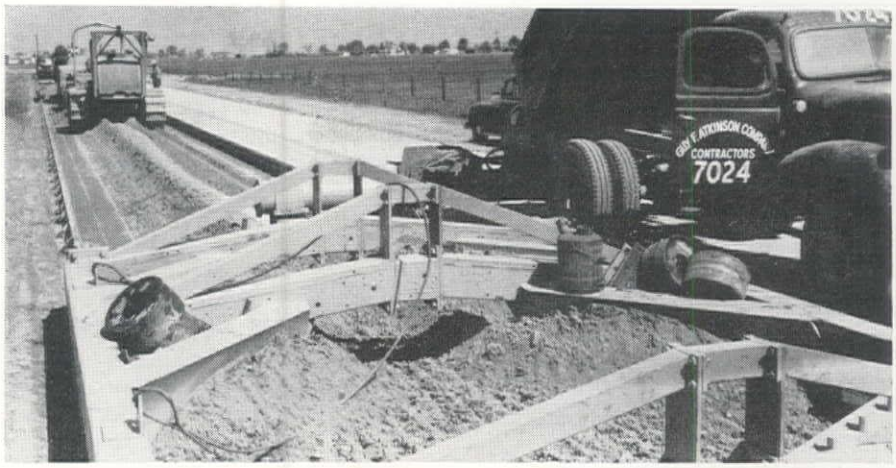
Curing—Asphaltic emulsion seal is used to cure the compacted base, applied as soon as possible after finishing. During any delay, the surface of the base is kept moist. Traffic is not allowed on the base for 7 days.

Two special cases

Logging operations and resulting heavy trucking over sections of state highway in local areas have produced some serious failures in existing surface and base. These roads were not designed for heavy-duty service, and the design usually provided for a bituminous wearing surface on an imported base. A solution to this problem, tried and proved successful, consisted of: (1) The thorough reworking of the entire surface and base, (2) addition of cement, (3) mixing in place and (4) compacting. This incorporation of old bituminous material into cement-treated base is believed to be the first case on record. The old surfacing mixture had no adverse effect on the mix, and there is some evidence that the effects were beneficial rather than otherwise.

The resulting base, topped with the usual 3-in. surfacing, has proved an adequate answer to the problem, both as to cost and service under severe truck loading.

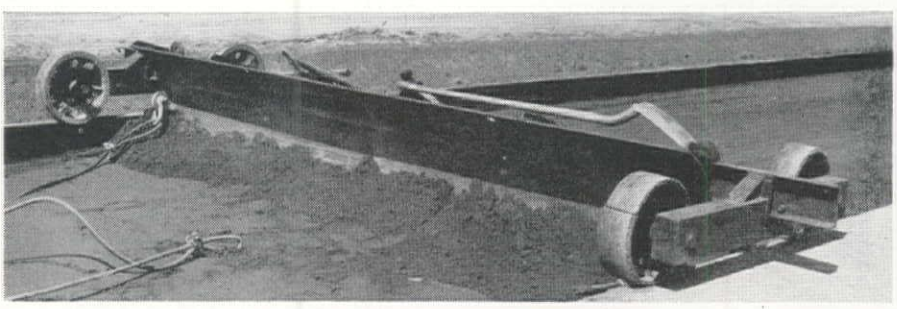
Another special application of cement



WINDROWING material to be mixed-in-place. This is accepted practice on California highways when the material on the road is found to be adequate when tested for cement-treatment.

CEMENT is applied from containers mounted on a distributor which is geared to place on the windrow a pre-determined amount per square yard of base to be treated.

ANOTHER TYPE of distribution for applying bulk cement operates with a screw conveyor supported on out-board wheels depositing into a trough left when the windrow was formed.



COMPACTED treated base is trimmed to final grade. Specifications require that compaction of plantmixed material must start within 30 min. after it is deposited, using a steel roller.

Representative Unit Bid Prices on Recent Projects

The Contract	Cement-Treated Base				Cement		Surfacing			Water
(County, contractor and acceptance date)	Thickness (Inches)	How Mixed (Roadmix or Plantmix)	Quantities (Sq. Yd. or Tons)	Unit Price	Cement (Total barrels)	Price of Cement (per barrel)	Top Course	Asphaltic Emulsion (Tons)	Unit Price	Unit Price (Per M Gal.)
1 Mendocino Co., C. M. Syar..... Accepted Oct. 20, 1948	5 and 6	Road	49,045 sq. yd.	$0.29 per sq. yd.	3,813	$4.80	Asphaltic emulsion	50	$35.00	$2.50
2 Mendocino Co., Guy F. Atkinson Co..... Accepted Sept. 7, 1949	6	Plant	22,557 tons	2.90 per ton	4,877	5.00	3-in. plantmix	—	——	—
3 Shasta Co., Fredrickson & Watson Construction Co..... Accepted Jan. 17, 1949	6	Plant	31,555 tons	2.17 per ton	5,262	4.65	3-in. plantmix	137	——	1.50
4 Madera Co., Harms Bros..... Accepted June 29, 1949	4 and 5	Plant	126,392 sq. yd. (25,864 tons)	0.43 per sq. yd. (2.60 per ton)	10,562	4.00	5-in. plantmix	431	38.00	1.70
5 Los Angeles Co., Griffith Company..... Accepted April 14, 1949	4	Road	77,661 sq. yd.	0.27 per sq. yd.	2,604	4.30	8-in. concrete pavement	—	——	1.65
6 Orange Co., Cox Brothers Construction Co..... Accepted Aug. 8, 1947	8	Road	62,918 sq. yd.	0.38 per sq. yd.	12,247	3.00	—	—	——	1.65
7 San Bernardino Co., Morrison-Knudsen Co., Inc. ..... Accepted Dec. 10, 1948	6	Plant	51,318 tons	2.00 per ton	5,217	3.10	3-in. plantmix	124	30.00	1.75
8 Imperial Co., Basich Bros. ..... Accepted April 18, 1949	6	Plant	61,562 tons	3.00 per ton	16,571	4.00	4-in. plantmix	521	40.00	1.85
9 San Diego Co., Griffith Company..... Accepted June 30, 1949	6	Plant	20,440 tons	1.75 per ton	7,454	4.60	3-in. plantmix	—	46.00	1.75

REMARKS . . .

(1) Project 3.8 mi. in length. Consisted in general of placing base material on portions, of scarifying and breaking up the existing base and surfacing, and of mixing the broken material with Portland cement and recompacting and placing plantmixed surfacing and seal coat thereon. The cement-treated base was mixed in a roadmixing machine and then spread and compacted and covered with a curing seal of asphaltic emulsion. A total of 590 tons of sand curing seal was placed at a unit price of $4.10.

(2) Project 5.17 mi. in length. Consisted in general of constructing a graded roadbed, of placing base material of varying thickness, and of placing the cement-treated base and plantmixed surfacing. Mineral aggregate was produced from a gravel bar in a creek near the project's center. A total of 100 tons of sand curing seal was placed at a unit price of $4.00 per ton.

(3) Project 5.0 mi. in length. Consisted in general of constructing a graded roadbed and placing imported borrow to reinforce the top 15 in. under the cement-treated base, followed by the cement-treated base and plantmixed surfacing. Mineral aggregate was produced from a source in a creek 1 mi. from the job.

(4) Project consisted of constructing graded roadbeds for a divided highway with the necessary roadbeds for outer highways and detours. Two types of cement-treated base were used. Type A consisted of mineral aggregate and 4% Portland cement. The Type A base was placed 4 in. thick; Type B was placed 5 in. thick. The 5-in. plantmix surfacing consisted of 0.36-ft. plantmix surfacing Types A and B and 0.06 ft. of open graded plantmix. Seal coats and penetration treatment were applied.

(5) Project in general consisted of constructing two 36-ft. paved roadways separated by a central dividing strip. Select material for cement-treatment was obtained from within the roadway prism and mixed in a roadmixing machine.

(6) Project in general consisted of resurfacing the existing pavement with 1½-in. plantmix surfacing; widening 15 ft. on the left and 5 ft. on the right, with 3-in. thickness of plantmix surfacing over the cement-treated base. Mineral aggregate was obtained by widening the cuts within the limits of the job. This material was placed in prepared windrows along the roadbed and cement was distributed along these windrows. After mixing, it was immediately loaded on dump trucks and hauled to the street.

(7) Work in general consisted of constructing a divided 4-lane highway, each roadway graded to a minimum width of 35 ft. A cement-treated base was placed to a width of 25 ft., and 6 in. thick except where the existing pavement was used in lieu of the base, and various sections were widened 4 ft. Mineral aggregate was obtained from a pit 4 mi. from the job. A central mixing plant was set up at the pit, and the material was hauled to the job in dump trucks and spread with mechanical spreading and finishing machines.

(8) Project in general consisted of constructing a graded roadbed and placing the plantmix surfacing over cement-treated base. Mineral aggregate was obtained from a pit 20 mi. from the job. Material was hauled from the pit to a central mixing plant near the job, and from there hauled in 8- to 10-cu. yd. dump trucks to the roadbed, where it was deposited and spread.

(9) Project in general consisted of constructing a graded roadbed, placing selected material and imported base material, and surfacing on cement-treated base. Mineral aggregate for the base was obtained from a pit located approximately 1.2 mi. from the job and mixed at the pit. The material was hauled to the roadbed in 9-cu. yd. trucks.

NOTE: A complete unit bid summary including figures on cement-treated base appears on page 116 of this issue.

in treating base material is in connection with the problem commonly referred to as the "pumping" action of concrete pavement slabs. Whenever a rigid concrete pavement is placed on a base of erosive material, there is a tendency for movement of the joints under traffic with resulting loss of material, particularly if moisture gets through at the joints. This problem does not relate to the strength of the base material as much as to its erosive tendency. Hence, the answer is solidification.

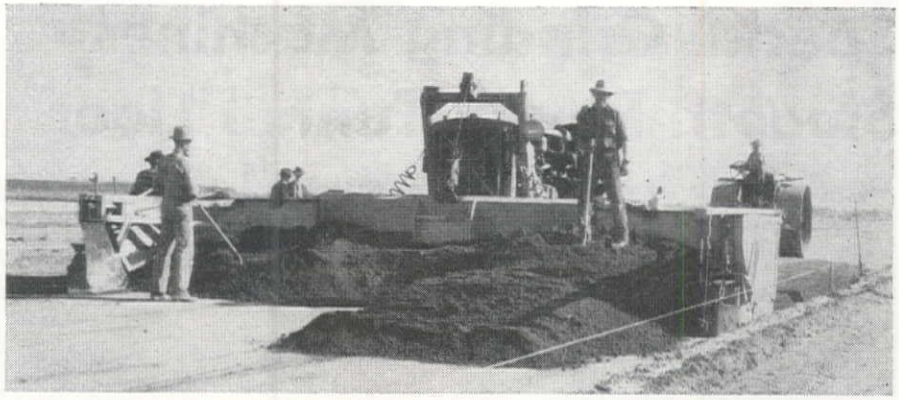
Many methods have been tried in California and other states in an effort to meet this common problem. Recently, the Division of Highways has tried the idea of cement-treatment for a 4-in. depth of base material in place. This low-strength material, not intended to run over 300 lb. per sq. in., is solidified and made resistant to erosion and serves as a base for the concrete slab. This general procedure has also been tried using a bituminous road-mix of 3-in. depth. Although the procedure is considered something of an experiment at present, the results to date are encouraging.

Conclusions

Cement-treated base has been used extensively by the California Division of Highways for about 10 years with increasing breadth of application. It has been used effectively to treat aggregates exhibiting an extremely wide range of characteristics and has been adapted to special problems. Although the original concept regarding the product and its use for highway construction has been gradually modified, the change has increased the limits of application and extended its use to more important routes carrying a heavy traffic load. Cement-treated base is a proven engineering material, with demonstrated economic advantages in the solution of a wide variety of problems involving the improvement of base materials. As an indication of its continuing use, more than 115 mi. of treated base and 33 mi. of treated sub-base were put down in 1949.

G. T. McCoy is state highway engineer of California. R. M. Gillis, assistant state highway engineer, was closely associated with early developments in cement-treatment when serving as district engineer and later as construction engineer. E. Withycombe is construction engineer of the Division.

Laboratory technique, control and the development of new testing procedures, with particular reference to cement-treatment, have been under the general direction of T. E. Stanton, materials and research engineer, and F. N. Hveem, staff materials and research engineer. J. L. Beatty, associate physical testing engineer, made many contributions during the development.



AIRPORT CONSTRUCTION with plantmix permits the use of a 20-ft. width of spreader.

FINAL COMPACTION by pneumatic-tired roller provides a harder surface with better texture.

Record of "Soil-Cement" Used in the West Since 1940 (Sq. Yd.)

	1940	1941	1942	1943	1944	1945	1946	1947	1948	Total Roads	Total Streets	Total Airports	Total All Types
Arizona	42,407	—	—	—	—	—	—	22,176	—	42,407	—	—	*64,583
California	93,829	1,186,074	1,902,343	539,975	1,274,868	482,140	1,223,685	837,247	2,695,182	4,989,662	1,061,780	2,757,462	*10,546,556
Colorado	—	—	—	—	—	—	—	—	—	—	—	—	—
Idaho	—	—	—	—	—	72,140	—	—	—	—	72,140	—	72,140
Kansas	67,208	—	115,398	321,678	25,000	—	153,460	226,286	85,128	579,784	4,558	462,076	1,046,418
Montana	—	—	—	—	—	—	—	—	—	—	—	—	—
Nebraska	324,291	—	379,008	217,005	60,633	—	—	—	160,740	1,272,465	6,295	—	1,278,760
Nevada	32,100	—	73,330	22,200	—	—	—	—	—	32,100	22,200	73,330	127,630
New Mexico	—	—	570,000	—	—	—	295,115	—	—	295,115	—	570,000	865,115
North Dakota	—	168,105	112,860	—	—	—	—	—	—	—	—	280,965	280,965
Oklahoma	84,870	213,347	402,508	21,111	171,566	3,136	283,824	13,459	4,067	569,483	384,125	315,336	1,269,627
Oregon	—	2,444	—	—	—	—	—	—	—	2,444	—	—	2,444
South Dakota	—	—	—	—	—	—	—	—	—	—	—	—	—
Texas	575,069	653,952	1,490,687	1,294,966	320,730	572,211	190,876	634,763	375,526	2,551,598	1,040,330	2,542,817	*6,290,419
Utah	—	—	—	—	—	—	—	—	—	—	—	—	—
Washington	—	42,842	1,866,382	—	18,983	—	—	302,670	10,000	171,242	650	1,894,715	*2,252,607
Wyoming	—	—	—	—	—	—	—	—	—	—	—	—	—
TOTAL	1,219,774	2,266,764	6,912,516	2,256,935	1,871,780	1,129,627	2,146,960	2,036,601	3,330,643	10,506,300	2,592,078	8,896,801	24,107,364

* *Includes miscellaneous applications.*

Source: Portland Cement Association.

Special Grinding Machines Smooth Rough Tunnel Floor

Eroded concrete floor of Seattle City Light water power tunnel smoothed by machines equipped with horizontal grinding wheels

AN UNUSUAL and money saving job to reduce loss of effective head in a water power tunnel was recently completed by Seattle City Light. Special machines were designed and built to grind the floor of a concrete-lined tunnel 20½ ft. in diameter and 11,000 ft. long.

The tunnel carries water to the City's Gorge Powerhouse, at the lower end of the Skagit River Gorge, approximately 100 mi. northeast of Seattle. A contract was let to the Guy F. Atkinson Co. in the amount of $3,189,000 for enlarging the Gorge Powerhouse, streamlining the tunnel and doing other work preparatory to installation of a new 60,000-kw. generator. This job is a part of Seattle City Light's present $80,000,000 construction program to increase the power capacity of the Skagit Project to 644,000 kw.

It was necessary to improve the existing tunnel so that it would carry a two-thirds increase of water. Erosion during 25 years of use had uncovered the aggregate in the tunnel floor, leaving rough protrusions of ½ to 1 in.

Extra head provided

City Light engineers decided that the rough surface of the tunnel should be eliminated. Consideration was given to accomplishing this by applying a gunite coating; however, this would have resulted in a decrease in the capacity of the tunnel. Therefore, it was decided to grind the surface smooth, even though some grinding experts said it could not be done in the time available. By providing a smooth surface, approximately 10 ft. of extra head was provided at the powerhouse.

E. R. Hoffman, Superintendent of Lighting for the City of Seattle, suggested that a special grinding machine, using a horizontal wheel, might be designed to accomplish the necessary work. Acting on this suggestion, the contractor designed such a grinder, in cooperation with City Light engineers, and one machine was built. After some experimental work, three additional units, slightly modified from the original design, were constructed. The total cost of these four machines was about $18,000.

The machines performed well, completing the job in 45 days. From 200 to 300 lineal feet of tunnel per day were ground smooth, a width of about 15 ft. of invert being covered.

Each machine required an operator and two hose tenders. Three of the machines each used eight 12-in. diameter wheels 3 in. thick on a single arbor, making a grinding face of 24 in. The fourth machine had seven 20-in. diameter wheels 4 in. thick, making a grinding face of 28 in.

The three small machines had 40-hp. motors, and the large machine a 75-hp. motor.

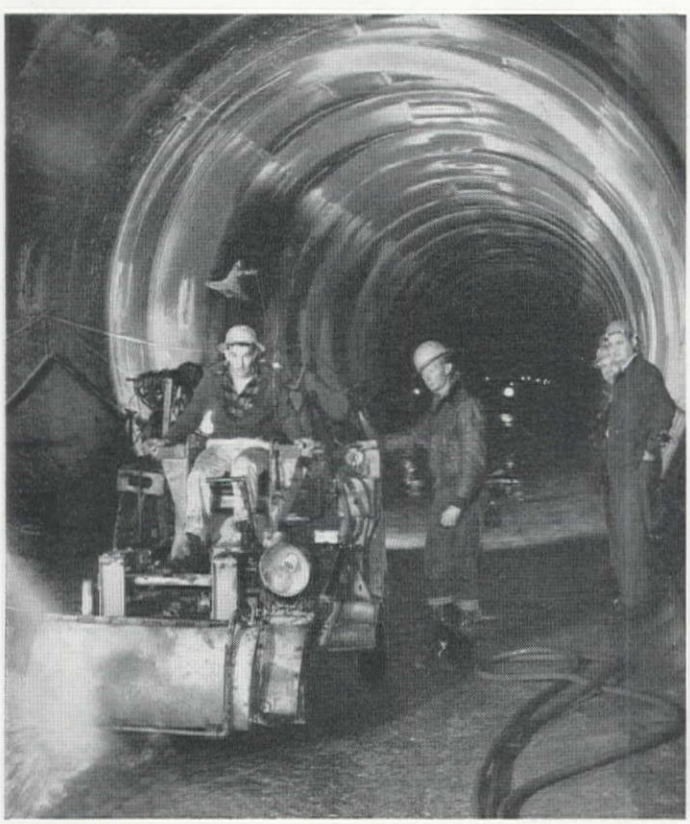
Two kinds of grinding wheels were used. The Pacific Grinding Wheel Co. of Everett, Wash., furnished wheels of silicon carbide abrasive in the Resinoid bond process. The Carborundum Co. office in Seattle furnished carborundum wheels.

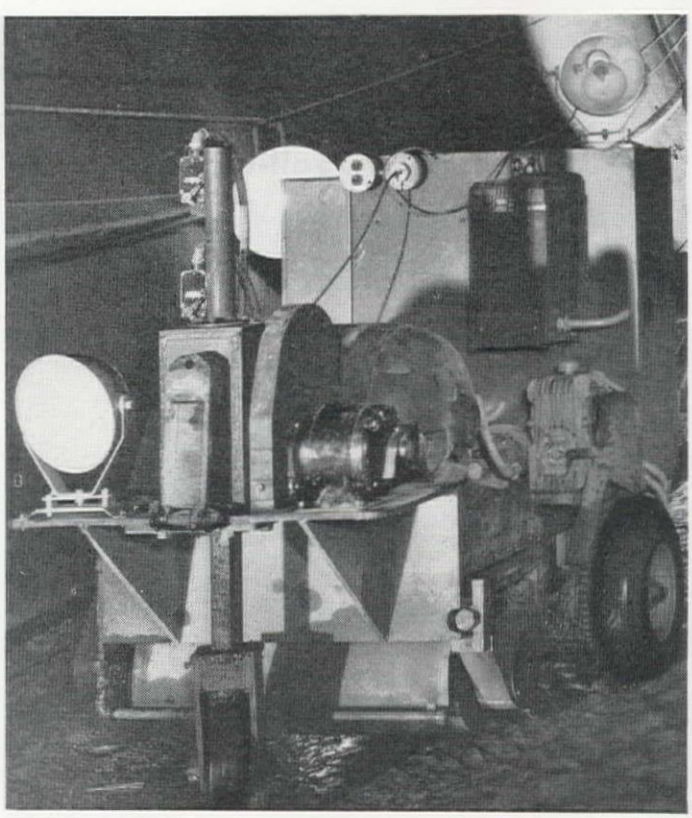
Grinding speed was about 6500 ft. per min. rim or surface speed. The wheels lasted about 18 to 30 hours each.

E. R. Hoffman is Superintendent of Lighting for Seattle City Light, and C. W. Cutler is Skagit River Project Engineer for the City. For the contractor, Ralph Hawkins was Project Manager and Tom Hawley was Job Superintendent.

LATEST THINKING of the 48 State highway departments and the District of Columbia on concrete pavement practices is presented in a report of the American Road Builders' Association Committee on Concrete Pavement Design. Issued as ARBA Technical Bulletin Number 163, the 122-page booklet has been compiled with the assistance of representatives from each of the Highway Departments and covers subgrade soil practices, concrete materials, proportioning, placing, finishing and curing, as well as structural features of concrete pavements. The booklet is available to all ARBA members on request and sold to others at $1 per copy.

ONE OF FOUR machines used on the job is illustrated in action below. This machine, powered by a 75-hp. motor, was equipped with seven 4-in. grinding wheels for an effective grinding face 28 in. wide. Three smaller units (see cut at right) had 40-hp. motors and grinding faces 24 in. wide.





Nine Large Reservoirs at a Cost of $1,100,000,000 Envisioned as—

The Colorado River Storage Project

Construction of a series of storage reservoirs on the Colorado River and tributaries is urged by the U.S.B.R. to satisfy the pressing water and power needs of the Upper Basin States

TO EFFECTUATE the distribution of water contemplated in the Colorado River Compact of 1922, the Mexican Water Treaty of 1945, and the Upper Colorado River Basin Compact of 1948, it is necessary to construct a series of reservoirs on the Colorado River and its tributaries. Without such works it would be impossible to control the river's flow in years of heavy runoff, or to have water available for the various designated purposes and projects in dry years.

According to the 1922 Compact, the Upper Basin States (Wyoming, Utah, Colorado, and New Mexico) are pledged to deliver at Lee Ferry, near the Arizona-Utah boundary, 7,500,000 ac. ft. of water annually. According to the report of the Engineering Advisory Committee for the Upper Basin States Compact Commission, about 1,385,000 ac. are presently being irrigated in the Upper Basin, and man-made depletions in the flow in those states average about 2,000,000 ac. ft. annually. Including projects now under construction, or authorized, this depletion is estimated at 2,550,000 ac. ft.

Recurrence of the unregulated flow conditions of the critical 10-year drouth period 1931-40 would permit man-made depletion of not more than 4,750,000 ac. ft. annually, if the agreed deliveries to the Lower Basin States at Lee Ferry are to be maintained. Even these depletions would be subject to reduction as necessary to assist in meeting deficiencies in deliveries promised to Mexico.

Drouth use requires storage

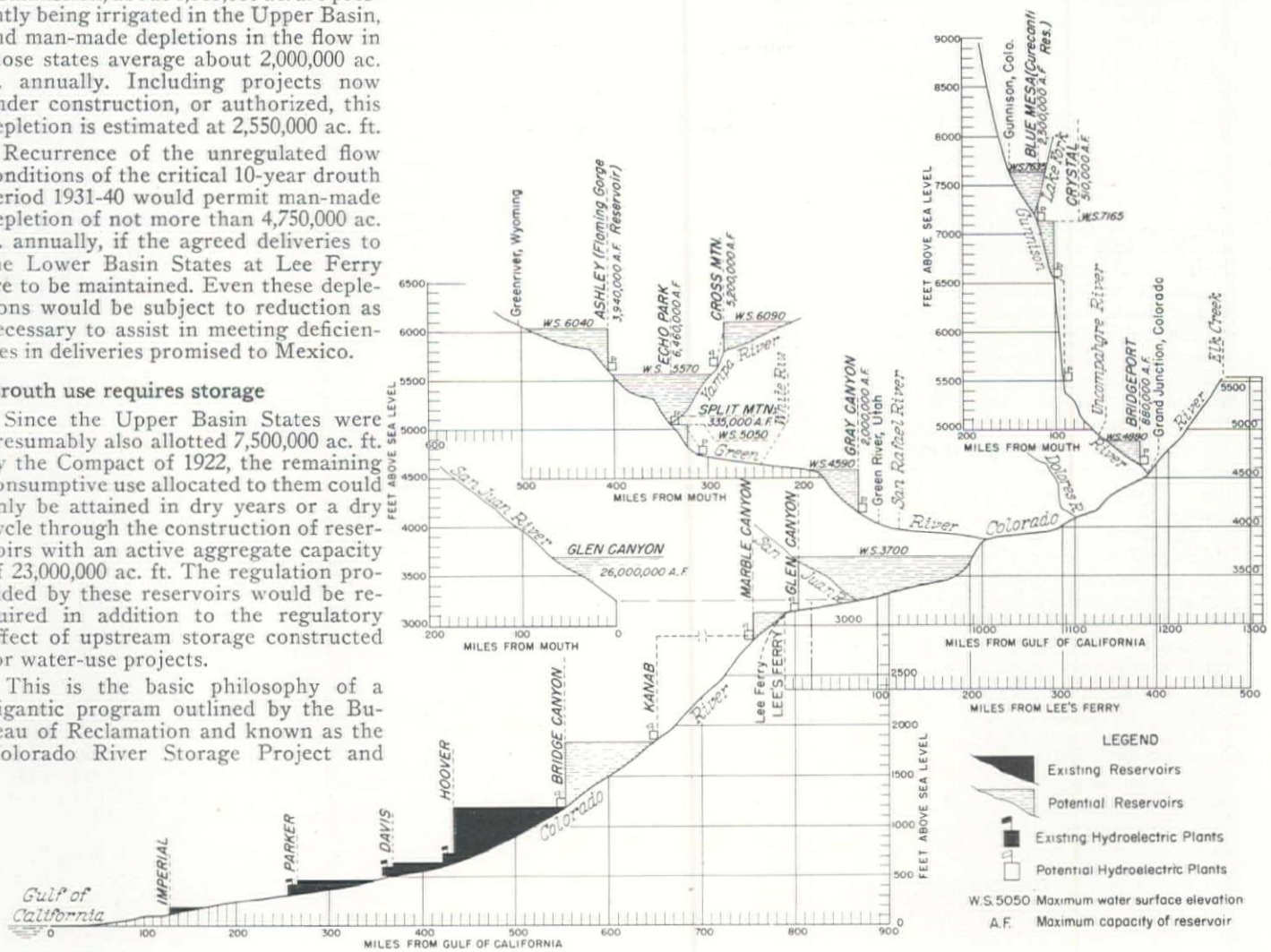
Since the Upper Basin States were presumably also allotted 7,500,000 ac. ft. by the Compact of 1922, the remaining consumptive use allocated to them could only be attained in dry years or a dry cycle through the construction of reservoirs with an active aggregate capacity of 23,000,000 ac. ft. The regulation provided by these reservoirs would be required in addition to the regulatory effect of upstream storage constructed for water-use projects.

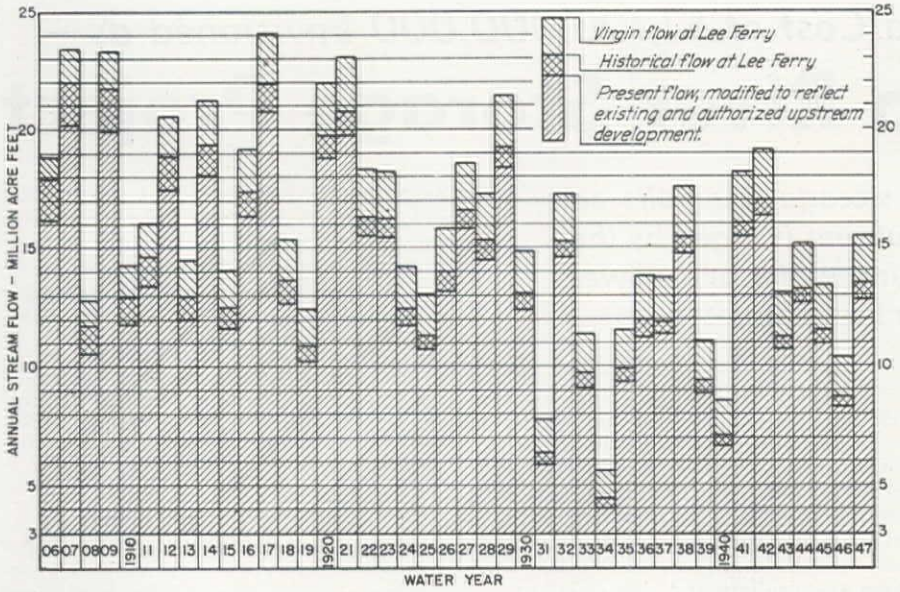
This is the basic philosophy of a gigantic program outlined by the Bureau of Reclamation and known as the Colorado River Storage Project and Participating Projects, the preliminary outline of which has been approved by the Upper Basin States Compact Commission. The total cost is estimated tentatively at 1.1-billion dollars. It would embrace nine large reservoirs, with a total capacity of 48,065,000 ac. ft., and a power installation of 1,780,000 kw. Under the preliminary plan, it is anticipated that the total cost would be repaid from power revenues, and from the same source funds would be available for development of many irrigation projects in the area. This is on the basis of an average firm power rate of 5.2 mills per kw. hr. at load center within the natural boundaries of the Upper Basin, and does not include any allocation of costs to non-reimbursable sources such as recreation and fish and wildlife development. At the Salt Lake City meeting of the National Reclamation Association, Reclamation Commissioner Michael W. Straus indicated that he would attempt to secure non-reimbursable funds for such purposes, presumably to permit reduction of the power rates in line with Bureau practice in recent years of considering power rather than irrigation the principal function of river development.

Power demands dictate urgency

With water resources in the Upper Basin developed at a reasonable rate, according to the report, the regulatory reservoirs would be required for long-time hold-over purposes in about 21 years. Immediate construction is required however, the report further states, in order to meet the electric energy demands of power market areas. In justification of early construction it is pointed out that some power revenues could apply against the cost of facilities before they were actually used for regu-

RIVER PROFILE shows relative location of the proposed storage reservoirs.





STREAM FLOW of the Colorado River at Lee Ferry near the Arizona-Utah border.

latory purposes; that revenues could begin to apply against the costs of economically justified and urgently needed irrigation projects in the Upper Basin States which are beyond the repayment abilities of the water users; that unused water in the early years could assist in rapid filling of the reservoirs; that immediate benefits would accrue to Lower Basin States through sediment control and flood control; and that potential power sites above Hoover Dam could receive early favorable consideration.

In considering the reservoirs to be built under the Colorado River Storage Plan, the conditions that seemed imperative were the construction of reservoirs having an active storage capacity of 23,000,000 ac. ft. over and above losses to sediment; selection of sites collectively capable of permitting the greatest possible yield annually to the Upper Basin States for consumptive purposes consistent with production of electric energy in the amount required for the economic development of the water and other natural resources of the states; and to provide the hold-over storage necessary to meet the compact and treaty obligations at Lee Ferry.

Evaporation from regulatory reservoirs recognized in the Upper Basin States Compact as a legitimate charge against the apportioned consumptive use of the states limits the extent to which sediment retention space in the reservoirs might be justified. In this report a period of 200 years was considered for sediment control, during which an estimated 18,000,000 ac. ft. of such material would accumulate. Succeeding generations could take further steps for control.

Construction schedule

The tentative construction schedule has been planned to meet the electric energy requirements of areas which could reasonably be serviced. Power demand areas within the Upper Basin States would be given preference, but early relief would also be furnished for power-deficient areas in the lower basin. Some of this latter would again be withdrawn as demand grew in the upper basin, but could be replaced by potential power developments in the lower basin, such as Bridge Canyon and Marble Canyon.

Echo Park unit has been selected for construction as the first unit of the storage project. It would be little affected by sediment control requirements and is well situated with respect to supplying immediate power needs of the upper basin. It is proposed that it be a curved concrete gravity type dam on the Green River about 3 mi. downstream from the mouth of the Yampa River. The reservoir would extend 63 mi. up the Green and 44 mi. up the Yampa. The spillway would have a capacity of 81,500 sec. ft., and would consist of a discharge tunnel, 35 ft. in diameter, with two 30 x 55-ft. fixed wheel gates for control. Permanent outlet works have been designed for a discharge capacity of 20,000 sec. ft. A single intake tower of the type constructed at Hoover Dam would control the flow into a 30-ft. steel pipe. Five generating units would supply 200,000 kw. of energy and a transmission line would extend to important centers in Colorado, Utah and Wyoming. Access to the dam would be by construction of a highway from U. S. Highway 40 near Vernal, Utah.

The probable second unit would be the Glen Canyon unit, being located at the lowest possible point for control of sediment and river discharge, and also being within reach of critical power-deficient areas in the lower basin. It is an almost unbelievably perfect damsite, with practically vertical walls for the entire proposed height. Investigations are going forward presently at the site. With completion of these two units, considerable flexibility would be permitted in planning the remaining units.

Power revenues main benefit

Power revenues would be the major tangible benefit to result from the project. They have been estimated in the report over a 100-year period. Annual gross revenues from the sale of power under complete operation are estimated at $35,000,000 annually, allowing for expected stream depletions and transmission losses. Indirect power benefits totaling $36,000,000 are also considered. These indirect benefits are: savings in cost of energy from cheapest alternate source, $16,000,000; proportionate share of retailing utilities benefits arising from resale of power at a higher rate, $17,500,000; commercial and industrial benefits arising from use of power, $2,500,000. The total annual benefits from power generation are therefore considered as $71,000,000.

The annual equivalent project costs are estimated at $41,146,000, including $31,522,000 as the annual construction cost and $9,624,000 as average annual cost for operation, maintenance, and replacements. To arrive at that figure, the construction cost is based on amortization of the total project in 100 years at 2.5% interest. Thus the estimated annual benefits from power sales compare with costs at a 1.73 to 1 ratio. This ratio of course is modified if other benefits are considered, or if construction costs vary widely in either direction from the estimates.

The power rate of 5.2 mills per kw. hr. established in the report is based on amortization of project costs allowable to power at 3% interest. These costs in-

Units Proposed for the Colorado River Storage Project

Dam	River	Height (ft.)	Total Capacity (ac. ft.)	Hold-over Capacity (ac. ft.)	Power Installation (kw.)	Cost (Million $)
Black Canyon	Gunnison	600	510,000	—0—	210,000	158
Cross Mountain	Yampa	295	5,200,000	4,200,000	60,000	49
Curecanti (Cottonwood Dam)	Gunnison	475	2,500,000	2,000,000	75,000	112
Echo Park	Green	525	6,460,000	4,400,000	200,000	139
Flaming Gorge (Red Canyon Dam)	—	475	4,180,000	1,965,000	75,000	91
Glen Canyon	Colorado	565	26,000,000	10,306,000	800,000	347
Gray Canyon	Green	445	2,000,000	641,000	200,000	156
Split Mountain	—	245	335,000	—0—	120,000	68
White Water (Bridgeport Dam)	Gunnison	250	880,000	—0—	40,000	35
Engineering		—	—	—	—	5
			48,065,000	23,512,000	1,780,000	1,160

clude the power plants and appurtenant facilities, plus 59% of the cost of joint facilities, such as dams and reservoirs. The remaining 41% of these joint facilities would be assigned as follows: river regulation 27%, sediment storage 10%, and the Central Utah project and irrigation in western Colorado 4%. The last investment in power would be incurred 19 years after installation of the first power unit, and the power allocation would be repaid (if no alterations were made in the power rates) 46 years after installation of the last unit.

Project Development Account

It appears that most of the irrigation projects upon which it would be possible to utilize project water in the upper basin will need financial assistance, and this is possible through utilization of some of the funds realized from the sale of power. It is proposed to establish an account to be known as the Upper Division Development Account. To it would be credited all revenues from the sale of power generated by the storage project in excess of requirements to pay project operation and maintenance costs. Construction costs assigned for repayment by power revenues would be charged against the account, and net credits would be used to show complete reimbursement of the reimbursable costs of irrigation projects in the upper basin which will not be able to completely finance themselves.

Projects could participate in the account if they had benefit-cost ratios of at least unity and could pay their own operation, maintenance, and replacement costs and some part of the construction cost. Projects meeting these requirements, and which after all sources of revenue over a period of 60 years were estimated as being insufficient to return the reimbursable costs of the project, would be eligible to participate in the account.

It is possible that other power generating units could be built in the Upper Basin States to take full advantage of all the available power drop, if power demand exceeds development, but they are not considered in the present report. Among them are: on the Green River, Riview and Desolation; on the Yampa River, Juniper and Lily Park; on the Colorado River, Dewey, Moab, Junction and Dark Canyon; and on the San Juan River, Martinez, Bluff, Goosenecks, Slickhorn and Great Bend.

The report was prepared in the Region IV office of the Bureau of Reclamation, of which E. O. Larson is Regional Director. It was considered by the state engineers of the affected states, and was accepted in principle by the Upper Basin States Compact Commission meeting in Salt Lake City on Oct. 29 and 30.

First participating projects approved

The first participating projects were suggested by the several states at the same meeting, and were adopted by the Commission. They were the Eden, Lyman and Seedskadee projects in Wyoming; the Pine River Extension, Silt, Paonia, Smith Fork, La Plata, and Florida projects in Colorado; the Gooseberry and Emery (initial phase) projects in Utah; the Hammond project in New Mexico; and the Little Snake project in Colorado and Wyoming.

Of the Wyoming projects, Eden anticipates water for 20,250 ac. of new land, and supplemental water for another 8,530 ac., from construction of 12 mi. of new canal and extending laterals; Lyman would furnish water to 31,960 ac. of presently dry land from an off-stream reservoir at the Bridger site, and canals; Seedskadee would serve 40,830 ac. of rich lands along the Green River below Fontenelle Creek, without the requirement of any storage reservoir.

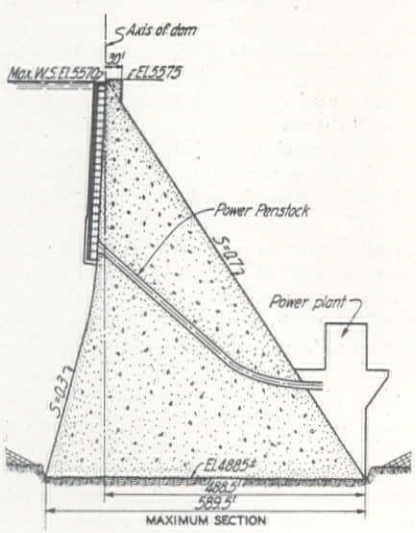
Among the participating Colorado projects, Pine River Extension would irrigate 15,100 ac. of new land and supply additional water to 1,200 ac., all near Ignacio, Colo., by rehabilitating existing canals; Florida would supply water to 6,300 new acres and to 13,800 ac. now only partially supplied; Silt would irrigate 1,100 ac. of new land and 5,200 ac. now partially supplied through construction of a dam at Rifle Gap near Glenwood Springs; Paonia would bring water to 2,000 new acres and supplement supplies to 12,700 ac. near Hotchkiss, by construction of a dam on East Muddy Creek and enlargement of a 35-mi. canal; and Smith Fork would make possible the irrigation of 4,230 ac. of new land and supplemental water to 9,220 ac. near Crawford by construction of a 4-mi. canal and enlargement of others.

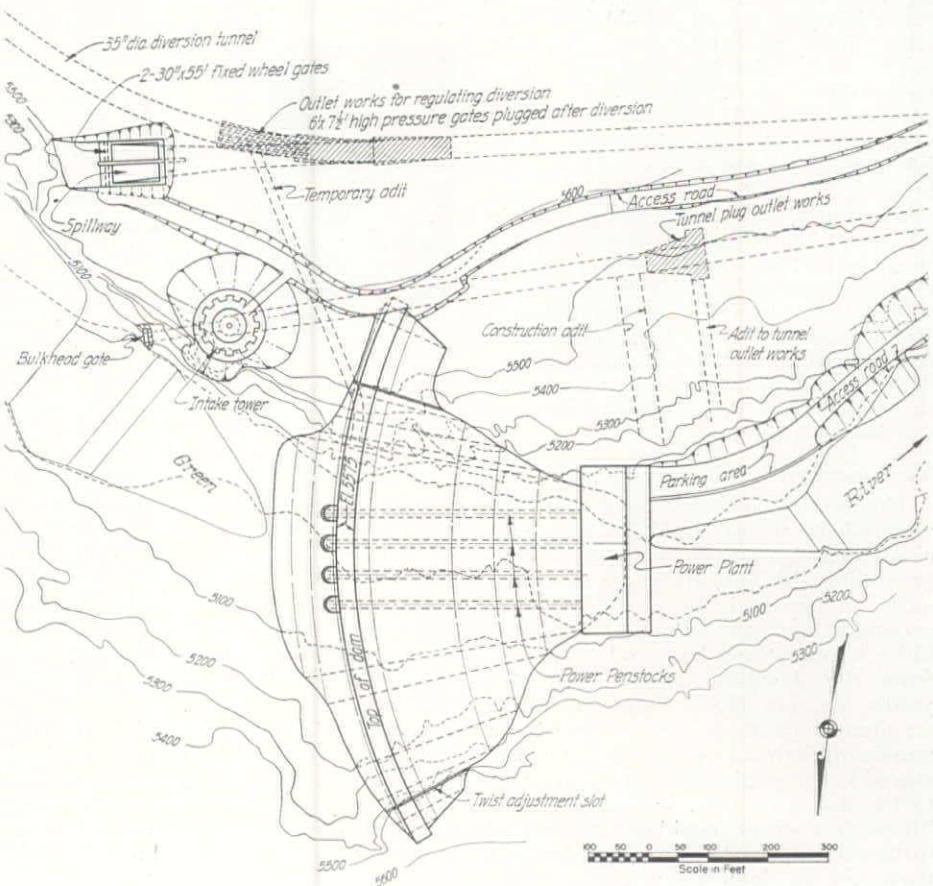
The Gooseberry project in Utah would irrigate the Sanpete Valley of the Bonneville Basin through construction of a reservoir on Gooseberry Creek and a tunnel 2.3 mi. long; and the Emery project would irrigate lands in the vicinity of Huntington and Castle Dale.

The Hammond project in New Mexico would include 3,700 ac. of land near Bloomfield, irrigated from a small diversion dam and canal.

The Little Snake project in Colorado and Wyoming would irrigate 92,110 ac. now dry and supply added water for 15,710 ac., and would include construction of three reservoirs and many miles of canal; about 43,000,000 kw. hr. of firm power would be developed on the project.

ECHO PARK DAM on the Green River near the Colorado-Utah border has been selected for construction as the first unit of the project. Features of the curved concrete gravity-type dam are shown in the two drawings.





Construction of Concrete Outlet Works for Dam Speeded by—

Coordinated Yard and Crane Set-up

One crane within reach of form prefabrication yard and job site uses two hoisting lines to handle all lifting on construction of concrete outlet works for Farmington Dam

By
D. J. BRESSI
Construction Superintendent
Charles MacClosky Co.
San Francisco, Calif.

IN A SUCCESSFUL rush to beat the winter rains, the Charles MacClosky Co., engineers and general contractors of San Francisco, are nearing completion of their contract for construction of the outlet works at Farmington Dam. The dam itself, not yet started, is part of a $3,729,000 flood control project under the supervision of the Sacramento District, Corps of Engineers. The project is located 17 mi. east of Stockton, Calif., and is planned to reduce flood damages along the Littlejohn and Bear Creeks in the Stockton area.

The outlet works are being built in what will be the northern abutment of the dam, and will consist of an upstream entrance channel, sluice gate control tower, double barrel conduit, and downstream stilling basin. The outlet will function to allow an automatically predetermined flow of water to escape from the impounded flood, thus stabilizing the downstream flow.

Yard location

The setting up of a prefabrication yard where forms could be built efficiently was one of the first steps in programming this job. Because the entire outlet structure is below the original ground in a trench at the foot of a steep hill, all operations had to be handled from the downhill side, making the yard's location highly important. For maximum speed in concreting, large panels for forms were prefabricated and stored in the yard immediately adjacent to the dam structure, so that only one lift with a crane could set the panel forms in place. With such planning from known determinants, an orderly flow of material from raw lumber to finished form panels in place resulted. Form panels were moved by a 1¼-cu. yd. Lima crane, equipped with a 55-ft. boom and 15-ft. jib. The crane was set up with two hoisting lines. On the 55-ft. boom, a main hoist line operates a 2-part falling block with a hook, covering all ordinary work. In addition, an auxiliary single-part hoisting line was worked off the jib, and handled all lifting at long radius. This method allowed the alternate use of either line with no lost time for re-rigging.

Successful re-use of panel forms was due to the prompt cleaning they received immediately after being stripped. In a matter of minutes, the forms were knocked down, meticulously cleaned, and coated with a standard paraffine oil. On the double-barreled concrete conduit, pours were made in 20-ft. lengths, proceeding with bottom deck walls, and top deck rather than a monolithic pour. The conduit consists of twelve 20-ft. concrete sections of 6 x 9-ft. twin barrels, each section articulated and connected at joints with a continuous rubber waterstop. This necessitated forming and pouring of alternate sections.

Collapsible forms re-used

Six complete sets of conduit forms were made and set up. After pouring the alternate six sections, all wall forms were moved ahead and the intervening sections were then formed. Because specifications allowed two days stripping on walls and required 14 days on decks, the wall forms were stripped and re-used in the fill, in the conduit sections, while new decks were formed. The bottom deck was poured and finished "on the money."

Wall forms were built up of one panel per wall on the outside. Collapsible forms were used for inside conduit walls, but without the use of shims. Two long panels made up each interior wall face, and were separated by 1-in. strutted steel bearing plates at the spot where shims would ordinarily be used. The plates proved to be the fastest means for both securing and collapsing inside forms. Three days before collapsing inside forms, the top deck of the conduit was

PICTURED AT LEFT—

AN OVERALL view of the form prefabrication yard (left) and the job site (right). The crane, with a 55-ft. boom and 15-ft. jib, walks along the berm between the two locations to handle all lifting.

formed and poured. Specifications called for the cold joint to be in the wall, just under the deck. Timber posts held up the top deck forms for the rest of the 14 days, while the wall forms were collapsed and moved down the line.

Collars, 2 ft. by 3 ft., 8 in., surround the conduit every 20 ft. at the joints. The inside wall forms, designed and built for a dual purpose, were used to pour the collars. All joints were sealed with bituminous paint, or paint and ⅜-in asbestos fiber bituminous mastic. Bearing plates were cross-braced between walls with struts.

Approach channel

In the bed of the reservoir, an unlined approach channel runs for 348 ft. from the former creek bed to the outlet structure. This approach is 16 ft. wide at bottom, and has sides sloped 1-on-2. Nearing the control tower, the approach enters a 46-ft. curve and a 1-on-3 transition section, lined with one-man stone placed on a pervious foundation. The water then passes the headwalls into a short length of the conduit section, and then over 40 ft. of footings for the control tower and slide gates. All pervious backfill required for the structure was obtained from different areas at the job site.

From the control tower, the conduit section proceeds for 235 ft. under the future earth dam. At the end of the conduit section, the water enters a 47-ft. down-slope approach to 76 ft. of stilling basin, passing from the basin past headwalls and into the creek bed. The basin is lined with 1,500 cu. yd. of derrick stone, resting on 3-in. gravel and pervious backfill. In the stilling basin, there are five baffle blocks staggered in the invert, each one 5 ft. high and 5 ft. wide. At the end of the stilling basin is a regulating chamber, with two lines of perforated 6-in. VCP embedded in the concrete walls. In event of a surge of high water in the stilling chamber, the overflow will be collected by the pipe and returned through drains to the invert.

Too much water a problem

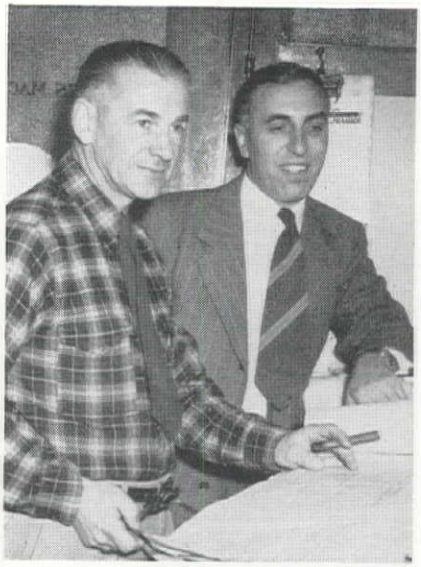
Some jobs are full of surprises. Water was the biggest problem of the contractor; in this case, too much water at the prevalent elevation of 116 ft. During excavation for footings at the control tower, soft soil was encountered at an unexpected level. Excavation of about 900 cu. yd. was completed to an extra depth of 14 ft., with the crews finishing on a Sunday night. All hands were on the job first thing Monday morning, and the hole was filled with a lean-mix concrete before the plentiful ground water could seep through in quantity.

During excavation for one of the wingwalls, water from a local spring spouted up through an opening in the bottom of the cut. A 4-in. pump and a small "one-lunger" could not stop the flow at the top, creating one of those typical situations that keep superintendents up nights. With the aid of additional pumps and while pumping as fast as possible, the bottom of the excavation was filled with 12 in. of lean-mix concrete for a seal. Before the pour, three feet of 3-in. pipe was imbedded at the sub-grade and connected to a pump. The pump kept the trench dry enough for the layer of concrete to set, and after serving its purpose, the pipe was sawed off at the concrete and plugged. This fast work capped the spring forever at the wingwall.

Uncooperative farmer delays job

Grading and earthwork on the job were rushed in an effort to beat the winter rains. Here again water caused much worry. Almost the entire length of the outlet structure is along the breaking slope of a hill; thus, above is a watershed and below is the creek. During a preseason cloudburst, the entire crew was guarding the dikes which were placed around the jobsite. Conditions were under control until the moment a farmer, apprehensive of high water, opened his local dam some 12 mi. upstream. The new oncoming rush of water kept all hands and all earthmovers busy over a weekend, strengthening the dikes and plugging leaks of watershed and creek water. This occurred during grading for the invert, which is 20 ft. below the creek bed. The recorded rain was 1½ in. during the 4-hr. period of peak flood.

An original preconstruction estimate that ground water infiltration would occur only in the deeper portion of the stilling basin was realized. For usual



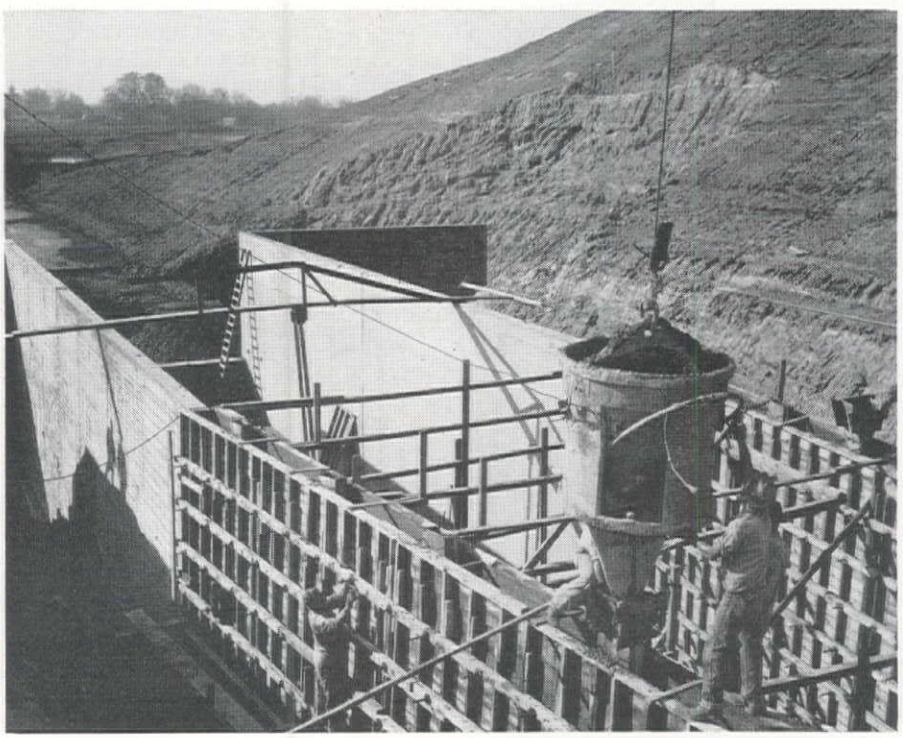
CLYDE K. MOSEMAN, left, and CHARLES C. MacCLOSKY, principals in Charles MacClosky Co., study the blueprints for the outlet works.

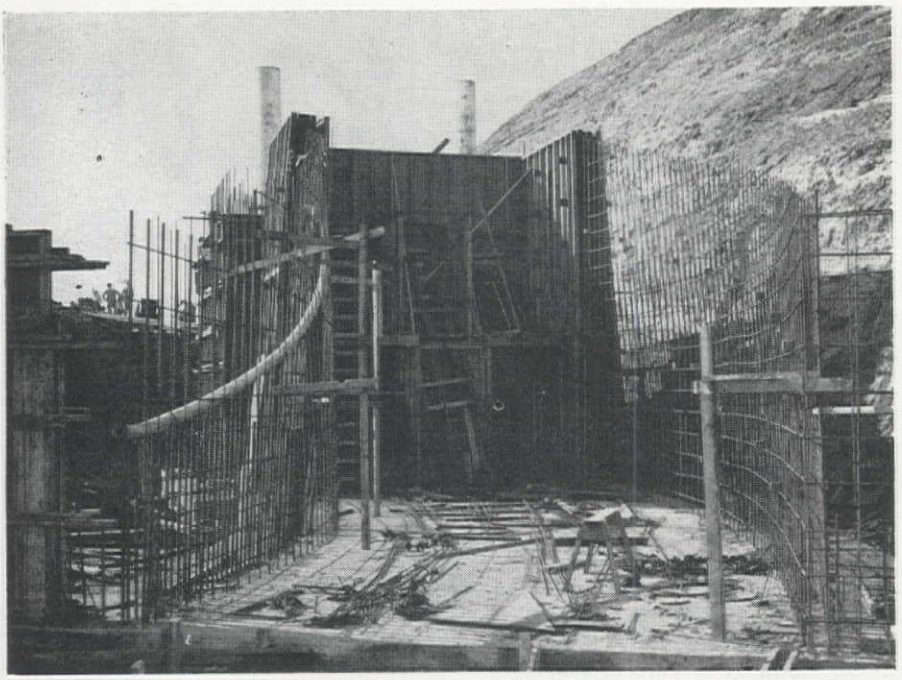
conditions, a 5-hp. automatic electric sump pump was installed inside a wooden cage. This pump handled most of the underground flow, and additional gasoline pumps were used when needed.

To avoid inundation by water runoff and to expedite the schedule for early completion, backfill operations in the conduit area were started before completion of other concrete work. For this reason, the form prefabrication yard had been planned to allow sufficient working room for excavation, concreting, and backfill construction.

One of the detailed concreting problems encountered by the contractor was to place successfully 2½-in. slump concrete in 21-ft. high wingwalls, with a 5½-in. maximum opening between layers of

THE ALL-PURPOSE crane swings a bucket of concrete into place for the conduit walls. Vertical plywood chutes were used successfully to place the 2½-in. slump concrete.





INLET STRUCTURE for the conduit will be submerged under water impounded by Farmington Dam. Partially completed section of inlet above is curved to follow the dam's axis.

reinforcing steel at the top of the wall. Vertical plywood chutes proved to be a simple and ingenious answer to this problem. Five sets of 16-ft. long sectionalized plywood chutes were used for each wall pour. The chutes were made in three sections, consisting of two 5-ft. lengths and one 6-ft. length, and were hung from the form tops by bolts passing through prebored holes. Joints consisted of plywood bands and woodscrews. The chutes were sufficiently rigid to be placed between the two curtains of steel without trouble. As the concrete came up in the forms, the chutes were raised by two men and the top section unfastened. This method left the crane free for the concreting with no delay for changing chutes.

The original job plan of operations was to excavate the entire structure and then start concreting operations on the conduit, followed by construction of control tower, inlet structure, and finally the stilling basin. At the peak of construction, all four sections were to be under way concurrently. Because of unsuitable foundation material encountered in the control tower footing, a change in operational sequence was necessary, and construction of the stilling basin preceded the tower and inlet structure. Changed design, due to soil conditions, delayed by several weeks the contractor's schedule for concreting operations.

Transit-mix concrete came from nearby Escalon, and 6,000 cu. yd. for structures was poured with a 1-cu. yd. Gar-Bro bucket. Concrete was finished with conventional membrane curing.

The earth was in most instances hard, and the specifications called for no undercutting of the sub-grade. Excavation for structures and the approach channel totalled 90,000 cu. yd.

In addition to the measured and controlled flow being provided by the outlet works, flash flood water will be handled by a regular spillway to be built as part of the dam.

C. K. Moseman, representing the contractor, has scheduled completion of the project for April 1, 1950, six months ahead of the contract completion date.

Farmington Dam is being constructed by the Sacramento District, Corps of Engineers, under the provisions of the 1944 Flood Control Act. This act authorized a group of 16 dams in the Sacramento and San Joaquin Valleys. The rolled-earthfill dam will have a crest length of 7,800 ft., maximum height of 58 ft., and crest width of 20 ft. In addition to the outlet works, the dam will have a broad-crested weir type ungated spillway, with a 12,600 cfs. capacity. Storage at the gross pool will be 52,000 ac. ft. The Farmington project is expected to be 50% complete by June, 1950.

The entire project is under the supervision of Colonel Joseph S. Gorlinski, District Engineer for the Corps of Engineers. F. L. Long, Jr., is serving as Project Engineer.

Coordinated Columbia Basin Plan Includes 405 Projects

A GRAND TOTAL of 405 potential irrigation, multiple-purpose, and other projects, are included in the coordinated Department of the Interior-Department of the Army plan for the development of water and land resources of the Columbia River Basin, according to a tabulation prepared by the Bureau of Reclamation with the collaboration of the Corps of Engineers. The projects, large and small, constitute the total future development of water resources in the Columbia River Basin as currently envisioned by these agencies. Many of the projects serve more than one function. Investigations of a number of the future possibilities have not been advanced to the point at which specific project data are available. Cost data are available on 234 of the 405 projects. These would cost $7,213,345,000.

Water Development for Northwest Texas Cities

A BUREAU of Reclamation report, outlining proposals for developing additional water supplies for eleven cities in water-short northwest Texas, has been sent to the States of Texas, Oklahoma, and New Mexico, and to other Federal agencies for comments. The report points toward possible relief to the cities through developing water resources of the Canadian River for municipal, industrial, and irrigation purposes. The communities now obtain water by pumping from wells, with inadequate supplies presenting a threat to the economic and industrial development of the area.

The report envisions construction of a dam and reservoir on the Canadian River about 45 mi. northeast of Amarillo and approximately a mile upstream from Sanford, in the northwestern part of Hutchinson County, Texas, and of the necessary city water aqueduct and pumping plants and irrigation facilities to meet the water needs of Amarillo, Pampa, Borger, Plainview, Lubbock, Tahoka, O'Donnell, Lamesa, Slaton, Levelland, and Littlefield. Total cost of the service sought by the communities is estimated at $84,656,000, 93% of which would be repaid to the Government with interest over a 50-year period by the municipal and industrial water users.

Sanford Dam, proposed to be constructed under the project, would be a rolled earth-fill structure with a crestline of 7,200 ft., a top width of 40 ft., and a maximum height above stream bed of 186 ft. It would create a reservoir extending 20 mi. upstream which would have a total capacity of 1,956,000 ac. ft.

Water would be pumped from the reservoir and delivered by approximately 275 mi. of pipeline to the 11 municipalities in the project area. A total of 15 pumping plants would be required at various points along the pipelines. Effluent from the sewage treatment plants of two of the municipalities would be used to irrigate an ultimate total of over 20,000 ac. This type of irrigation is already practiced in the area, and has been found to be thoroughly successful and is approved by health authorities.

THE OKLAHOMA STATE Supreme Court has set aside a law passed by the 1949 legislature reducing the motor vehicle tax apportionment of 36 of the state's 77 counties and increasing the apportionment of municipalities proportionately.

The attack on the new law was filed by the commissioners of a half dozen counties hit hardest on road revenue by the change. Oklahoma and Tulsa county commissioners claimed the new law would cost them more than $60,000 annually in road finances.

Safety Record at Cherry Creek Dam

A total of more than 2,000,000 man-hours of work without a single fatal or critical injury is the record established on construction of the big rolled-earthfill Cherry Creek Dam

By
HARRY L. HIGHLAND
Safety Engineer
Denver District,
Corps of Engineers
Denver, Colo.

A REMARKABLE record has been established by the Denver District, Corps of Engineers, and respective contractors on construction of the $13,850,000 Cherry Creek Dam and Reservoir, located 8 mi. southeast of Denver, Colo. The large rolled-earthfill dam (containing 14,100,000 cu. yd. of fill material) was essentially completed without a fatal or critical injury accident.

Briefly, the accident experience on the project reads as follows:

——Manhours exposure, 2,285,109.

——Number of injuries per million hours worked (frequency rate), 6.56.

——Number of days lost per 1,000 days worked (severity rate), 0.23.

It is interesting to note that the nation-wide injury frequency rate for the construction industry, as compiled and published by the National Safety Council in "Accident Facts—1949," is 16.51, while the national severity rate is 2.51.

In July of 1946, Brigadier General Lewis A. Pick, then Division Engineer, Missouri River Division, and now Chief of Engineers, turned the first sod to begin construction of the dam and reservoir. However, this ceremony did not mark the initial step in development of the accident control program for this project. The comprehensive plan for improvement of Cherry Creek and tributaries, for flood control and other purposes, in accordance with recommendations of the Chief of Engineers, was authorized by the Flood Control Acts as follows: Act of Aug. 18, 1941, which authorized the initial and partial accomplishment of the project, and the Act of Dec. 22, 1944, which authorized completion of the plan approved in the previous Act.

Advance planning helped

Between the date of authorization and beginning of construction, a great deal of advance planning for accident control was accomplished. The term "Advance Planning for Accident Control" is a familiar one. However, its true meaning is often obscured by generalities. Even in this enlightened age of growing appreciation and respect for safety, only a small percentage of construction men are aware of the innumerable and diversified factors involved in development of a program which will insure maximum benefits through effective, practical, and planned methods and procedures.

Boiled down to common terms, planned accident control for a given operation simply means this: An all-inclusive evaluation of each phase of operations involved—which in turn is used as a basis for pre-determining the most practical and effective procedures required for obtaining maximum efficiency.

Today it is an accepted fact that no job or operation plagued with a high accident frequency experience is either efficiently or profitably accomplished.

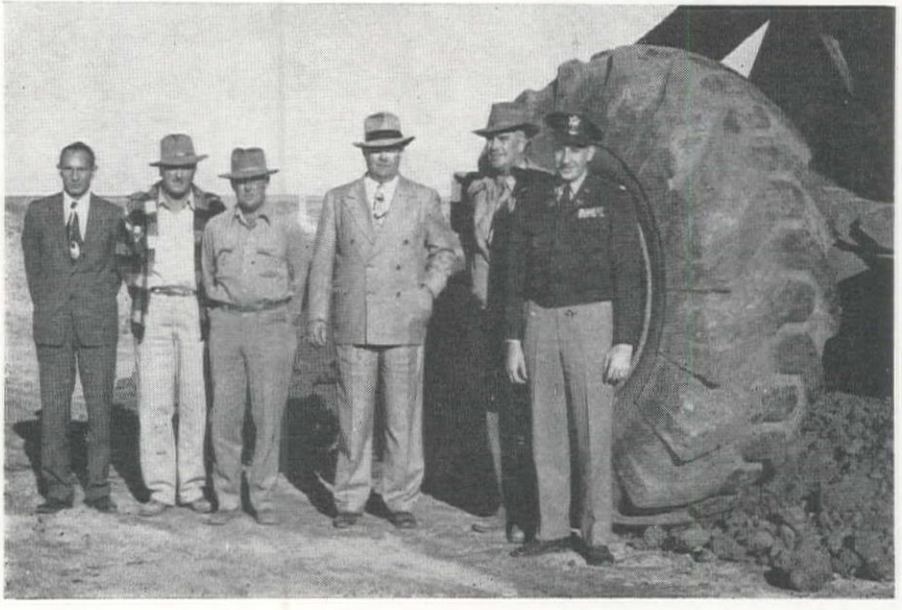
In developing the Cherry Creek Dam accident control program, the initial step consisted of a site survey for the purpose of determining various physical conditions, such as: factors to be considered in planning a flash-flood warning system which would permit advance notice and emergency precautions for protection of workmen and equipment; surveys for locating, and subsequent marking of quicksand hazards; studies of soil conditions as a guide for future excavation shoring needs; detailed investigation of available sources of suitable drinking water, including laboratory tests; tentative selection for office, shops, and material yard sites with due regard for access and exit roads, parking areas, location of fuel storage and dispensing facilities. In addition, the preliminary site survey included assembly of factual data on grades, curves and related factors to be considered in future haulroad layouts.

As plans and drawings were developed, each phase was carefully reviewed to insure inclusion of adequate safety factors and standards. This same procedure was followed as technical personnel prepared construction specifications. This phase of the "planned" program was not a one-man project. All engineering units of the Denver District office joined forces in a unified effort to prepare final drawings and specifications which would provide contractors and field supervisors of the Corps of Engineers with the basic detail and guides required for safe construction.

"Top brass" cooperated

It was realized that development of adequate plans and specifications was only the preliminary step in the program. Volumes have been, and doubtless will continue to be, written on the imperative need for increased interest and participation of management or "top brass" in accident control. Safety engineers are especially appreciative of this need. However, there has never been any doubt about the full interest and participation of all levels of management in the Denver District safety program. To a large extent the gratifying

STANDING beside the last load of earth for the dam—MORRIS ROONEY, resident safety engineer; WAYNE WOLFE, assistant resident engineer; JOHNNY NEW, construction superintendent; GEORGE PHELPS, project manager for Wunderlich Contracting Co.; PAUL JENSEN, resident engineer, and LT. COL. L. J. LINCOLN, Denver District Engineer.



NOTE: Articles that have appeared in *Western Construction News* on construction of the Cherry Creek project are: "Excavation and Backfill for the Cutoff Trench," February, 1947, page 73, and "Construction of Outlet Works, Embankment and Spillway Canal," October, 1948, page 73.

Facts about the Cherry Creek Dam and Reservoir Project

Cherry Creek Dam is a conventional-type, rolled-earthfill dam containing approximately 14,100,000 cu. yd. of material, 185,000 cu. yd. of which is rock riprap. The width at the crest is 30 ft., while the bottom width (max.) is 1,200 ft. Depth of cutoff below streambed is 55 ft. Maximum height is 140 ft., and the crest extends nearly 3 mi. The upstream slope is faced with 18 in. of dumped riprap placed on a 9-in. blanket of sand and gravel.

The outlet works consists of a triple-barrel conduit 740 ft. long, a 174-ft. intake tower, and five 6 x 9-ft. gates, and contains 31,900 cu. yd. of concrete and 4,223,000 lb. of reinforcing steel.

safety experience of the Cherry Creek Dam project can be attributed to management interest, of which the following are examples:

At a ceremony in the Denver District Office on December 16, 1949, Brigadier General S. D. Sturgis, Jr., C.E., Missouri River Division Engineer, presented a National Safety Council award to Lieutenant Colonel L. J. Lincoln, District Engineer, for the best safety record of the five districts within the Division. The genuine "management interest" of General Sturgis is obviously reflected in the following statement: "This program of safety is paying dividends in the form of saving lives and property. Its importance cannot be over-emphasized in such a large construction program as the comprehensive river development now under way in the Missouri basin."

In addition, and this is extremely important, management's interest and participation in accident prevention must be continued on through each successive link in the chain of command. The procedure outlined below describes one of the methods through which this is accomplished within the Denver District.

Immediately following the official bid opening, approval and awarding of the contract, etc., with which all are familiar, the District Engineer invited the successful bidder into his office for a discussion on safety. The contractor was acquainted with the governing policy of the Corps of Engineers as reflected in contract provisions, and the District policy and techniques, through which compliance therewith would be accomplished. In addition, the moral obligation of the Federal Government and contractors performing work for the Corps of Engineers, in providing all reasonable and necessary safeguards required for protection of workmen, was stressed. Other items considered were: economic dividends reflected by increased operational efficiency and production, reduced equipment and property damage costs, lower premium rates for workmen's compensation, etc., all of which are available through effective accident control. These factors were brought out and "spot-lighted" as additional justification for an intensive accident prevention campaign.

In simple terms, the District Engineer thus provided the footings on which the project safety program was to be constructed. Incidentally, the foregoing procedure is followed on each major contract awarded by the Denver District.

Foreseeing hazards

The next step consisted of the development of an outline, including specific consideration of each construction phase, in sequence, and listing of hazards normally related to such operations. This guide, prepared by the District Safety Branch with the assistance of operating personnel, was used by project supervisors. For each type of hazard referred to in this outline, a definite "accident control method" was suggested. This plan proved very effective when used as a supplement to the official Safety Requirements Manual of the Corps of Engineers included as a mandatory portion of all contracts.

CONTRACTORS who accomplished the three major phases of construction on the Cherry Creek project were as follows:

David G. Gordon and Bressi and Bevanda Constructors, Inc. . . . Excavation and backfill for cutoff . . . $1,381,425.

Al Johnson Construction Co. . . . Construction of outlet works . . . $1,748,037.

Wunderlich Contracting Co. . . . Construction of embankment and spillway canal . . . $7,995,125.

Immediately following the arrival of key supervisory personnel on the project, a safety planning conference was called by the Resident Engineer. It was attended by both Government and Contractor supervisors. Each item of the outlined program was discussed in detail and definite arrangements for its effective application were developed. In addition, regular weekly safety progress conferences were scheduled. These sessions were held each Monday morning during which activities and required safety needs for the week were considered. The value of such meetings cannot be over-emphasized. While an overall advance plan for the control of accidents is essential, it is imperative that it be supplemented by practical project level planning continually. In this manner, those actually responsible for the success or failure of the project safety program, the operating personnel, are able to concentrate on imminent problems which may arise, and on which the supervisor's attention must be focused, as determined by the nature of current activities.

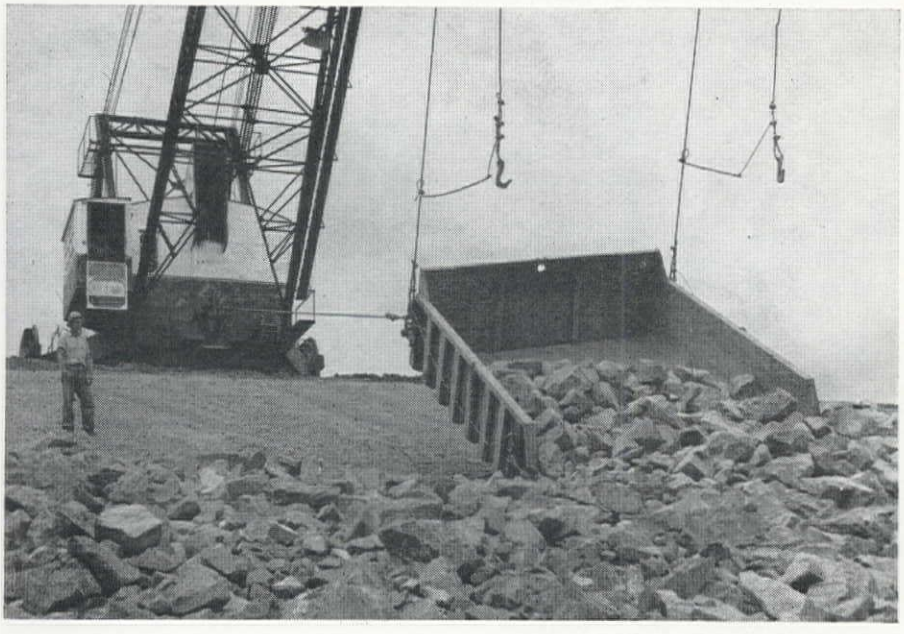
Two important steps

Based on experience gained on the Cherry Creek Dam project, it is considered essential that advance planning for accident control be divided into two separate, although related, phases described above. This method was followed with gratifying results on the subject construction job. The initial general plan may be compared with "Guide Specifications," in which basic control procedures of an overall nature are outlined. The second step, developed by project operating personnel during the scheduled weekly planning conference sessions, may be considered as the "shop drawing" supplement to the general plan. It is definitely geared to specific job-site needs as determined by the nature of construction planned for the immediate future. This two-phase planning method permits flexible adaptation of control measures to meet rapidly changing conditions on projects of this nature.

In both planning and carrying on the safety program for this or any other type

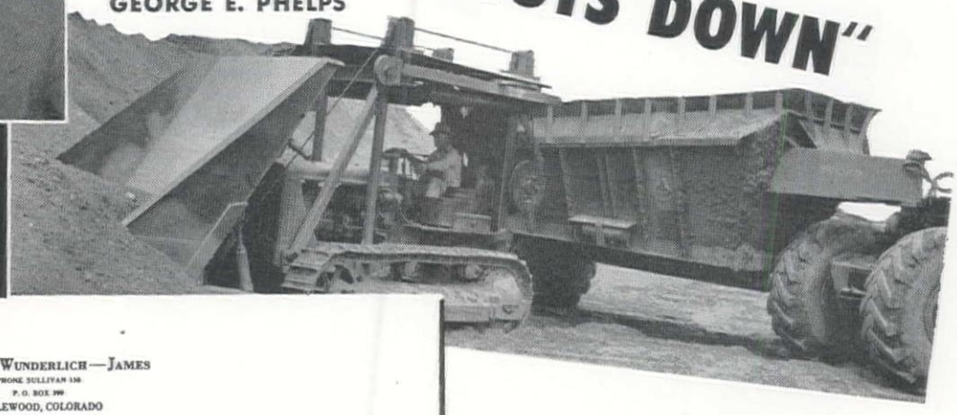
Continued on page 88

A MONIGHAN DRAGLINE with 125-ft. boom places riprap on the dam. This time- and injury-saving method eliminated the need for lowering trucks down the face of the dam.



"PRODUCTION UP... COSTS DOWN"

GEORGE E. PHELPS



PHELPS—WUNDERLICH—JAMES
PHONE SULLIVAN 158
P. O. BOX 399
ENGLEWOOD, COLORADO

(a joint corporation venture)

December 1, 1949

John Austin, Incorporated
707 First National Bank Building
Denver 2, Colorado

ATTENTION: Mr. John Austin

Dear Sir:

We have had one of your Austin 6-C Overshot Loaders in operation on our Cherry Creek Dam Job for the past three months and have found it to be a very efficient machine. Its jobs have been many and in each case it has proven to be a rugged, high-production loader.

We use this machine principally in loading blanket material and sand into Euclid bottom-dump wagons. Our production records are far beyond any expectations as we found that this machine would average 300 yards in a normal working hour, and at times reached a production rate of 350 cubic yards an hour, this operation being in blanket material and sand.

Maintenance costs are found to be at a minimum, with fuel consumption being about the same as for normal dozing operations. The fact that this loader does its own loading, cleaning, sweeping, etc., and is a one-man operation, has taken a large slice from our former loading costs. The Austin Overshot Loader has a definite place in our future operations.

We whole-heartedly recommend the Austin Overshot Loader for use in any operation similar to those in which it has proven itself on Cherry Creek Dam.

Very truly yours,

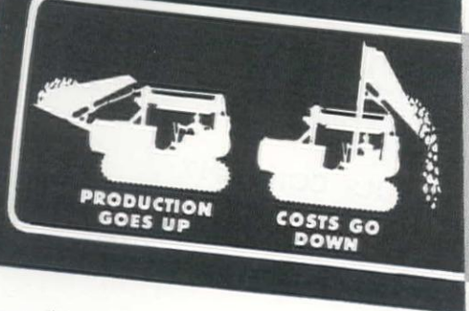
PHELPS-WUNDERLICH-JAMES

By: Geo. E. Phelps

GEP:gkl

300 CUBIC YARDS PER HOUR

NOTE: Rated Production on this 1½ yd. unit is 225 yds. per hour



WRITE FOR FOLDER

John Austin, Inc.
Dept. WCN
DENVER 2, COLORADO

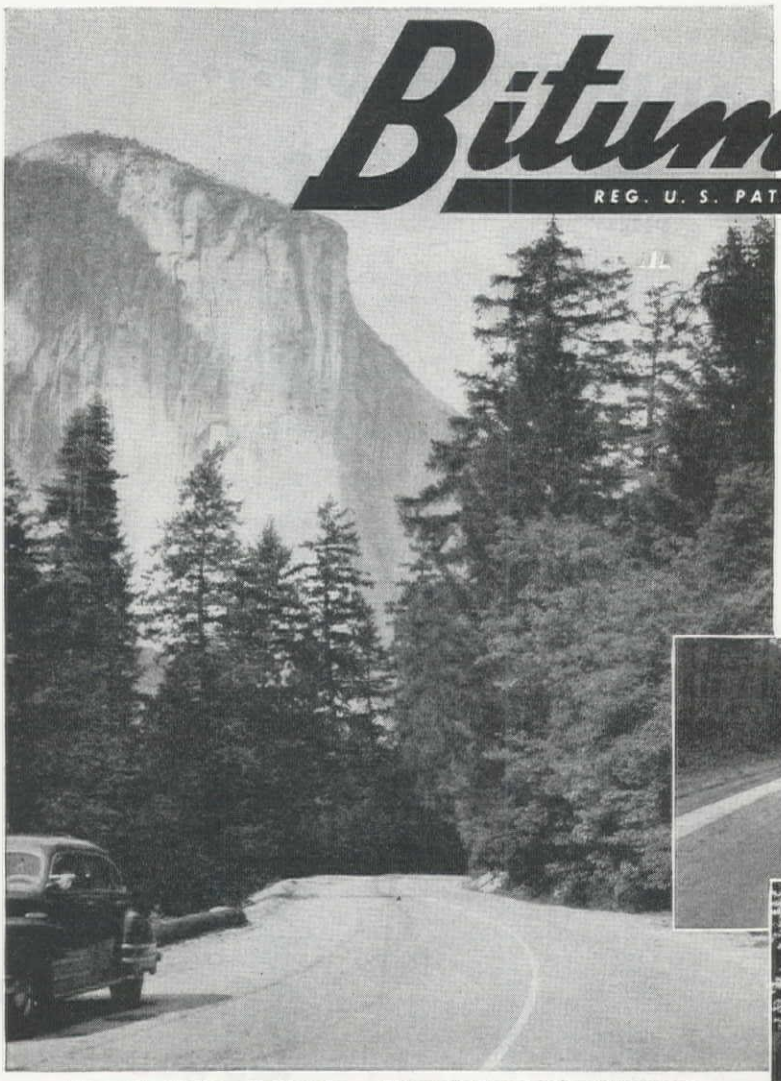
Bitumuls

REG. U. S. PAT. OFF.

has pioneered MANY PRODUCTS

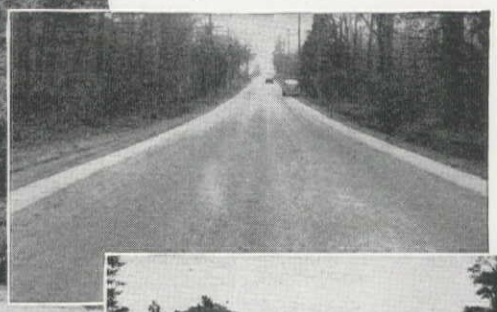
1. Penetration Macadam

with Bitumuls Emulsified Asphalt



Yosemite Valley, California — Bitumuls Penetration Pavement

Maryland Test Road



Bar Harbor, Maine

From California's famed Yosemite Valley to hard rock Maine, there are over 50 million sq. yds. of **BITUMULS** Penetration Macadam.

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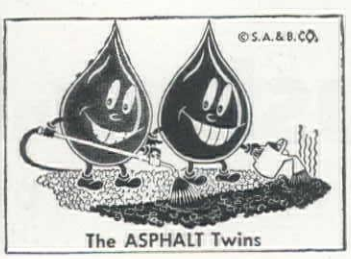

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Portrait—A Distinguished Educator

Franklin Thomas, 1949 National President of the ASCE, has distinguished himself as an engineer-educator and a civic-minded citizen

By THOMAS A. DICKINSON
Los Angeles, Calif.

ACCORDING to an old saying, Franklin Thomas was destined to become a reprehensible combination of cad, scoundrel, and bounder as of May 19, 1885; for that was the date on which he became the son of a Congregational Church minister near Red Oak, Iowa. But, insofar as the old saying about ministers' sons is concerned, Thomas has been a consistent non-conformist—having refused to acquire even such mildly-bad habits as smoking over a period of more than 60 years.

That is why he received such a stirring tribute from one of his oldest friends, after he recently announced his intention to retire from his post as National President of the American Society of Civil Engineers. "Doctor Thomas," averred his friend, "is the sort of man most of us would like to be."

Even in his extreme youth, the minister's son was a studious type whose thirst for knowledge could not be satisfied with a few quick gulps; and, after he received his B. E. degree at the University of Iowa in 1908, he took up graduate work at McGill University.

Practical experience

Then, in order to convince himself that "a scholarly man can also be a practical man," he gained practical engineering experience by serving a year as a foreman on construction of dams for Mines Power Co. at Cobalt, Ontario.

Practical experience helped him to obtain another post as instructor in the department of engineering at the University of Michigan. After two years in the latter capacity, he spent a year working as a designer for Alabama Power Co. and returned to school—the University of Iowa, once again, where he received his C. E. degree in 1913.

The latter degree helped him to obtain an offer of employment from California Institute of Technology, where he soon went to work as an associate professor to help develop the civil engineering department.

Astute scholarship and a prodigious capacity for work enabled him to become professor of civil engineering for Cal-Tech in 1915, and proved executive abilities were responsible for his appointment to serve as chairman of the administrative committee of the Cal-Tech faculty during the absence of the president in 1917.

At the beginning of World War I, he patriotically abandoned his duties as an educator in order to accept the commissioned responsibilities of a first lieutenant in the Engineer Corps Reserve; and in 1910 while he was still on leave of absence from Cal-Tech, he retained a temporary appointment as an assistant engineer for the U. S. Bureau of Reclamation.

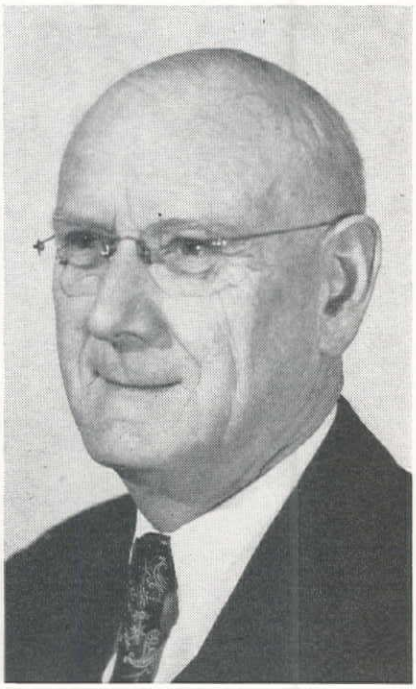
Returning to Cal-Tech in 1920, he resumed his duties as chairman of the administrative committee of the faculty until 1921; and, since then, he has distinguished himself as one of California's most civic-minded educators.

A record of service

In addition to having served Cal-Tech continuously (as chairman of the Division of Civil and Mechanical Engineering, Aeronautics and Meteorology, from 1924 to 1944; and as dean of students, since 1944), he has been a member and vice-chairman of the Board of Directors of the City of Pasadena (1921 to 1927), president of the Pasadena Chamber of Commerce (1927), president of the Pasadena Community Chest (1928), president of the Pasadena Civic Orchestra Association (from 1929 to 1931), and a member of the Board of Directors of the Metropolitan Water District of Southern California (since the latter was organized in 1928).

He acted as vice-chairman of the Board of Directors of the Metropolitan Water District of Southern California during that portion of his membership which extended from 1929 to 1947, and in 1939 he was awarded the Arthur Noble Medal for distinguished service to the City of Pasadena.

FRANKLIN THOMAS



Governor Earl Warren acknowledged Dean Thomas' engineering and executive abilities in 1947 by naming him as a member of the Colorado River Board of California, and in 1948 fellow members of that board held an election which made the distinguished educator their chairman.

Less spectacular and sometimes more important duties that have been assumed by the minister's son (who, according to an old saying, should have been a ne'er-do-well) include work as a consultant on flood control and sanitation projects for the City of Los Angeles and the Counties of Los Angeles and Orange.

Simultaneously, he has found time to maintain active membership in an impressive number of distinguished organizations—including Sigma Tau, Tau Beta Pi, Sigma Xi, the American Water Works Association, the California Sewage Works Association, the American Society for Engineering Education, the Pasadena Kiwanis Club, and the aforementioned American Society of Civil Engineers.

Activities in the ASCE

Thomas became a Junior Member of the latter organization in 1912, an Associate Member in 1916, and a Member in 1923. As an A. S. C. E. Member, he participated in activities of the special Committee on Irrigation Hydraulics from 1923 to 1933; became president of the Los Angeles Section in 1924; acted as chairman of the Committee on Accredited Schools in 1937; served as District 11 Director from 1930 to 1933; was vice-president from Zone IV in 1944 and 1945 and president in 1949.

As A. S. C. E. President, Dean Thomas received his ultimate reward as a scholar—the honorary degree of Doctor of Engineering—at the University of Southern California in June, 1949.

It might seem that a man of so many accomplishments would find little time for hobbies; yet the dean has managed to maintain an active personal interest in music since the early days of his youth, and friends say he can still hold his own with professional musicians when it comes to singing or playing a cornet.

He has a tendency to blush and deny the charge, if you accuse him of being a philanthropist; but it's not at all hard to find Cal-Tech students who will attest that, "he's one guy who's always willing to help you with your problems—even if it's necessary to loan you money from his own pocket."

Although he is a husky man, almost 6 ft. tall, Franklin Thomas has never taken a serious interest in athletics. However, he has indirectly sponsored a variety of athletic activities over a period of many years in his efforts to serve the campus Y. M. C. A. at Cal-Tech.

Socially, the dean is something of a paradox—a conversationalist who can

Continued on page 88

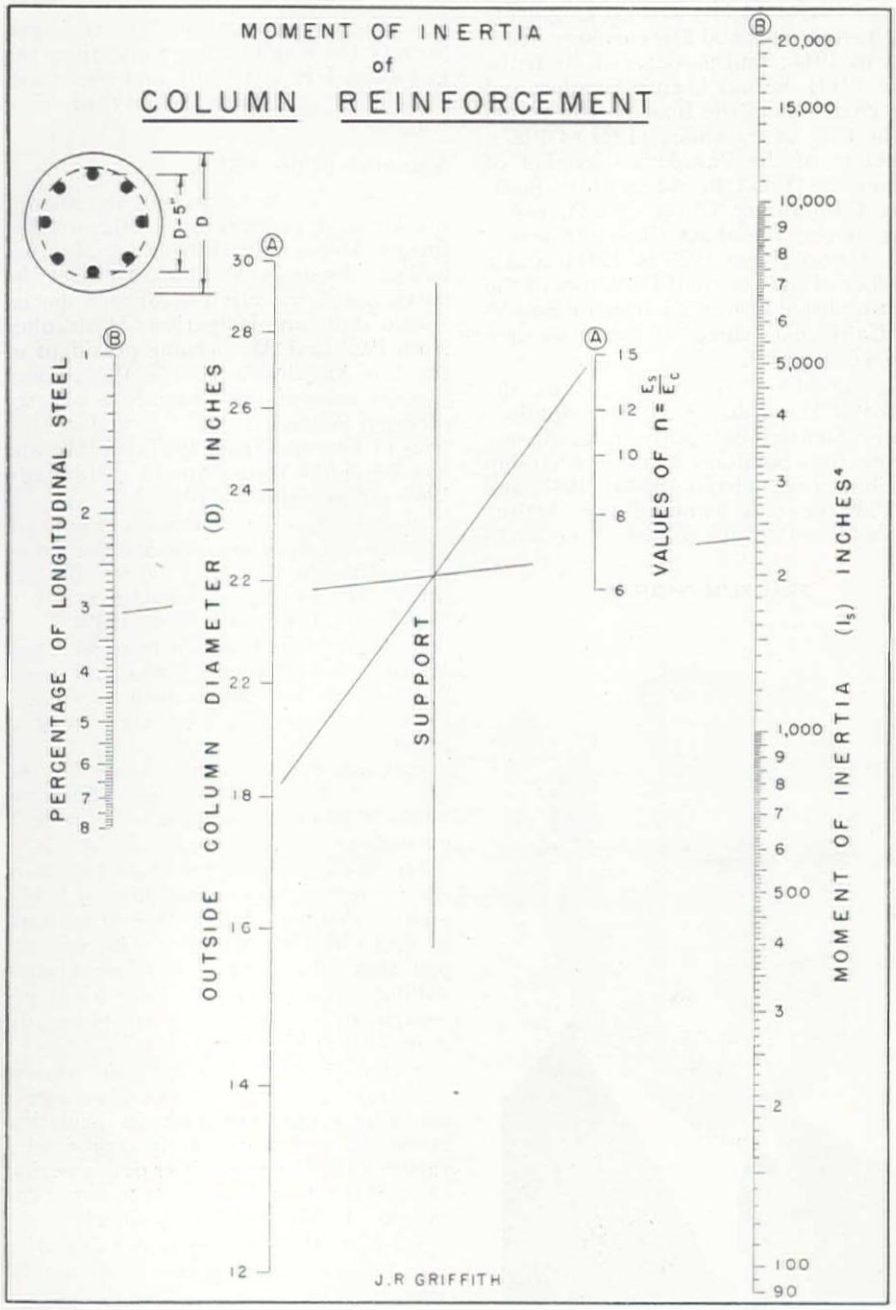
Construction Design Chart

CXVI . . . Moment of Inertia of Column Reinforcement

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

IN THE ANALYSIS of reinforced concrete columns subjected to both bending and direct stress, it is sometimes necessary to determine the moment of inertia of the column. When solving for the moment of inertia of a composite section consisting of different materials, such as reinforced concrete, the basic procedure is to reduce all materials to terms of an equivalent single material. In reinforced concrete members, the steel is usually reduced to terms of equivalent concrete area, and is referred to as the method of transformed sections.

In order to transform the longitudinal steel in a spiral reinforced concrete column to terms of an equivalent area of concrete, the conventional method is to reduce the steel to terms of a thin hollow ring. On the basis of equivalent deformations, each square inch of steel would carry $n = \frac{E_s}{E_c}$ times as much stress as a square inch of concrete. The gross area of the concrete, without reduction for the steel area, is conventionally used for computing the resistance of the concrete. Since the area occupied by the reinforcing steel has been thus figured, the area of the steel is multiplied by the factor $(n-1)$.



In preparing the accompanying chart, certain common assumptions and approximations have been made since there are an infinite number of possible variations. The mean diameter of the equivalent hollow ring has been taken as 5 in. less than the outside diameter of the column. This would allow for 1½ in. of protective covering outside of a ½-in. spiral wire, assuming either 1-in. round or 1-in. square bars are used for longitudinal reinforcement. Any deviation from these basic assumptions will result in a small variation in the resulting moment of inertia. On the other hand, such variations should not be regarded with too much concern when we realize that the usual specification sets the value of $n = \frac{E_s}{E_c}$ as a constant value for any value of f'_c. Thus it is customary to use a value of $n = 15$ when $f'_c = 2{,}000$ p.s.i. The value of E_c is actually a variable depending upon the unit stress, and as a consequence n is in reality not a constant.

Two straight lines intersecting on the "SUPPORT" are necessary for a solution of the accompanying chart. One solution line should be drawn between values on the (A) scales, and the second line between values on the (B) scales. I have drawn solution lines on the chart for the following assumed conditions:

Outside column diameter, $D = 18$ in.

$n = 15$

Longitudinal reinforcement to be ten 1-in. round bars

$A_s = 7.9$ sq. in.

$$\text{Percentage of steel} = \frac{7.9}{254.5} = 3.1\%.$$

On the moment of inertia scale, a value of $I_s = 2{,}350$ in.⁴ will be noted.

Urquhart and O'Rourke[1] include tabular values for the moment of inertia of column reinforcement based on a unit percentage of steel. The table referred to gives, for the above assumed conditions, a value of $I_s = 754$ in.⁴ The total value for a percentage of 3.1, as assumed in our problem, would then be $I_s = 3.1 \times 754 = 2{,}337$ in.⁴, which is a reasonable check on the accuracy of the value obtained by the chart.

[1] *Design of Concrete Structures*, McGraw-Hill.

Utah Programs Highway Jobs

IMPROVEMENT or new construction of 147 mi. of state primary or secondary highways at a total cost of $4,720,000 has been programmed by the Utah State Road Commission for the fiscal year beginning next July 1. The state also still has a backlog of $2,930,000 in projects that have been previously approved but have not yet been contracted. Biggest project under the program is for construction of a 4-lane highway from North Farmington Junction to Layton, to cost about $750,000.

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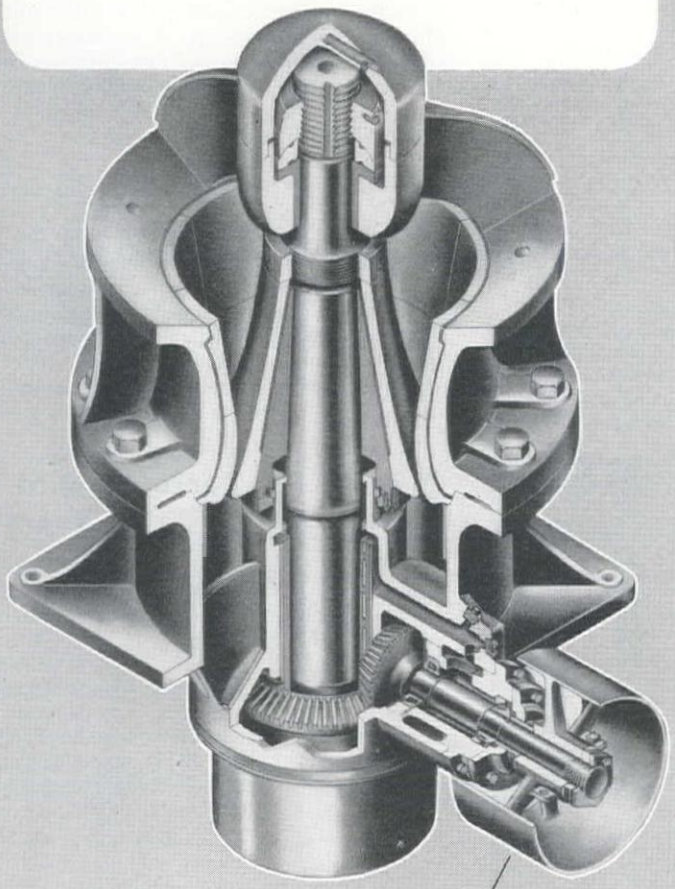

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A "TRAYLOR" LEADS TO GREATER PROFITS

A "Course in Construction" at The University of California

WITHIN the last few years, several colleges in the West have recognized the need to expand the curriculum in their departments of civil engineering to include "courses in construction." These courses would be designed to acquaint upper-division students with the fundamentals of construction practice and the work of contractors. Those students taking these courses would: (1) be better equipped to find employment in contracting organizations, (2) have better chances for advancement, and (3) be of more immediate value to their employers.

The University of California has given serious study to setting up such a program and three years ago introduced an optional course in "construction" into its curriculum in civil engineering at Berkeley. All freshman and sophomore students take the same courses in engineering fundamentals and at the beginning of their junior year elect to take optional courses providing specialization in irrigation, sanitary, structural or transportation engineering. During the last two years, students electing to take the new construction option enrolled in such available general courses as accounting, business administration, management and personal administration.

During this same period the University studied the problem of securing a properly qualified engineer to plan and organize courses which would be of more direct interest and value to students in this option. The problem was difficult.

Recently, Henry M. Hale, a graduate of the university and president of Milton-Hale Machinery Co., Inc., Albany, N. Y., made available to the university the services of Frank A. Nikirk to assist in setting up selected courses in construction engineering. This offer was accepted by Professor H. B. Gotaas, Chairman of the Civil Engineering Department and Dean M. P. O'Brien of the College of Engineering. Nikirk was appointed visiting professor effective January 1.

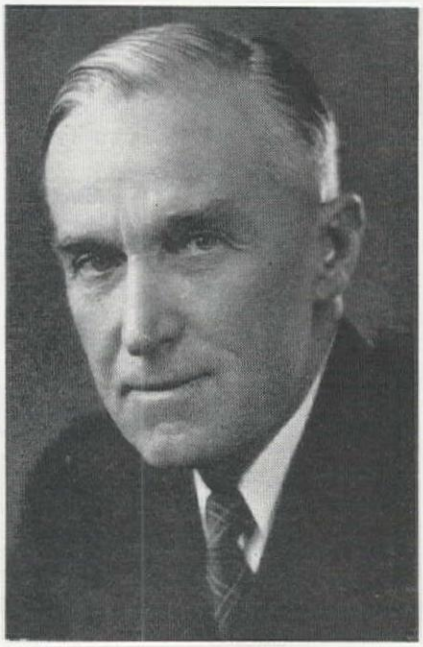
Frank Nikirk is well known among contractors and to the construction industry as a result of his long service with the Caterpillar Tractor Co., as well as other equipment manufacturers, and years in private practice. He graduated from Stanford University in 1904 as a civil engineer and worked for several years on railroad location and construction. There followed several years of municipal work, concluding with service as City Engineer of San Jose, Calif. In 1927 he joined the Caterpillar Tractor Co. as a civil engineer, advising this organization on engineering trends in the earthmoving field and assisting the users of Caterpillar equipment in making the most efficient use of these machines. During these years he became well known throughout the entire country as a recognized authority in the use of heavy construction equipment. In 1942 he left the Caterpillar organization and became a consultant to the Corps of Engineers. More recently, he has been with the Milton-Hale organization in an advisory capacity. He is a member of the American Society of Civil Engineers and has served on committees studying problems relating to engineering education.

In his new capacity, Mr. Nikirk will review the present curriculum to determine the existing courses best suited to those students who elect to enter the contracting side of the construction industry. Based on this study he will advise on new courses which may be developed to treat more specific elements of construction and contracting. For example, courses might be developed which would review the elements making up construction costs and how these affect bids prepared by contractors. Courses of this type would be general rather than specific. Other courses might be developed to cover the types and uses of major units of construction equipment, together with the operating and economic problems involved.

According to Professor Gotaas of the Civil Engineering Department, the new courses will be developed slowly and with careful study to indicate their logical position in a curriculum designed to equip students to secure positions with contractors' organizations. Further, it is the plan of the department to develop a program by which lower division students could secure advice and council indicating whether or not they would be interested in or qualified to take these optional courses. The final result of this program would be to graduate students who would be of more immediate value to contractors and who would have a better chance for success in this chosen phase of the construction field.

As part of the program, the Department might encourage upper-division students, not only to find summer work with contractors, but also to remain out of college for one or two semesters to advance their practical education before completing their formal academic training.

FRANK NIKIRK, now at the University of California as visiting professor, will assist in setting up selected courses in construction engineering. He has many years of varied experience in the construction industry.



No Precedent for Webb Profit-Sharing Program

PENSION and profit-sharing plans for all regular personnel of the Del E. Webb Construction Co., which has offices in Phoenix, Ariz., and Los Angeles, Calif., have been announced by Del E. Webb, company president. A comprehensive investigation by officials of Ron Stever and Co. of Los Angeles, consultants supervising installation of the plans, leads them to believe the Webb Company is the first major construction organization to install such a benefit program.

According to Webb, the new pension and profit-sharing plans are designed to provide all eligible employees with a reward for services rendered, and as an inducement for continued loyalty and efficient workmanship. Announcement of the program followed presentation by the company of a Christmas bonus equivalent to a month's salary to all employees on its regular pay roll one year or longer.

All present and future pay roll personnel at Webb Company main, district and field offices over the nation, and all job superintendents, qualify for the pension and profit-sharing plans on completion of eligibility requirements. These include one year of service for participation in profit-sharing and three years of continuous service for the pension plan.

1949 U.S.B.R. Force Account Work Lowest in Seven Years

CONSTRUCTION performed by the Bureau of Reclamation with its own forces instead of through contracts with private industry totaled $5,741,000 in fiscal year 1949, or 2.6% of the year's $217-million dollars' worth of construction in 17 Western States. The percentage figure was the smallest for this type of work by the Bureau in seven years, and was approximately half the 5.4% ratio and $10-million dollar expenditure for force account work in the 1948 fiscal year.

The force account method is used by the Bureau to carry on construction on its projects by hiring labor to perform essential tasks in emergency situations, on work which does not lend itself to the contract method, and when it is impossible to secure acceptable bids, or assurances of adequate performance under private contract.

Jet Power for Heavy Construction?

Lightweight turbojet engines being developed by Boeing Airplane Co. presage that jet power for trucks and earthmovers could become a reality within the next ten years

JET POWER for trucks and other earthmovers will be a reality within ten years, at the present rate of solving the remaining design and mass-production problems. Highly technical work on gas turbine engines, more popularly called "jets," is proceeding at a fast rate in the Seattle plant of the Boeing Airplane Co., and the research begun during the war in 1943 has produced several custom-made models that show great promise for being variable power, variable torque, 1-lb.-per-hp. engines.

No transmission

Two models of gas turbine design, 500 and 502, were recently described by Edward C. Wells, vice-president for engineering at Boeing. The two outstanding features of the new gas turbine models are (1) small size and portability, and (2) in Model 502, the infinite variety of torque available, eliminating the necessity of gear boxes in the transmission drive. These two items alone will make the new gas turbines ultimate competitors with diesels, according to Mr. Wells, where the power requirements are from 50 to 500 hp. Only in recent years has a power plant of gas turbine design been built that will operate efficiently in this power range.

Model 500 is a turbojet weighing 111 lb. and delivering a thrust of 180 lb. from its exhaust gases. Model 502 consists of Model 500 plus a turbine wheel, reduction gear, and power output shaft added, bringing the weight up to 185 lb. Power output from the shaft is 160 hp., continuous rating, with a temporary maximum of 200 hp. for emergency. Basically, Boeing's Model 502 is in two major sections, gas producer and power-output, that makes it comparable in function to a motor-generator set. In the gas-producer section, a single-state centrifugal compressor, two can-type burners, and an axial-flow turbine wheel to run the compressor are used. Thus, the gas producer section is a pure jet engine, expelling hot gases with a total thrust of 180 lb.

In the power-output section, the exhaust thrust is guided through another turbine wheel, converting the thrust into rotary power. The gas producer turns at 36,000 rpm. and delivers the gas through an expanding nozzle box to the power wheel, which normally turns at 22,500 rpm. The power wheel turns a 9:1 reduction gear, delivering a maximum continuous output-shaft rating of 160 hp. at 2,500 rpm.

The outstanding quality of the engine that will make it ideal for trucks and tractors in future years is the nozzle box, or scroll case, that funnels the gases from the producer to the output sections. This metal casing is the only major engine part that connects the two sections. Power is delivered from the first to the second wheel in the velocity of the gases only, and there is no shaft, clutch, gear box, or fluid coupling needed. This feature is relatively new in the field of gas turbines, and is the reason for the "infinitely variable torque" property of the engine.

No mechanical connections

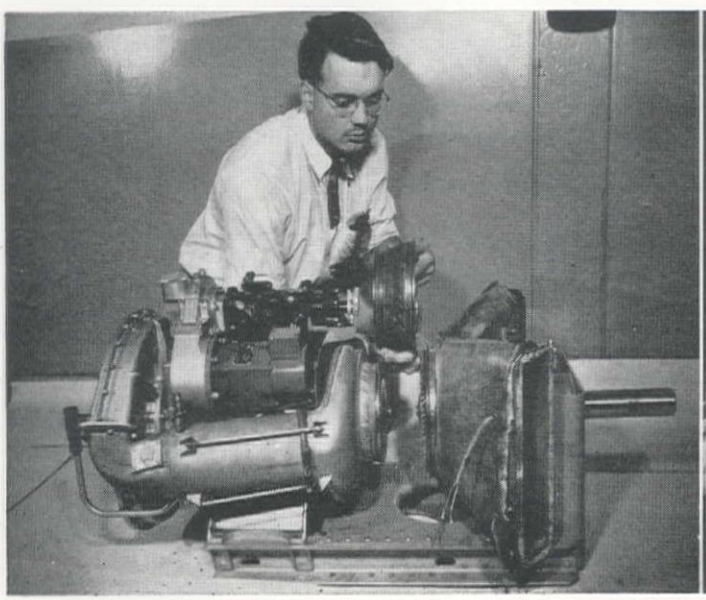
If a truck powered by a Model 502 carried its load at full rated throttle and speed, the compressor turbine would turn at 36,000 and the power output turbine at 22,500 rpm. As the truck entered an up-grade, still at full throttle, the compressor turbine would still produce the 180-lb. thrust and turn at 36,000 rpm., although with the slower truck speed and increased torque needed, the output wheel would turn at 15,000 rpm. With an increase in grade, the first turbine would still turn at 36,000 rpm. and deliver 160 hp., but the output shaft would only turn at a few thousand or less, simulating compound-low transmission conditions. The output wheel could virtually deliver twice the rated torque while still absorbing the 160 hp. to hold the truck at a standstill. In this manner the operator would have absolute control, with a smoothness and "feather touch" action, over the entire range of horsepower and transmission requirements.

This variable torque property was stressed by Mr. Wells, who stated "if the 502 had a mechanical connection between its two stages (as some turbine designs do), its working power would be tied, mechanically, to the narrow speed range of its compressor efficiency. Because it has no connection, however, the compressor can be run at efficient speed and its shaft speed varied to suit the load.

"Truck operators, particularly, should be highly interested in this feature. For them, it will provide superior accelerat-

POWER-PRODUCING section of turbine, left below, has no mechanical connection to power-output shaft at right. Only connection is shroud which technician is installing. This provides an infinitely variable transmission, capable of extremely high torque without the use of conventional gears.

ENTIRE TURBINE, dismantled, can be placed in a single small cabinet. Because of this feature, parts storage and transportation for the turbojets would be no problem on remote jobs. One mechanic using 14 lb. of tools can tear down and re-assemble the engines in one working day.



ing qualities, giving a fast start under load, plus maneuverability."

Another feature of particular interest to contractors and equipment men is the simple design and small number of parts required to make one unit. Boeing engineers claim that there are only one-sixth as many parts in their gas turbine as in the average piston displacement engine of equal horsepower, and that one mechanic completely disassembled and assembled one of the turbines in six hours, using a total of 14 lb. of tools.

Additional qualities of the newly developed Boeing turbines are slight friction loads and nearly constant starter power requirements. Tests proving the contention that at 65 deg. F. below zero, the turbine can be started, warmed up, and opened to full power in 60 sec. will be run in the next 12 months. For all normal power uses, the engine is cooled by normal air circulation. Neither water jackets and radiators nor forced-draft air cooling systems are necessary.

Wells remarked that, "The turbine operates equally well on diesel fuel, kerosene, and low or high-octane gasoline. With additional development, now under way, our engineers expect to perfect its operation on low-grade industrial fuel oils, down to and including 'bunker C,' the low-cost tars remaining at the bottom of the still after all other factors have been cracked off. Consumption is about equal for these fuels on a ratio of fuel pounds per brake horsepower per hour."

Unsolved problems

Among the problems that still need refinement on the new engine is the high fuel consumption as compared to that of comparable piston engines.

As is generally true in the operation of gas turbines, a considerable percentage of the available power must be spent to drive the air compressor. A lot of power developed by the turbine does not come out at the drive shaft for this reason. This inefficiency is true of all gas turbines, and with steady research through the coming years, is being reduced step by step. The less power required to run the compressor, the more will be available on the shaft for each dollar of fuel.

Noise problems are now being solved on the testing blocks. The high, singing whine of the compressor blades has been cut greatly by the use of a Fiberglas silencer, and sound technicians are at work reducing exhaust gas and reduction gear noise.

Considerable progress has been made toward replacement of critical metal alloys—cobalt and columbium—used in the turbine wheels. Manufacturing the test models of the turbine has involved a great deal of research and experiment. The cost thus far has been high, due to the custom work and new techniques required.

Refinements are made continually. With quantity production of "jets" in the next several years, power-hungry construction equipment will experience many changes by the introduction of gas turbine engines.

Safety Record

. . . Continued from page 83

of operation, the most important element involved is that of cooperation. This can only be obtained through convincing all concerned that the old "police tactic" method of enforcement has been discarded. Construction men of today are intelligent. They have to be, otherwise the growing competition will soon eliminate them entirely. The successful safety engineer or director of 1950 no longer confines his efforts to detection of an unsanitary latrine or a stray scrap board from which a nail protrudes. He applies the basic elements of genuine engineering to the task of practical accident prevention. To accomplish this, he must have also a general knowledge of modern construction methods. One stupid, impractical recommendation made to a construction superintendent by an incompetent safety engineer for the correction of an unsafe method or practice, automatically and permanently earmarks him, and justly so, as a "screwball."

From the beginning of the Cherry Creek Dam project in 1946 until the last yard of earth was placed in the structure on Nov. 2, 1949, the Denver District Engineer received not one single complaint from a contractor based on an objectionable or impractical safety recommendation! This was not because no problems arose, or remedial measures were recommended. It was a result of this governing policy—"If it isn't practical—it isn't safety."

The cooperation of respective contractors during this entire construction period was outstanding. Their combined experience of only 14 reportable injuries, (plus one sustained by a Corps of Engineers employee), none of which were of a critical nature, underscores this fact. A record such as this clearly indicates what can be accomplished through planned, applied accident controls. In addition it provides irrefutable proof that the Corps of Engineers, as represented by the Denver District, and the construction industry, as represented by the prime contractors referred to above, are accepting the moral obligation of providing employees with the safest possible environment in which to earn their wages.

Portrait of Thomas

. . . Continued from page 80

be entertaining without being frivolous, serious and deliberate without being offensive. However, the weight of his official duties at this writing has forced him to confine most of his social activities to the Congregational Church, which he currently serves as a member of the business advisory board.

He rarely mentions his family; and, indeed, many associates have been surprised to learn that an educator with such a multitude of interests could also have a family. However, he actually attributes much of his success to a devoted wife who—in addition to helping him with many of his official duties—has enabled him to become the father of two boys and two girls. Both daughters are now married. His two sons are among the veterans who were killed in action while serving their country in World War II.

Utility's Canyon Ferry Dam Bought by U.S.B.R.

A CONTRACT has been executed between the Bureau of Reclamation and the Montana Power Co. for purchase of the power company's Canyon Ferry Dam and Powerplant, adjacent lands and residences on the Missouri River about 17 mi. east of Helena, Mont., for the Bureau's Canyon Ferry Unit of the Missouri River Basin Project, according to K. F. Vernon, director of the Bureau's Region 6.

Acquisition of the power company's dam, powerplant and other holdings is required as a part of the Bureau's plans for construction of its Canyon Ferry Unit. The 2,050,000 ac. ft. reservoir at the new dam will inundate the existing dam and powerplant, which is located about ¾ mi. upstream from the dam now under construction.

The contract between the government and the power company calls for the payment of $950,000 to the power company for its dam, powerplant, natural-flow water rights, lands and buildings which will be affected by construction of the new Canyon Ferry Dam and Powerplant.

Under provisions of the contract, the Bureau of Reclamation will provide annual storage capacity of 47,500 ac. ft. in the new reservoir for the storage of water under the company's Montana storage right of Oct. 31, 1898. The stored water will be released, as ordered by the company, to provide for its downstream water requirements.

Work has been in progress on construction of the Bureau's Canyon Ferry Dam since last summer. The river was recently channeled through a diversion flume and the river-level behind the cofferdam is beginning to rise. It is expected that the river level will reach the Montana Power Company's Canyon Ferry Powerplant by around March 15, at which date the company will cease operation of the plant and allow the government full possession of the generating plant and facilities. The Bureau will dismantle and salvage most of the equipment at the plant.

PREDICTIONS of the growth of California, Oregon and Washington population-wise are given in a report issued by the U. S. Department of Commerce. The report estimates that the population of California in April, 1960, will range between 12,500,000 and 14,000,000; of Oregon, from 1,984,000 to 2,236,000, and of Washington, from 2,607,000 to 3,218,000. California population has now passed 10,665,000, placing California ahead of Pennsylvania and second only to New York.

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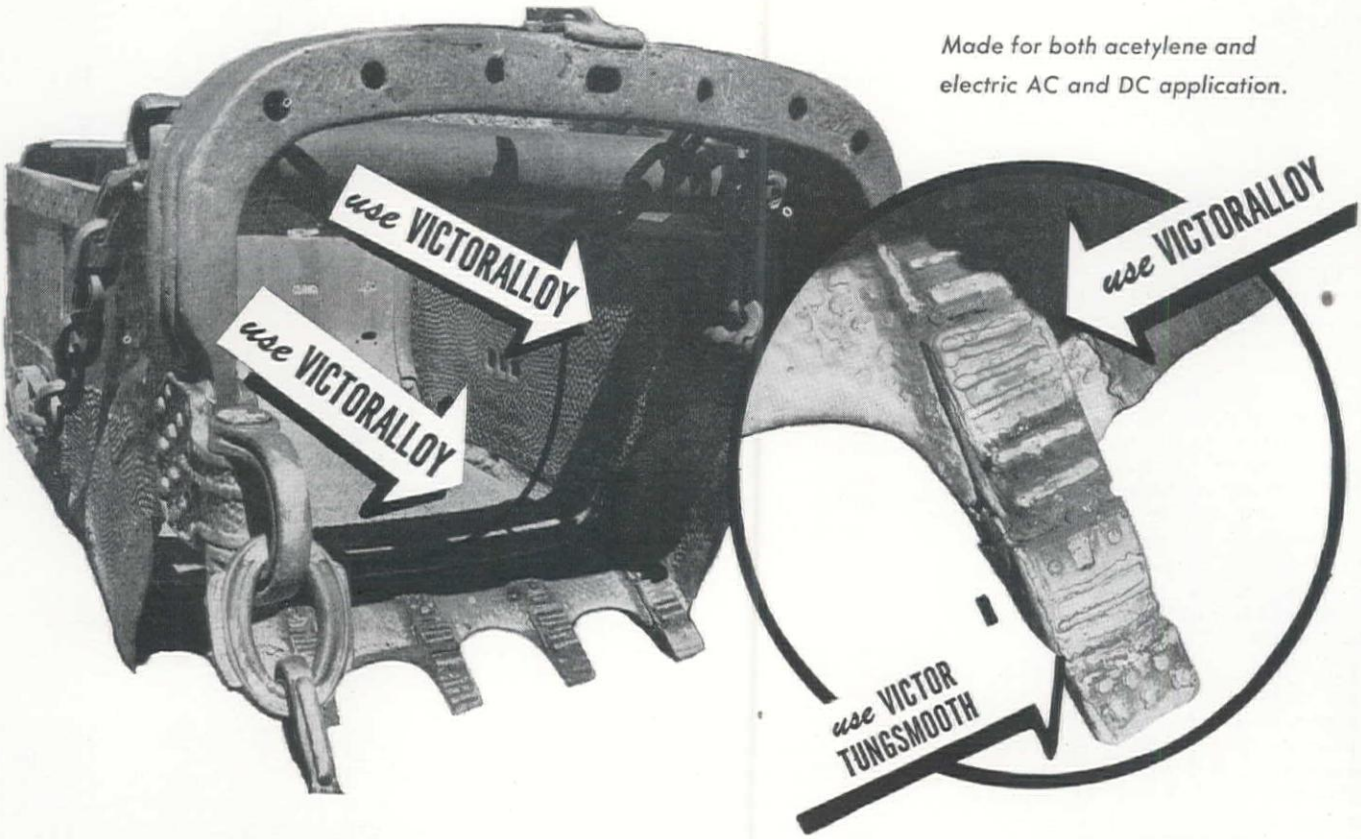

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The Story of the "Bridge to Nowhere"

Construction of a new bridge at an isolated site in Colorado has been unjustly criticized in the Western press—Here is the real story

A NUMBER of stories have appeared in Western newspapers and magazines regarding the "bridge that goes nowhere." The bridge referred to lies southeast of Denver, Colo., on State Highway 83, which is also Federal Aid Secondary Route No. 170 in the State of Colorado. The story in back of the stories that have appeared is one of interest to the construction industry generally.

In the 30's, State Highway 83 was constructed immediately southeast of Denver, entirely with State money, to a point northwest of Parker. Then, in the days of P. W. A. projects, an additional length of the highway was constructed to a standard suitable for farm-to-market purposes. When the original Federal Aid Secondary Act of 1936 came into being, an additional mileage of surfacing was constructed. At the conclusion of this phase, the strategic network of highways came into being, and because of the congestion on State Highway 1, which to this day is the main-traveled route between Denver and Colorado Springs, State Highway 83 was brought into the picture as an auxiliary route to provide added capacity between Denver and Colorado Springs. The proposed southern junction of State Highway 1 and 83 was to take place approximately 10 mi. north of Colorado Springs.

For this reason, the entire length of State Highway 83 from Denver to the junction north of Colorado Springs was approved as a Federal Aid Primary route on the strategic network and an additional amount of the highway through the town of Franktown and extending south to a structure site at Cherry Creek was built. The structure site at Cherry Creek was selected because of the fact that the precipitous walls of the stream would lend themselves to the construction of an arch bridge.

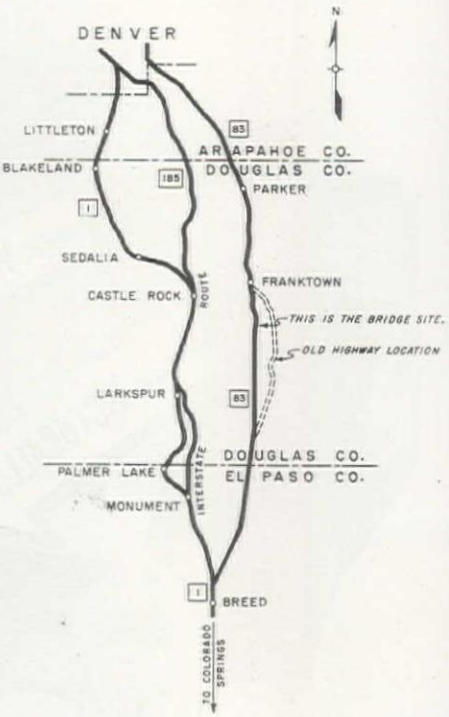
Cherry Creek is known locally as a bad actor. This reputation is well deserved because the entire watershed is in a flash flood area which within hours can change a practically dry stream bed to a raging torrent carrying a depth of water of as much as 30 ft. The arch structure site was such that it would provide necessary clearance for flash floods with no additional structure cost. The bridge was designed for a 30-ft. curb-to-curb roadway with an H-15 loading. At this point, World War II intervened and before the bridge could get under way, all construction stopped.

At the end of World War II and as a result of the creation of the interstate system with its established high standards of construction, it became apparent that a review of the previous decision to improve alternate routes was in order. A complete economic study was made of the possible routes between Denver and Colorado Springs, and the decisions reached as a result of this study were as follows: The main Interstate route from Denver to Colorado Springs should follow a new location from the southeast city limits of Denver to a point immediately north of Castle Rock, thence via the present routing to a point at Larkspur, then by way of a new location to the town of Monument and then generally following the route of the existing highway to Colorado Springs. The decision relating to the Interstate routing resulted in the necessity of selecting a Federal Aid Secondary route to serve the general area on the Denver-Parker-Franktown-Breed location of State Highway 83. This appeared reasonable as there was only a short stretch of State Highway 83 which had actually been improved to Federal Aid Primary standard.

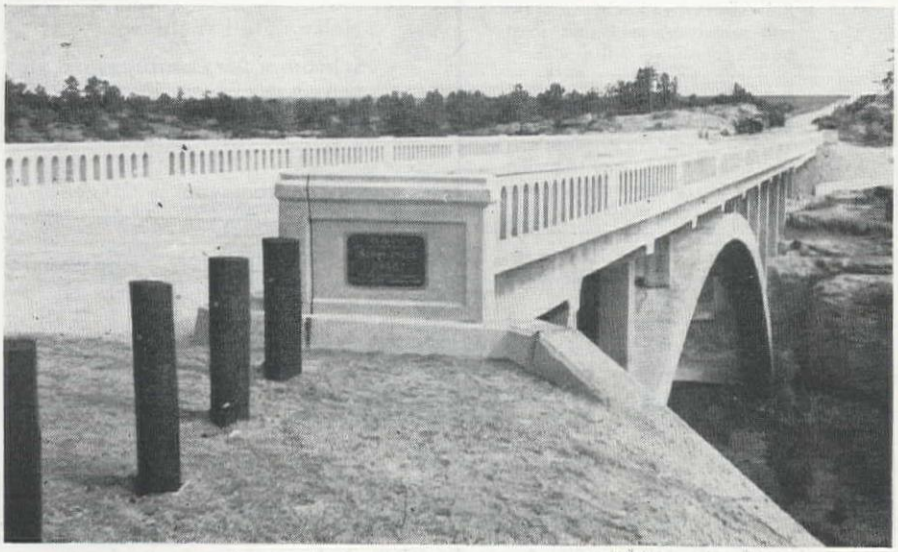
In the meantime, the bridge across Cherry Creek was let by contract to the J. H. & M. M. Monaghan Co. Because of the isolated site of the structure, it made an ideal bridge project which could be constructed without any interference to existing traffic. Another item that entered into the consideration relates to the Colorado Budget Law which makes it mandatory to budget funds in December for construction proposed for the ensuing year. The bridge project, which was let in September of 1946, was in that period of time when materials were so scarce that no guarantee could, or would, be made by material suppliers as to delivery.

The attitude taken by the Colorado Department was that, when the bridge project was sufficiently advanced, funds would be asked for the required roadway connection at the south end to tie the bridge and its northern and southern approaches in as a serviceable part of State Highway 83. As the bridge neared completion in 1948, the southern approach was budgeted for the year 1949. The contract for this construction was let to Herren & Strong in September of 1949.

The map indicates the location of the highway as it has been built. It is anticipated that the connecting link will be completed early in 1950 and at that time the famous bridge, which is known as the "bridge to nowhere," will actually lead to a connection with the Interstate highway north of Colorado Springs and from that point to any place in the Continental United States that may be reached by highway.



THE "BRIDGE TO NOWHERE" actually will soon be a part of an important highway route.



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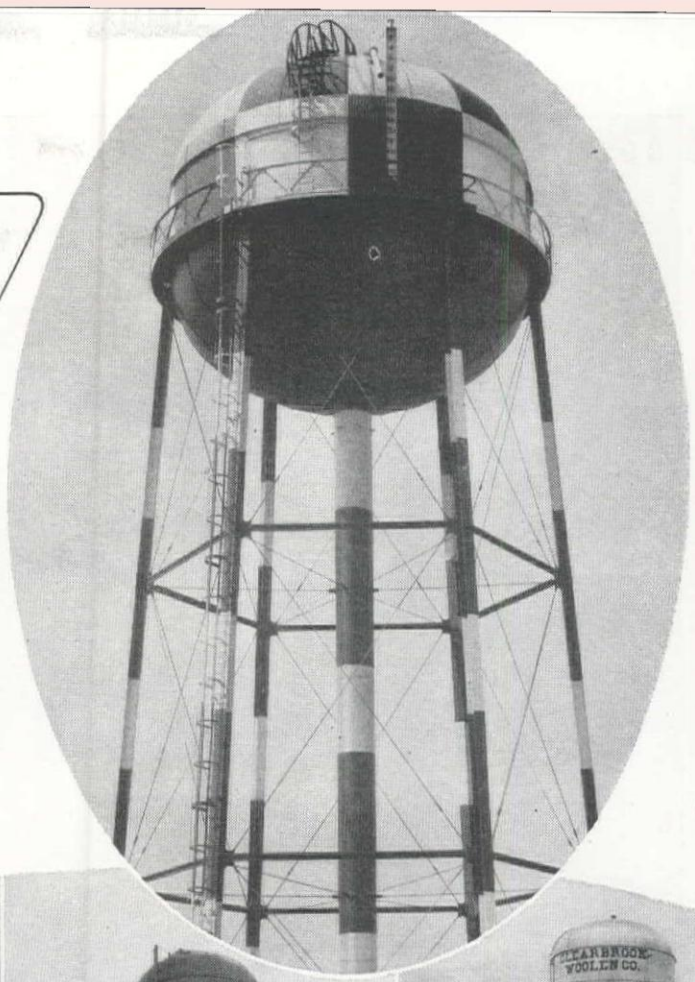

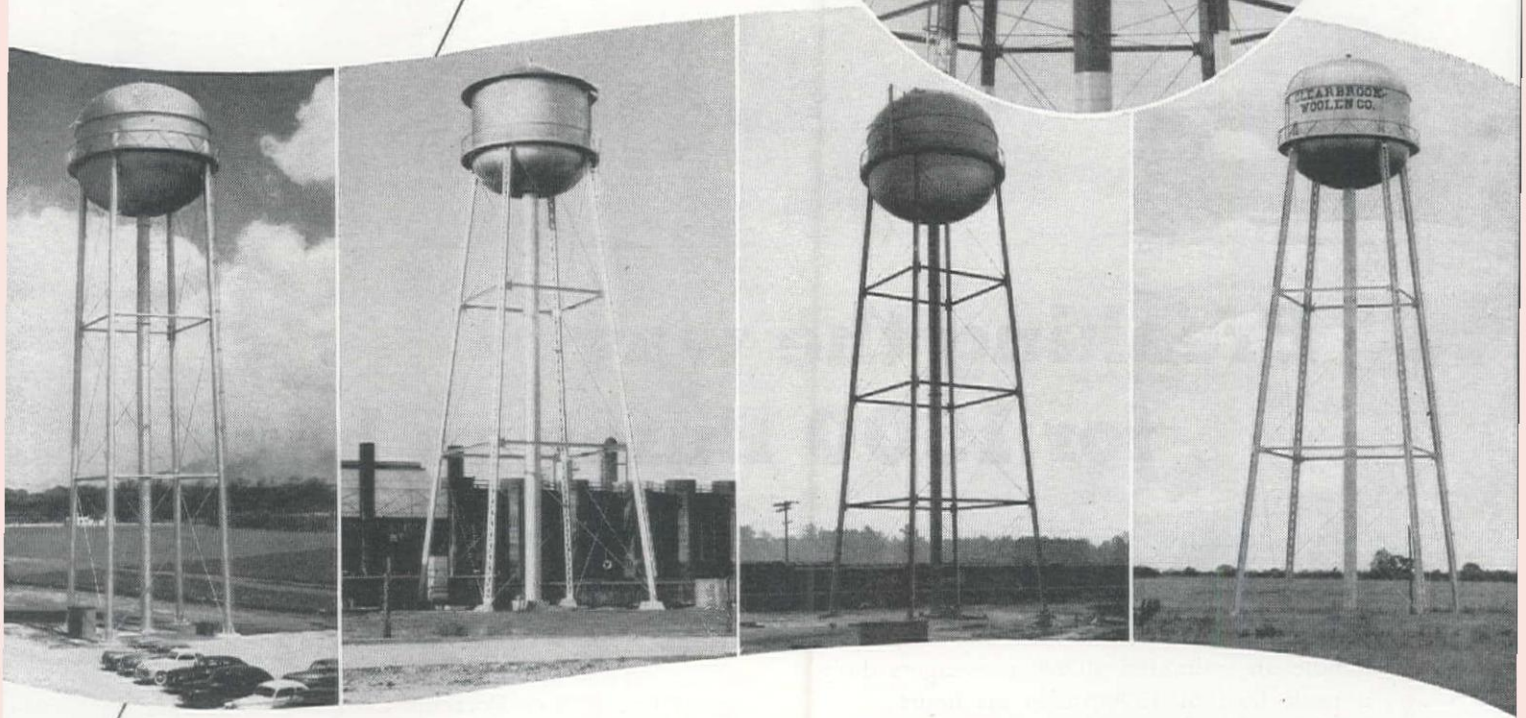

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In the heart of New York City, a full city block is being cleared of old buildings to make room for a new $20,000,000 bus terminal. Scheduled to be completed in 1950, the terminal will handle an estimated 60,000 passengers daily—a peak load of 1500 buses an hour!

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NEWS OF WESTERN CONSTRUCTION

FEBRUARY 15, 1950

Contractor's Subsidy Disputed at Phoenix

REPERCUSSIONS were beginning to be felt last month after the City Council of Phoenix, Ariz. granted an additional $24,890 to a contractor who claimed he lost money on a construction job for the city. A second contractor has also applied for additional payment, this time in the amount of $10,090, for just one phase of a $190,000 job. A third contractor was reported preparing still another claim for an estimated $100,000.

The trouble started when the Peter J. Foskin Construction Co. applied for the $24,890 in addition to the contract price of $59,250 for construction of sanitary sewer lines. The claim was allowed by the Phoenix City Council on the basis that the job required more labor and materials than bid specifications allowed.

Then, the J. H. Welsh & Son Contracting Co. submitted a claim for $10,090 on the same basis for construction of a major sewer line replacement.

R. Gail Baker, Phoenix City Engineer, recommended against the payment in the first case, and was also reported against payment of the second claim.

No Bidders for $5,000,000 Garage at Pershing Square

NOT A SINGLE BID was received for construction of the $5,000,000 subterranean garage at Pershing Square in Los Angeles up to the deadline on January 26. Hopes for the big garage—proposed, planned and discussed for nearly 20 years—faded after the Los Angeles City Park and Recreation Commission said that, unless builders submit immediate requests in writing to set a new deadline for bids, the project would be considered abandoned. It was reiterated that the City will not build the garage with its own forces.

Labor Surplus at Hanford

LURED by the announcement of a $185-million construction program during the next two years at the Hanford atomic plant, construction workers have been arriving at Richland, Wash., at the rate of 125 a day. Now, that atomic energy city has a labor surplus of more than 6,000 men. The expansion project will not begin until late in April, and already there are more than enough workers on hand to fill all available jobs. Most of the construction workers are from Montana, Idaho, Oregon and California.

Three Power Dams Planned On Brazos River in Texas

THE BRAZOS River Conservation and Reclamation District, a Texas State agency, has filed with the Federal Power Commission a declaration of its intention to construct and operate three dams on the Brazos River in Palo Pinto and Hood Counties, Texas.

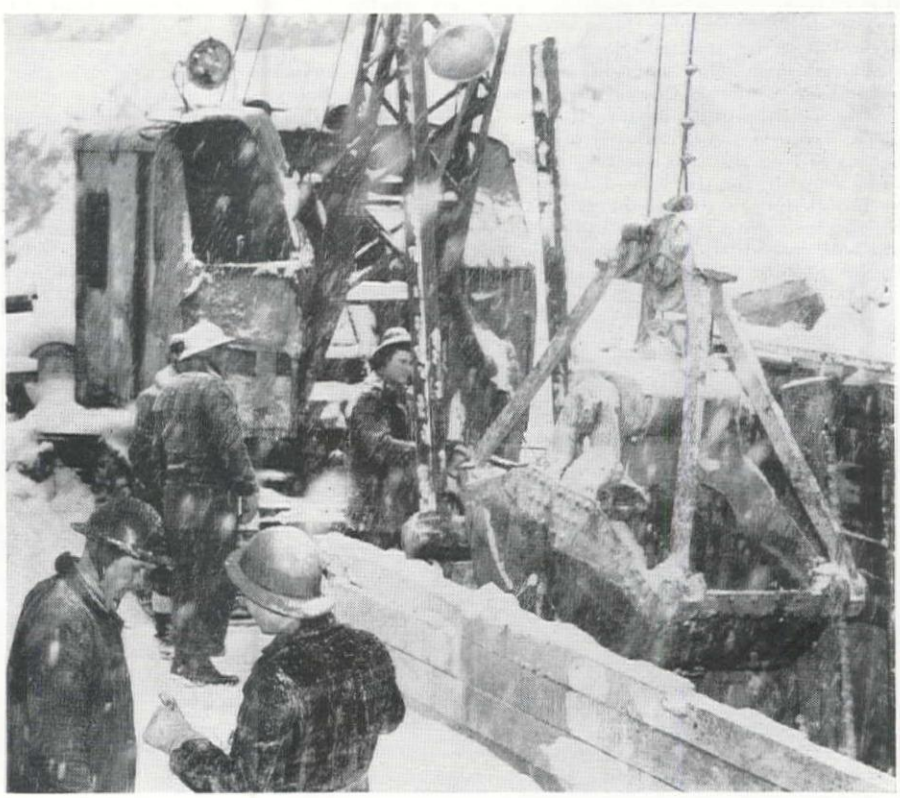
The District said that the three dams, to be designated Turkey Creek Dam, Inspiration Point Dam and De Cordova Bend Dam, will be operated solely for power purposes. The power would be marketed for consumption wholly within the State of Texas.

The Turkey Creek Dam, to be located in Palo Pinto County 6 mi. northwest of Mineral Wells, would be 79 ft. high and 1,352 ft. long, with one 21,256 kilovolt-ampere generator. The dam would create a 31.5-mi. long lake covering an area of 4,700 ac.

The proposed Inspiration Point Dam, also to be built in Palo Pinto County, about 8 mi. south of Mineral Wells, is described as 82 ft. high and 1,528 ft. long. The lake created by this dam would be 39 mi. long and would cover a 6,350-ac. area. One 25,000 kilovolt-ampere generator would be installed.

"THIRTY BELOW" NOT TOO COLD TO STOP WORK AT HUNGRY HORSE DAM

EXCAVATING the fault zone treatment shafts at Hungry Horse Dam in Montana is continuing despite "thirty below" weather and snowfall of 76 in. Below, a clamshell hoists rock from a shaft at the upstream face of the dam. After grouting is completed in the spring, the shaft will be filled with concrete to form a part of dam's foundation.



The De Cordova Bend Dam, proposed to be constructed in Hood County about 7.5 mi. southeast of Granbury, would be 83 ft. high, 2,211 ft. long, and would form a 42.5-mi. lake covering an area of 7,730 ac. The District proposes to install one 43,478 kilovolt-ampere generator at this site.

All three dams would be concrete Ambursen type with a Tainter gate section and with earth dikes at each end.

The District requested a finding by the Commission that the Brazos River in the vicinity of the proposed construction is not a "navigable water" as defined by the Federal Power Act, and that the construction and operation of the three dams will not affect the interests of interstate or foreign commerce.

Some Improvements Due On First Airport FIDO

THE FIRST commercial installation of FIDO (Fog, Intensive Dispersal of) installed at Los Angeles Municipal Airport last year (WCN, April, 1949, p. 77) will have to be augmented by additional burners before it is completely successful, according to Col. Clarence Young, Director of Airports for the city. It is estimated that the additional installations would cost about $250,000.

The FIDO system is a series of oil burners along the runway calculated to produce sufficient heat to raise the saturation point of the atmosphere in the vicinity of the runway, so that it will absorb the water vapor present in the form of fog, and clear a landing area of sufficient size to enable safe flying. This and other safety aids have been developed at the experiment station at Arcata, Calif. The Los Angeles installation cost $842,000, of which the federal government paid $455,459, and the major airline users will repay the balance.

Prior to the construction of the FIDO system along the east-west runway at the field a meteorological survey indicated that under nearly all conditions, the principal wind factors were across the runway, with only about a 10% component of easterly wind. Yet on the only two times the system has been used in fog conditions, the easterly component was present and seriously reduced the efficiency of the dispersal. Col. Young feels that greater radiation between the burner lines will be necessary, and that to accomplish this it will be necessary to place supplemental burners closer to the runway.

Texas Firms Plans a Rival To Pennsylvania Turnpike

THE TEXAS Turnpike Co. has signed the designer of the Pennsylvania Turnpike to engineer a Western counterpart, a 4-lane toll road between Dallas and Houston in Texas. J. E. Baltimore Co., which also engineered the Gulf Freeway at Houston, signed a contract Jan. 23 to engineer the fast intercity highway. The toll road will cut about 30 mi. off the present route between the two largest cities in Texas. It is expected to cost about $85,000,000. Construction will begin in about four months.

$5,243,535 Award for San Francisco Tunnel

MORRISON-KNUDSEN CO., INC., with a low bid of $5,243,535, has been awarded a contract by the San Francisco Department of Public Works for construction of the Broadway Tunnel under the Russian Hill in San Francisco. Second low bidder was the T. E. Connolly firm, at $5,291,639. A representative of the Utah Construction Co., with a bid reported as $200,000 under the award figure, arrived a few minutes late at the bid opening on Feb. 1, and the firm's bid was not accepted. Six bids were submitted for the job.

New Seattle A.G.C. Building

IMPROVEMENT of the facilities and services of the Seattle, Wash., Chapter, Associated General Contractors of America, and the Seattle Construction Council will be accomplished this summer by construction of a new office building which will house the joint activities of the affiliated associations. A site for the building has been purchased at Third Avenue West and Harrison Street in Seattle.

A "Bigger Tractor" Formed by Combining Two Tractors

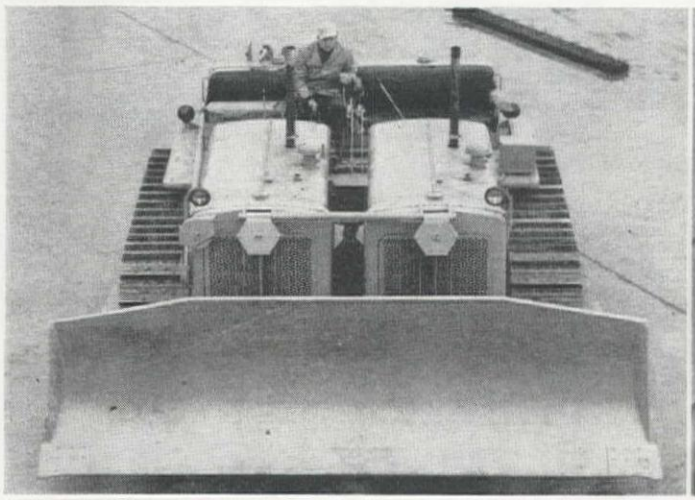
Joining two conventional Caterpillar D8 tractors in a consolidated power unit, the Petersen Tractor & Equipment Co. of San Leandro has completed, and is testing, what they believe to be the answer to contractors' demand for a "bigger tractor."

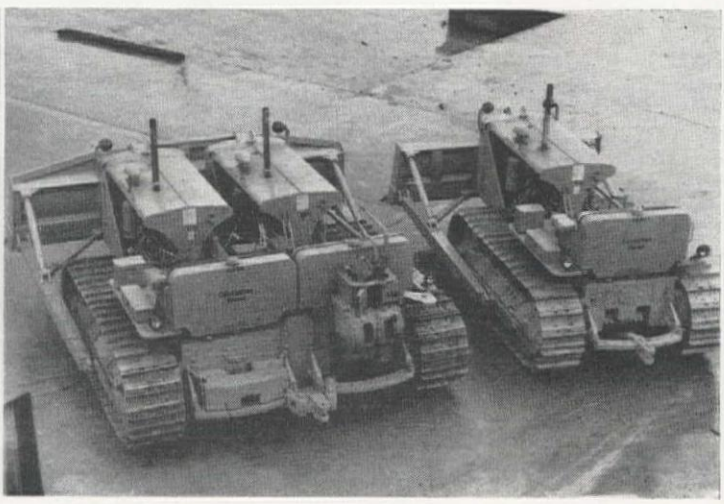
The development has been directed by R. A. Petersen, vice-president of the firm, and design was worked out by Fred Stevens, chief engineer. They have labeled the new unit a "Twin Caterpillar D8." General features of the unit are indicated below.

The modification program included the removal of the inside tracks from two conventional units and the introduction of steel beams to join the two tractors into a rigid unit. Other modifications provide for the consolidating of controls so that they can be handled by a single operator. The master clutch is handled by one lever, but there are individual controls for brakes, steering and gear shifting. Weight of the unit (without dozer blade) is 55,000 lb.

According to K. F. Park, consulting engineer for the company, no part of the consolidated unit is subjected to greater strain than in the conventional model. Mr. Park points out that maintenance time will be reduced because of the convenience of having the machines available at the same time and in the same place.

At the present time, the machine has been tested in the company's yard for both loading of scrapers and for bulldozing. The unit is particularly adapted to loading large capacity scrapers without a "pusher." On the other hand, it can be used as a pusher under heavy loading conditions. It has been equipped with a bulldozer blade, 16 ft. long and 5 ft. high, which may prove very effective in spreading material on earthfill dams where the loads are arriving faster than can be spread in a confined area with a normal unit. Again, the machine may prove effective in handling some of the large tamping rollers now being specified on earthfill projects.





Associated General Contractors Hold Annual Convention in San Francisco

A CONSTRUCTION volume of $20,000,000,000 predicted for 1950 and its relation to the national economy will be the subject of major study by the Associated General Contractors at their 31st annual convention to be held in San Francisco, Feb. 27-Mar. 2.

The state of the nation's economy will be the major item on the program for the first day, when the speakers will include W. Walter Williams, Seattle, chairman of the Committee for Economic Development, and Dr. Edwin G. Nourse, Washington, former chairman of the President's Council of Economic Advisers.

Current construction conditions, and a review of the association's activities during the past year will be presented by President Adolph Teichert, Jr., Sacramento, California, and Managing Director H. E. Foreman, Washington, D. C.

Tuseday's general session will hear from speakers on developments on highways, labor-management relations, apprentice training, accident prevention, and contracts and specifications. Vice President Walter L. Couse, Detroit, will preside. Market development, insurance and bonds, and public relations will be among the Wednesday general session topics. On both Tuesday and Wednesday, the association's three divisions—Highway Contractors, Building Contractors, and Heavy and Railroad Construction Contractors—will hear speakers in their respective fields at special luncheons. The divisions then will hold all-afternoon meetings on particular problems encountered in their fields of construction.

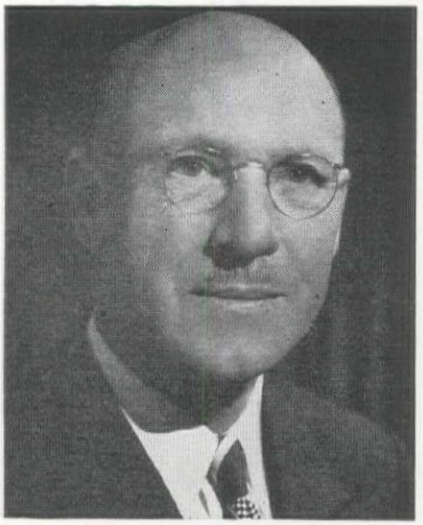
Presiding at the division meetings will be: C. P. Street, Charlotte, North Carolina, chairman, Building Contractors' Division; Carl E. Nelson, Logan, Utah, chairman, Highway Contractors' Division; A. S. Horner, Denver, Colorado, chairman, Heavy Construction and Railroad Contractors' Division.

On Tuesday and Wednesday there also will be meetings of the association's Joint Cooperative Committees with the American Association of State Highway Officials, and with the National Association of State Aviation Officials, which will discuss the best means of expanding the needed construction of the nation's highway and airport systems.

At the concluding session on Thursday morning, officers will be installed, official business of the association will be transacted, and resolutions will be adopted. Walter L. Couse, Detroit, is president-elect for 1950, and G. W. Maxon, Dayton, Ohio, is vice president-elect.

The annual banquet will be held Thursday night to conclude a planned program of outstanding entertainment. A record-breaking attendance of 1,200 representatives from leading construction firms from all over the county is expected.

Hosts to the convention are the Northern and Central California Chapters in San Francisco; the Southern California Chapter in Los Angeles; and the San Diego Chapter, San Diego.



RETIRING National President ADOLPH TEICHERT, JR., who is president of A. Teichert & Son, Inc., Sacramento, Calif.

INCOMING National President WALTER L. COUSE, who is president of Walter L. Couse & Co., Detroit, Mich.

PLANNING COMMITTEE—(Seated) W. D. SHAW, manager, Southern California chapter; FRANK MODGLIN, of the M & K Corp., chairman of the committee; R. A. SMITH, director, Southern California chapter. (Standing) GEORGE LOORZ, president, Northern California chapter; A. E. HOLT, director, Northern California chapter; R. S. SEABROOK, director, San Diego chapter; FRANK G. CORKER, secretary-manager, Central California chapter; WINFIELD H. ARATA, secretary-manager, Northern California chapter; GORDON H. BALL, treasurer, Northern California chapter; CLAUDE FISHER, vice-president, Southern California chapter.

H. E. FOREMAN, Managing Director of the Associated General Contractors.

Pumping Eliminated by Spreading of Water

PLEASED with the experimental spreading of Colorado River Aqueduct water in Orange County, Calif., the directors of the Orange County Water District have agreed to continue the program.

The water, purchased from the Metropolitan Water District of Southern California, is released into the Santa Ana River channel at Arlington, and is diverted from the river into the ditches of the Santa Ana Valley Irrigation Co. and the Anaheim Union Water Co., so that these districts do not need to resort to pumping. The stopping of this pumping draft and the percolation of some portions of the water has raised water tables noticeably elsewhere in the county.

The original purchase was 10,000 ac. ft., released at a rate of 40 cu. ft. per sec. Subsequently another 1,000 ac. ft. was purchased, and the further acquisition of 2,000 ac. ft. has been authorized. Money to pay for the water comes partly from the two irrigation companies which contribute what they would have paid for pumping charges, and from gun clubs which have agreed to raise the payment they make for the extensive quantities of water they use.

Propose Irrigation Project In West Central Colorado

A PLANNING report on the proposed Collbran Project, which would supply additional irrigation, municipal and domestic water and electrical energy in the Plateau and Grand Valleys of west central Colorado has been released by the Bureau of Reclamation. The report describes proposed developments to relieve critical water and power shortages in the Grand Junction industrial area. The estimated cost would be $13,299,000 of which $13,042,000 would be repaid to the Government over a period of 50 to 60 years by water and power users.

The plan of development provides for a minimum of 20 sec. ft. continuous flow from two Grand Mesa streams, Big and Cottonwood Creeks, by a pipeline, which would transport the water to an equalizing reservoir near Grand Junction. The diverted water would be used en route at two power plants to generate annually 51,600,000 kwh. of firm power and 6,670,000 kwh. of secondary power.

THE 1950 Pacific Northwest Conference of the American Society of Civil Engineers will be held at the Winthrop Hotel at Tacoma, Wash., May 5-6, with the Tacoma Section as host. The Conference, organized in May, 1949, consists of the ASCE membership in Oregon, Washington, Idaho, Montana, British Columbia and Alaska. Its purpose is to promote occasions for the discussion, formulation and expression of engineering judgment relating to matters affecting the engineering profession and the public welfare. F. D. Langdale, 211 Maple Park, Olympia, Wash., is Secretary of the Conference.

PERSONALLY SPEAKING

WAGNER

Charles H. Wagner has been appointed resident engineer to supervise all construction at Chief Joseph Dam in Washington. He transferred to the Seattle District last September from Republican City, Neb., where he was resident engineer during construction of the Harlan County Dam.

* * *

Sherman P. Duckel, Assistant City Engineer of the City of San Francisco, has succeeded **Harry Vensano,** retired, as San Francisco Director of Public Works. Duckel began service with the City in 1927 as inspector of streets and sewers, and was named assistant city engineer in 1942.

* * *

W. E. Johnson has been named manager of the design and construction division for the General Electric Co. to direct a multi-million dollar program of construction at the Hanford, Wash., atomic energy installation during this year. He was formerly assistant to the manager of the division. He succeeds **F. R. Creedon.**

* * *

Executives of the Morrison-Knudsen Co., Inc., Boise, Ida., have elected a new vice-president and expanded the firm's board of directors from 10 to 11 members. **Lyman D. Wilbur,** chief engineer of the company, is the new vice-president. New directors are **Bernard "Woody" Williams,** project manager of two dams now under construction in Wyoming, and **Al. H. Johnson,** recently in charge of two dams constructed on the Feather River in California.

* * *

C. Glenn Smith, formerly King County Engineer, Washington, has been appointed City Engineer of Puyallup, Wash.

* * *

Herbert G. Crowle, presently Chief of the Corps of Engineers regional flood control staff at Oakland, Calif., has been appointed by the Alameda County Board of Supervisors as engineer of the new Alameda County Flood Control District. In the past, Crowle has conducted flood surveys of the Alameda and San Lorenzo Creek watershed for the Corps of Engineers.

* * *

Walker R. Young, formerly Chief Engineer of the Bureau of Reclamation, is the newly-named president and treasurer of Thompson Pipe & Steel Co., Denver, manufacturer of water mains, culverts and other fabricated steel products. He succeeds **J. Leslie Brown,** who died Nov. 4. As president, Young will direct all operations of the company.

* * *

Colonel O. E. Walsh, North Pacific Division Engineer of the Corps of Engineers, has been appointed a member of the Board of Engineers for Rivers and Harbors. The Board, composed of seven members chosen from various divisions of the Corps throughout the United States, studies and makes recommendations on all river and harbor and flood control projects of the Corps of Engineers after holding hearings in Washington, D. C., and elsewhere. **Brigadier General John S. Bragdon,** recently named Deputy Chief of Engineers, is now chairman of the Board.

* * *

Fred W. Kiefer has resigned as city engineer of Blackfoot, Idaho.

* * *

As briefly announced in last month's *Western Construction News,* **Edward Hyatt** has retired as State Engineer and Chief of the Division of Water Resources for the State of California. Hyatt served the State of California for more than 35 years, and has been State Engineer for the past 22 years. A native Californian, his first engineering employment was with the U. S. Geological Survey in 1908, when he and the crew he was with mapped much of the desert regions and high Sierra. Much of this work was done with the late Col. Robert B. Marshall, Chief Topographer of the Geological Survey, who conceived the plan which eventually became the Central Valley Project. Marshall's counsel to his young aide served as an inspiration to Hyatt in later years when he directed the studies which turned Marshall's "wild engineering dream" into a reality.

HYATT

Later, Hyatt directed the surveys which led to development of the State Water Plan and the Central Valley Project. The State Water Plan has formed the basis of the entire water conservation program in California since it was presented in 1931, and the

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LIMA Truck-Mounted "Paymaster" that pays extra dividends because it can travel between jobs *on its own power*—at automotive speeds Type 34-T is a convertible shovel, crane, dragline or pull shovel, mounted on a standard 10-wheel truck crane carrier with independent engine for travel It has a crane capacity of 20 tons (35 ft boom, 10 ft. radius) and shovel capacity of ¾ or 1 yd., with outriggers extended. It can travel up to 31 M. P. H. Rotating equipment duplicates that of the famous crawler mounted "Paymaster", with alterations adapting it to truck mounting—thus assuring the same high peak, continuous performance which has made the "Paymaster" the leader in its field.

"Wheel-Mounted" units also available

You can now also get the LIMA "Paymaster" and the LIMA Type 604 (35 ton crane) in a single engine wheel mounted unit. Crawler Mounted LIMA machines are available in Shovel capacities from ¾ to 6 yards, Cranes to 110 tons and Draglines variable.

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Smith Booth Usher Co., 2001 Santa Fe Ave., Los Angeles 54, Calif.
McCoy Co., 3201 Brighton Blvd., Denver 5, Colo.
Contractors' Equipment & Supply Co., Springer Bldg., Albuquerque, N. M.
Modern Machinery Co., Inc., 4412 Trent Ave., Spokane 2, Wash.
Jameson Engineering Sales, 2705 Smith Tower, Seattle 4, Wash.
Foulger Equipment Co., Inc., 1361 South Second Street West, Salt Lake City 8, Utah
Thompson-Sage, Inc., 400 South Wilson Way, Stockton, Calif.
Acme Iron Works, Culebra Ave. at Expressway, N.W., San Antonio, Texas
Buran Equipment Co., 777 - 100th Ave., Oakland, Calif.
Tulsa Equipment Co., Inc., 418 East 2nd St., Tulsa 3, Okla.

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LIMA HAMILTON CORPORATION

Central Valley Project, which it proposed for initial construction, is now in an advanced stage of construction.

In 1914, he first began work with the State as an engineer for the California Highway Commission. In 1916, he transferred to the newly-formed State Water Commission, which took charge for the State of water rights in California. After 6 years, he was appointed to the office of Deputy Chief of the Division of Water Rights, which division was the successor to the State Water Commission. In 1924, he was appointed to the office of Chief of the Division of Water Rights, and in 1927, he was named State Engineer. In 1929, he took on additional duties as Chief of the Division of Water Resources.

A member of the American Society of Civil Engineers, he is past president of the Sacramento Section. He is also past president of the Western State Engineers Association, and has served on numerous committees and boards concerned with water questions.

A. D. Edmonston, Assistant State Engineer since 1945, succeeded Hyatt on Feb. 1. Edmonston first entered state service in 1924 as hydraulic engineer in charge of investigations and preparation of reports on water resources in California. From 1927 until 1945 he was principal hydraulic engineer in immediate charge of the formulation of the State Water Plan, the preparation of plans for the Central Valley Project, and other investigations. Since 1945, in his position as Assistant State Engineer, he has been delegated to act for the State Engineer in administration of all activities of the Division of Water Resources and in performance of all duties conferred by law on the State Engineer. Early in his career, from 1910 until 1924, he was employed on and in responsible charge of location, design and construction of hydraulic structures in connection with various irrigation, hydroelectric and municipal water projects in California. A member of the American Society of Civil Engineers, he graduated from Stanford University with an A.B. in Civil Engineering in 1910.

* * *

Milton T. Kitchel, structural engineer for the City of Oakland, Calif., has been appointed chief building inspector of Oakland to succeed **Ernest U. Roussell,** deceased.

* * *

Harold S. Carter, Professor of Civil Engineering at the University of Utah, has been named to direct a comprehensive survey of the Utah highway system. The survey will involve a study of financing, construction and administration with a view of formulating a legislative program for submission to the next Utah State Legislature.

* * *

C. D. "Dave" McKee has resigned as project manager for the Zia Co., which has handled maintenance contract work for the Atomic Energy Commission at Los Alamos, N. Mex., to become vice-president of the Robert E. McKee Construction Co. at El Paso.

* * *

President Truman has created a temporary Water Resources and Policy Commission to investigate federal laws and policies governing the nation's water resources and to submit recommendations for possible changes. Included on the seven-man commission are **Samuel B. Morris,** general manager and chief engineer of the Los Angeles Department of Water and Power; **Paul S. Burgess,** dean of the College of Agriculture of the University of Arizona, and **R. R. Renne,** president of Montana State College.

* * *

APPERSON

L. G. Apperson has been named to succeed **Ben S. Morrow** as City Engineer of Portland, Ore. Apperson has been Structural Engineer for the City. Morrow has been City Engineer since 1939. He will continue as chief of the city's water bureau and chairman of the board of engineers of the Portland sewage disposal project.

* * *

J. Swain is retiring as Asotin County Engineer, Wash., effective March 1. He will enter into private practice as member of the engineering firm of Swain, Storms & Associates at Clarkston, Wash. **Joe Hamilton,** formerly Benton County Engineer, of Wenatchee has been named to succeed Swain upon his retirement.

* * *

H. B. Kitchen retired Jan. 1 after 41 years of service as City Engineer of Watsonville, Calif. He was also Manager of the Watsonville Water Works and Superintendent of Sewage and Streets. He was succeeded by **Royal E. Fowle,** who served as assistant city manager since Sept. 1, 1949.

* * *

Walter Sanford is now acting construction engineer for the Bureau of Reclamation on the proposed Tiber Dam on the Marias River southwest of Chester, Mont.

* * *

Nominees for officerships of the American Road Builders' Association for 1950 and for directorships have been announced by nominating committees. A number of Westerners have been nominated. **Thomas E. Stanton,** materials and research engineer, California Division of Highways, Sacramento, Calif., was nominated for re-election as vice-president. A commissioner from the country's largest county—**Howard L. Way,** San Bernardino, Calif., county commissioner—is nominee for the presidency of the County Highway Officials Division of ARBA. **Christ P. Fauerso,** Wasco County Engineer, Oregon, was nominated for vice-president, Western District. **H. C. Walberg,** Skagit County Engineer, Washington, was nominated for one of the County Divisions' three-year directorships.

* * *

Five engineers have been named to the Yellowstone River Compact Commission's engineering committee. They are: **Fred Buck,** State Engineer of Montana; **L. C. Bishop,** State Engineer of Wyoming; **J. J. Walsh,** State Engineer of North Dakota; **Carl Meyers,** engineer for the Yellowstone District of the Bu-

COLONEL DWIGHT F. JOHNS (second from left), Division Engineer, South Pacific Division, Corps of Engineers, retired Jan. 1 after 37 years of active Federal military service. With Col. Johns during a recent visit to Los Angeles are, left to right—LT. COL. JAMES E. WALSH, then the Acting District Engineer, Los Angeles District; COL. HARRY THOMPSON, Chief, Engineering Division, Los Angeles District; OWEN G. STANLEY, Chief, Engineering Division, South Pacific Division, and COL. MAURICE E. ROVIN, Chief Administrative Assistant, Los Angeles District.

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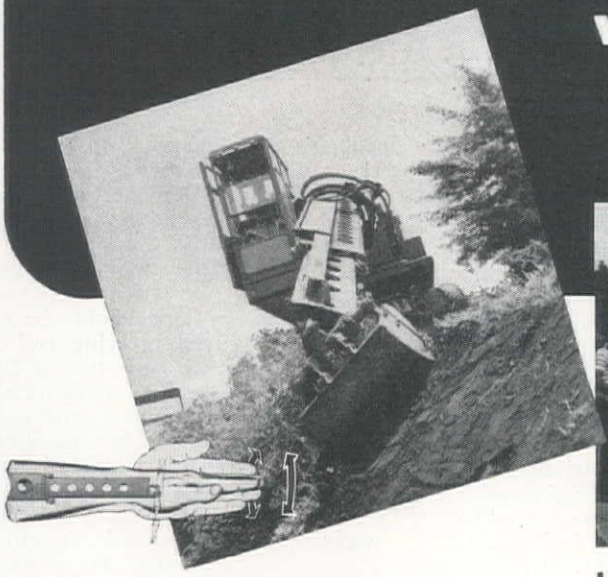
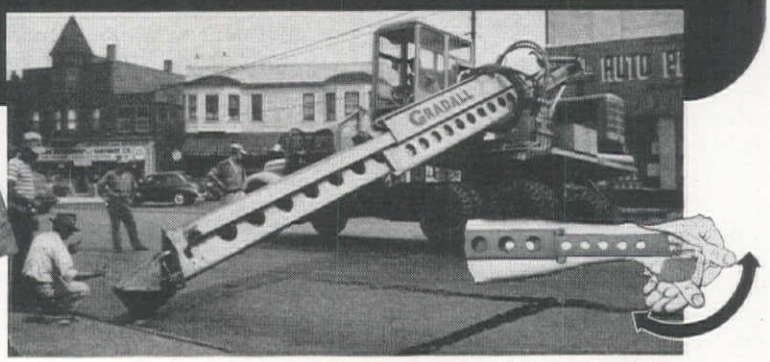


A SIMPLE TWIST OF THE WRIST. The boom of a *Gradall* can be tilted in an arc of 45 degrees each side of vertical. This unique "wrist action" makes it easy to dress slopes, chamfer trench edges, do scores of precision jobs.



LIKE A HAND WITH A GIANT GLASS CUTTER, the *Gradall* scores and cuts pavement into segments. The "hand" with its powerful grip LIFTS AND LOADS OUT HUGE SLABS—a neat, time-saving operation.

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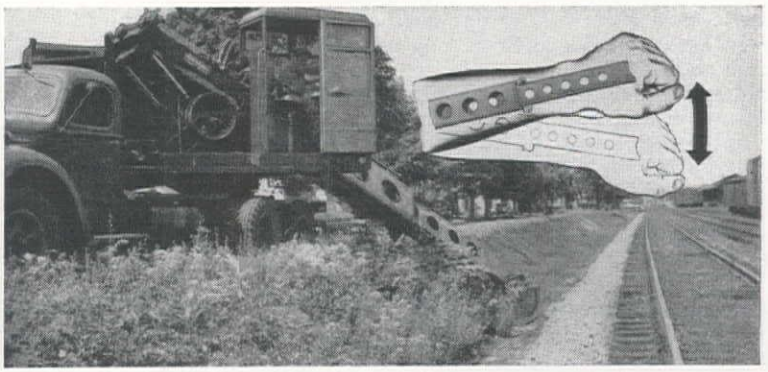

COORDINATION OF HAND, WRIST AND ARM ACTION under the manipulation of the operator does a skillful, precision job of cleaning ditch and dressing side slopes.

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N. C. Ribble Machinery Company.....El Paso, Texas

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reau of Reclamation, and **W. S. Hanna** of the Bureau of Indian Affairs. The committee will collect and tabulate available engineering data on the problem of dividing the waters of the Yellowstone River and its tributaries among Montana, Wyoming and North Dakota.

* * *

John H. Cline, Jr., civil engineer, and **J. Austin Zerkle,** architect, announce a new partnership, to be known as Cline & Zerkle, with offices in the Pacific Bldg., 610 Sixteenth St., Oakland, Calif., where they will practice architecture and engineering. Cline has been associated with Donald R. Warren Co., a partner in H. M. O'Neill Co., and in business as the J. H. Cline Co. Zerkle has been associated with Cline for the past 4 years in the design and supervision of construction on industrial, commercial and public buildings.

* * *

The Montana State Water Conservation Board has reorganized its engineering department in order to distribute work of the engineer members more equally. For a number of years, **Fred E. Buck,** State Engineer of Montana, has also been Chief Engineer of the Water Board. Responsibilities of the two jobs have been too heavy for one man. Accordingly, the Board appointed **Ralph F. Fifield** as Chief Engineer of the Water Board, **Robert H. Kelly** as Office Manager and Assistant Secretary-Treasurer, and Buck in a consulting engineer capacity. Buck remains as State Engineer, and in addition has been appointed as a member of a new committee which is to study ways and means of streamlining the state government and offer proposed legislation to the next Montana Legislative Assembly.

* * *

Five engineers have been added to the staff of the Institute of Transportation and Traffic Engineering at the University of California, Berkeley. They are: **Dan M. Finch,** in charge of the Testing Agency for the California Highway Patrol; **Bob Glenn,** Professor of Highway Engineering at Oregon State College; **Robert Horonjeff,** Chief of the Civil Works branch, San Francisco District, Corps of Engineers; **Herman P. Roth,** research engineer at Los Angeles, and **Bernard A. Vallerga,** a member of the University faculty.

* * *

J. W. Wulf of Culver, Ore., is supervising construction of a suspension bridge over the Warm Springs River for the Department of Interior, Indian Service, Warm Springs Indian Agency at Warm Springs.

* * *

Governor Earl Warren of California has named a 9-member State Water Pollution Control Board which will have the power to make policy and enforce water pollution regulations. Members of the board include **A. M. Rawn,** chief engineer and general manager of the Los Angeles County Sanitation Districts; **G. E. Arnold,** director of the San Diego City Water Department; **Don McMillan,** city manager of Pasadena, and **Wirt Morton,** Santa Barbara, member of the County Planning Commission. The other five members of the Board represent manufacturing interests.

* * *

Brigadier General John S. Bragdon has been designated Deputy Chief of Engineers, Department of the Army, at Washington, D. C. The General, who was appointed Assistant to the Chief of Engineers in May, 1948, has been serving as head of the Military Construction Division since 1944. The position of Deputy Chief was made vacant by the retirement of **Major General Roscoe C. Crawford** on November 30, 1949. Gen Bragdon will be succeeded in the military construction division by **Brigadier General George J. Nold,** whose appointment as Assistant to the Chief of Engineers was recently announced by the Secretary of the Army.

* * *

Lt. Col. Wilmot R. McCutchen, executive officer for the Army Engineers at Sacramento, Calif., has been ordered to Washington, D. C., for duty in the military construction branch in the Chief of Engineers' office. New executive officer at Sacramento will be **Lt. Col. Clarence C. Haug,** now commanding officer of the engineer research and development laboratories at Yuma, Ariz.

* * *

Frank Schwarzkopf, graduate engineer specializing in form detail and mill work, is now form detailer and mill foreman for the Baruch Corp. on the building being erected for Union Hardware and Metal Co. in East Los Angeles.

* * *

William F. Crabtree has been appointed area engineer in charge of the Bureau of Reclamation's office at Durango, Colo. He will be responsible for engineering and economic surveys involved in the planning of water resource development in the San Juan and Dolores river basins.

* * *

Gene Nicolai, assistant district information officer for the Bureau of Reclamation on the Columbia Basin Project for the past five years, has accepted a position as Regional Information Officer for the Bureau of Mines' Rocky Mountain Region, with headquarters at Denver, Colo.

* * *

A. J. Bowering, district engineer with the provincial works department at Merritt, B. C., has been appointed construction engineer with headquarters at Victoria, B. C., for the Provincial Department of Public Works.

* * *

James Anderson has been appointed resident engineer at Prince George, B. C., for the Pacific Great Eastern Railway. He was previously with the B. C. Electric Railway Co. at its power development on the Bridge River.

OBITUARIES . . .

George C. Pollock, 64, principal in the George Pollock Co. of Sacramento, Calif., died Jan. 15. He and his firm constructed such notable installations as the Tower Bridge at Sacramento, the Cruiser Dry Dock at Mare Island and the Long Beach Navy Base. He was a Past President of the Northern California Chapter of the Associated General Contractors of America.

* * *

Jacob Eugene Warnock, 46, Head of the Hydraulic Laboratory of the Bureau of Reclamation in Denver, Colo., died suddenly on Dec. 26. He had attained a national reputation as an authority in the field of hydraulic engineering. In 1931 he came to the Bureau as an Associate Engineer, and soon after became head of the Hydraulic Laboratory. He was very active in professional organizations. He was a member of the International Association for Hydraulic Structure Research, served for a number of years on the National Hydraulic Research Committee of the American Society of Civil Engineers, took special pride in his position as an ASCE representative on the National Engineers Council for Professional Development, served in various officerships with the local section of ASCE, and served on the Colorado Engineering Council for the past 10 years. During his professional career, he maintained an active interest in student functions in nearby colleges and universities acting as lecturer and councilor.

WARNOCK

* * *

John Laurence Griffith, 67, vice-president of Griffith, Cornall and Carman Construction Co., Salt Lake City, Utah, died Jan. 27. He entered the contracting business in Salt Lake City in 1916.

* * *

Lee Campbell, 51, Assistant State Bridge Engineer with the New Mexico State Highway Department, died Jan. 23. He was a veteran of 29 years with the department.

* * *

Ralph Clinton Avery, 64, structural steel consultant at Salt Lake City, Utah, died Jan. 24.

* * *

Douglas Graham, chief estimator for A. J. Peters & Son, San Jose, Calif., died last month.

* * *

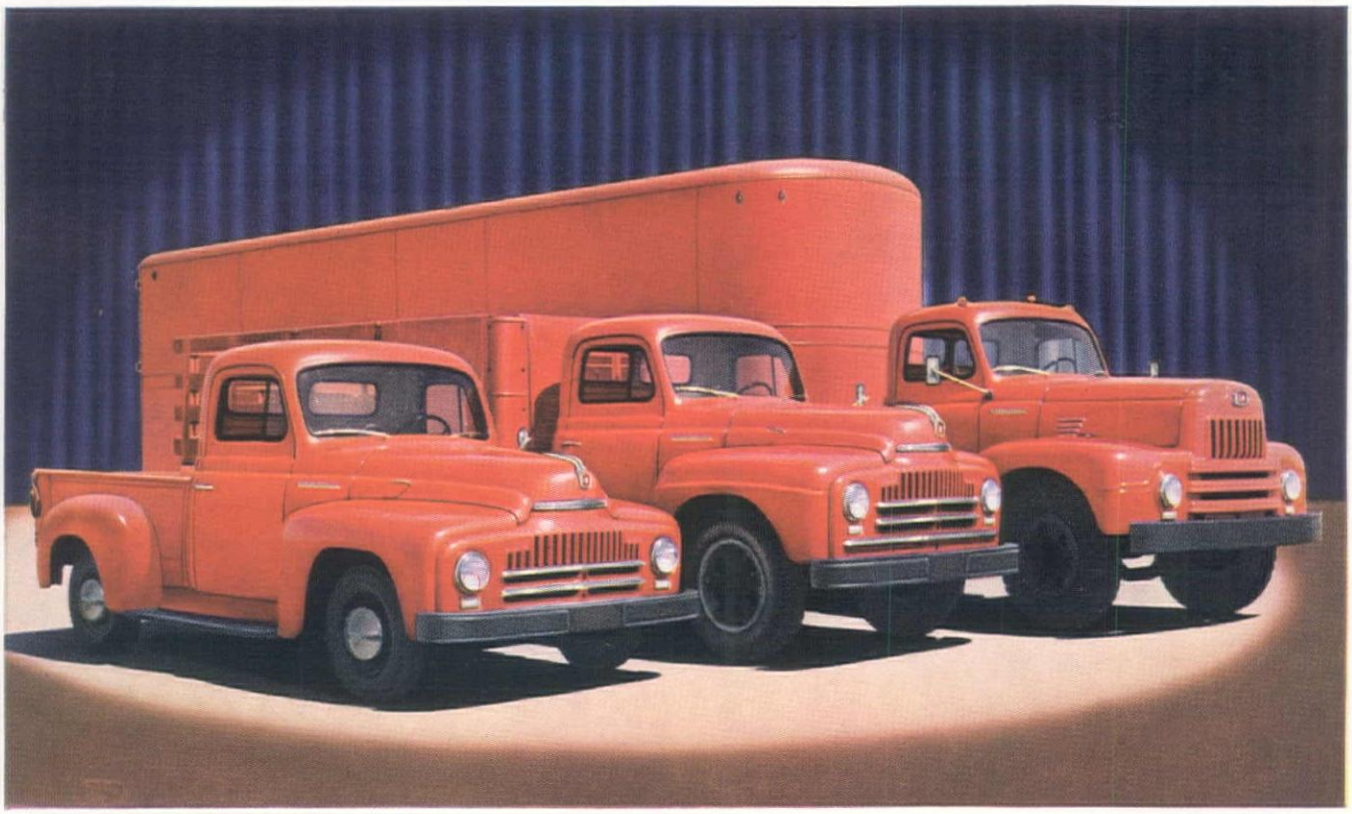
Harry D. Jumper, 53, chief engineer of the Consolidated Rock Products Co., Azusa, Calif., died Dec. 19.

* * *

Louis B. Harrison, 81, a former Colorado State Engineer, died at Denver recently. He was State Engineer in 1911.

Announcing—ALL NEW—ALL PROVED

INTERNATIONAL TRUCKS



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Now International puts you squarely in the driver's seat—with a complete new line of completely new trucks!

Every single new International Truck from 4,200 to 90,000 pounds GVW is heavy-duty engineered to give you lower maintenance and operating costs.

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And when the truck starts to roll, you find that new Super-steering right for position, and positive control.

AND TALK ABOUT FEATURES . . .

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NEW Engine Accessibility—Special fender and hood design provides extra working space between engine and fenders—hoods easily removed.

NEW Valve-in-head engines—All test-proved for greater power, greater economy, greater stamina, greater efficiency.

NEW Specialized Transmissions—Types and gear ratios for any job . . . three-speed, four-speed and five-speed with direct drive or overdrive in 5th.

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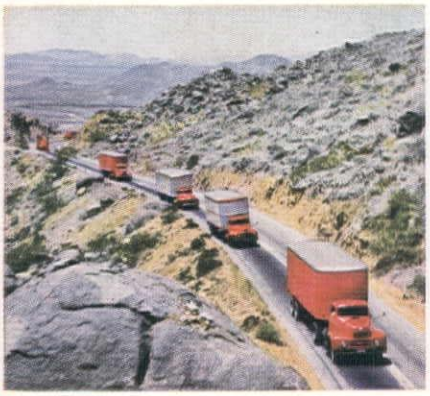
NEW Steel-flex Frames—Designed to provide an extra margin of strength combined with the right amount of flexibility.

NEW Load-balanced Wheelbases—Shorter wheelbases for standard body lengths provide better load distribution, better maneuverability.

NEW Cradle-Action Springs—Longer springs for greater riding ease . . . stronger springs, sturdier mounting and new spring suspension for longer life.

Plus dozens of new features and refinements throughout every truck!



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INTERNATIONAL INTERNATIONAL **TRUCKS**

INTERNATIONAL HARVESTER COMPANY CHICAGO

SUPERVISING THE JOBS

J. M. Sawyer is the general superintendent and **Paul Quinn** is the job superintendent for Macco Corp. of Paramount, Calif., and Puget Sound Bridge & Dredging Co. of Seattle, Wash., (joint-venturers) on their $1,169,755 contract for construction of 1,200 ft. of 23-ft. diameter steel and concrete-lined tunnel for the diversion and outlet works of the Lucky Peak Dam near Boise, Ida., a Corps of Engineers project. **W. E. Leece** is the job engineer.

* * *

Claude B. Wylie is the superintendent for Wylie Bros., Albuquerque, N. Mex., on a $377,594 contract for bituminous surfacing of approximately 15 mi. of highway between Carlsbad and Hobbs in New Mexico. **Robert Hardey** is the job foreman, **Curtis Chapel** is structures superintendent, and **V. Clark** is office manager. The same key personnel is directing construction of the firm's $321,717 contract for construction of 15 mi. of highway between Hobbs and Jal in New Mexico.

* * *

R. L. Basich is the superintendent for Basich Bros. Construction Co., San Gabriel, Calif., on a $410,818 contract for the grading and surfacing of approximately 4.3 mi. of Firestone Blvd. in Los Angeles County. The job includes rehabilitation of a bridge over the San Gabriel River.

* * *

Vern Bradley is the superintendent for Guy F. Atkinson Co., Seattle, Wash., on construction of the 1,146-ft. steel bridge across the Columbia River below the Chief Joseph Dam site near Bridgeport, Wash., a $946,620 job. **P. M. Duff** is timekeeper.

* * *

Henry Cooley is superintendent and **Adolph Fischer** is general foreman for Barrett & Hilp of San Francisco on construction of the California Farm Bureau building at Berkeley, Calif.

* * *

Albert Retzloff is superintendent and **Charlie Elkins** is foreman for Carrico & Gautier on the $1,350,000 construction of a building for the State of California at Berkeley, Calif.

* * *

Bill Scanlon is superintendent for E. T. Haas & Co. on construction of water mains at Modesto, Calif.

* * *

Al Selba is superintendent for Cannon Construction Co., of Stockton and Palo Alto, Calif., on the $103,300 construction of a school building at San Lorenzo, Calif. **John Trollman** is general manager of Bay Area operations for the firm. Cannon Construction Co. opened offices in Sept., 1949.

* * *

C. Epps is superintendent for W. C. Smith of California, Inc., Long Beach, on construction of the Burroughs School at Long Beach. **H. S. Epps** is assistant superintendent and **Kenny Ellis** is labor foreman on the $750,000 job.

* * *

Neil Drinkward is general superintendent for the Del E. Webb Construction Co., Phoenix, Ariz., on construction of the Veterans Administration Hospital at Denver, Colo. **A. G. Lane** is assistant superintendent. Other key personnel include: **J. W. Ford,** engineer; **F. W. Danielson,** job engineer; **W. A. Warriner,** office manager; **M. D. Stevens,** general carpenter foreman; **Paul Olsen,** general labor foreman; **John Shores,** steel foreman; and **Amadeo Lorenzo,** cement finishing foreman. **Ed Rothermel** is labor foreman.

* * *

Roy "Pete" Peterson is general superintendent, **W. M. Ryan** is project manager, and **Jack Vaughn** is assistant superintendent for Ryan Construction Co., Denver, Colo., on construction of storage tanks for the Colorado Milling Co. at Denver under a $260,000 contract.

* * *

E. F. Williams is general superintendent for Hutcheson Construction Co., Denver, Colo., on construction of the Pueblo Freeway near Pueblo under a $250,000 contract. Other key personnel include **John Calkins,** carpenter foreman; **"Slim" Dunham,** grading foreman; **Kenneth Byrd,** labor foreman; **Robert Strong,** steel foreman, and **Lester Kelley,** master mechanic.

* * *

A. C. Chaney is superintendent for F. B. Anderson, Inc., on construction of flood control facilities at Templeton Gap near Colorado Springs, Colo., part of a $1,250,000 Corps of Engineers project. **Glen Farris** is concrete foreman and **George W. Burns** is labor foreman.

* * *

Jim Norton is superintendent for Continental Construction Co. on construction of a grandstand for the Centennial Turf Club near Littleton, Colo. **Sam Befus** is assistant superintendent. The project is part of a $1,500,000 project.

* * *

O. Weidenheimer is superintendent for Mead & Mount Construction Co. on construction of the Rocky Mountain Osteopathic hospital at Denver, Colo. **Walter A. Bastedo** is assistant superintendent. **R. B. Mead** is the project manager.

* * *

Frank Campbell is the superintendent for Fry & Fry, Los Angeles, on construction of the $250,000 five-story concrete Antaky Bldg. in Los Angeles. **Howard King** is carpenter foreman and **Martz Zimmerman** is labor foreman.

* * *

Jim Lynch, Jr., is generally supervising construction of the $250,000 new civic auditorium at Southgate, Calif., for Lynch Construction Co. **J. F. Garland** is job superintendent, and **Gene Hubbard** is the job engineer. **T. H. Davis** is carpenter foreman; **O. T. Smith** is labor foreman. **Jim Turner** is superintendent for Henry E. Robertson Co., subcontractor for steel work.

* * *

L. E. Cox is the superintendent for Guy F. Atkinson Co. on construction of the Midway Drive Bridge at San Diego,

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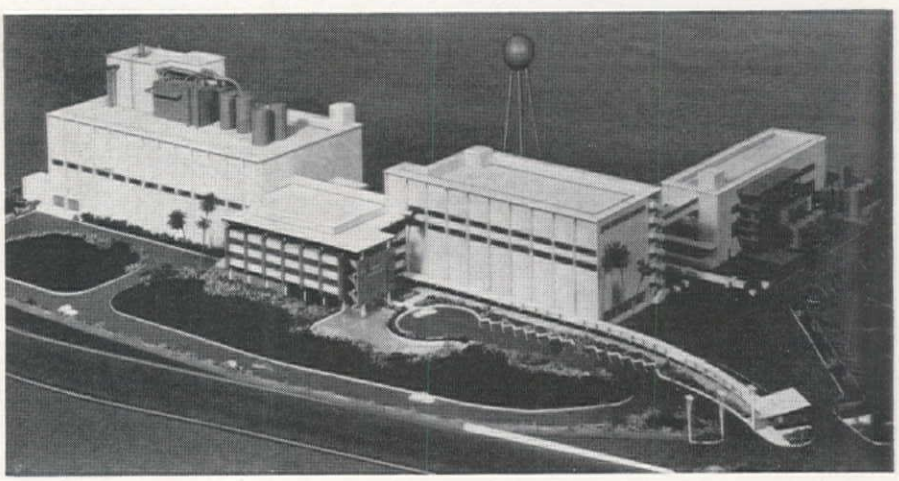
BECHTEL CORP. BUILDING $25,000,000 PLANT AT LOS ANGELES

INDUSTRIAL Division, Bechtel Corp., Los Angeles, is handling the design, engineering and construction of an industrial plant at Los Angeles for Lever Brothers Co., estimated to cost $25,000,000. Pictured is an architectural model of the plant. Preliminary excavation started in November. For Bechtel Corp., J. W. KOMES is manager, EARL NICHOLS, general superintendent and L. G. RUMMEL, chief engineer.



Calif. **Johnny E. Silberberger** is foreman and **George Duskin** is master mechanic.

* * *

Don Weaver is superintendent for Ben C. Gerwick, Inc., on construction of the Fruitvale Ave. bridge on the Eastshore Freeway in Oakland, Calif. **W. C. McRae** is carpenter foreman and **Ken Smith** is concrete foreman. Other foremen include **Bill Ferraris** and **Al Harris. Harry Laddish** is purchasing agent. **Fletcher Steele** and **John Omaccio** are the job engineers.

* * *

V. Maggiorra, contractor, has the contract and is directing construction of a $98,600 sewage pumping plant and force main at Corte Madera in Marin County, Calif.

* * *

Henry Schultheiss is the superintendent for Robert McCarthy Co. on construction of buildings for the new Marin Catholic High School in Marin County, Calif., at an approximate cost of $1,000,000. Carpenter foremen include **J. Duckett, Dave Woods** and **Roy Staton.**

* * *

Elof Gustafson is the superintendent for Stolte, Inc., and United Concrete Pipe Corp., joint-venture contractors for construction of the North Interceptor Sewer for the East Bay Municipal Utility District at Oakland, Calif. **George Trivitt** is general foreman on the job. **James Foose** is in charge of pipe laying operation and Pumpcrete work in the tunnel. **Pete Peterson** is in charge of manhole and structures work. **M. McDonald** is tunnel superintendent. **R. Cahoon** is in charge of pipe laying in trench. **D. Ryves** is sheet pile foreman, and **John Wright** is timber foreman. **Marvin Orr** is master mechanic. **Andy Anderson** is labor foreman and **Weldon Carrington** is truck foreman. **Maurice McClure** is job engineer, and **Art Perez** is timekeeper.

* * *

J. W. Henry is superintendent for the joint-venture firm of Harms Bros. and N. M. Ball Sons on highway construction near Livermore, Calif. **L. W. De Vault** is office engineer. Foremen on the job include **W. C. Wentworth, J. V. Bostick, D. E. Otis, R. B. Zeigler, J. P. Ragus** and **A. L. Wiens. L. H. Beal** is master mechanic.

* * *

Walt Phillips is superintendent and **A. O. Erickson** is project manager for Erickson, Phillips & Weisberg, general contractors of Oakland, Calif., on the $390,000 construction of a reservoir for the E.B.M.U.D. in East Oakland. **E. Larson** is foreman on the job. **Dan Branch** is office manager and engineer. **Fred Genessi** is master mechanic.

* * *

Rolf Jensen is superintendent and **George McKeever** is project manager for Barrett & Hilp, San Francisco, on construction of a $500,000 church and rectory building at Burlingame, Calif. **Harry Mullins** is foreman, and **Russell Fredrico** is timekeeper.

* * *

R. P. "Dick" Moore is supervising construction of a $500,000 multiple-unit apartment building at San Mateo, Calif., for Barrett & Hilp, San Francisco. **Jim Whitney** is foreman.

* * *

Current personnel on construction at San Francisco Municipal Airport for Morrison-Knudsen Co., Inc., include **Floyd "Tex" Smith** as pipe superintendent and **Alfred "Buck" Hope** as excavation superintendent. **Vernon Blount** is concrete superintendent and **Ray Hender** is carpenter superintendent. Foremen on the job include: **Trace Baker,** truck; **George Coons,** grade; **Byron Doherty,** mechanic; **C. C. Haymart,** plumber; **W. J. Hirning,** lubrication; **W. H. Jackson,** mechanic; **Jack McGuire,** grade; **Harold Parrott,** mechanic; **William Ricker,** grade; **M. E. Schmidt,** pit; **H. E. Stanton,** grade; **A. L. Spaggiari, B. L. Smith** and **Harry Splinter,** labor; **Lex Hobson,** master mechanic; **A. E. Erickson,** field mechanic, and **George Roesch,** shovel mechanic.

* * *

H. S. Robertson is supervising construction of a shop and warehouse on the sewerage project at El Segundo, Calif., for W. F. Robertson Co. **Harry Palmgren** is the job engineer. Carpenter foremen on the $500,000 job are **R. H. Doremus** and **John Mardula.**

* * *

Frank C. Matchette is job superintendent on construction of the administration and laboratory building for the Hyperion Sewerage project at El Segundo, Calif., for Iannini Co. of Manhattan Beach, Calif. General foreman on the job is **Dee Querner.**

* * *

H. C. Washburn is superintendent for Peter Kiewit Sons' Co. on a $196,914 contract for construction of the Kelso-Longview bridge across the Cowlitz River in Washington. **Ivan W. Breunsbach** is project manager. **Ray D. Brigance** is pile driver foreman, and **Leo Jones** is in charge of steel and concrete work. **D. N. Dillon** is job office manager.

* * *

Joe Brown is superintendent for General Concrete Co. of Portland, Ore., on the $400,000 construction of a tunnel for the City of Portland. **Boots Cheff** is project manager and **Nick Flynn** is foreman.

* * *

Ray Spangler is the superintendent for Fisher Contracting Co. of Phoenix, Ariz., on construction of the Welton Mohawk Canal in Arizona. **Carl Jacobson** is assistant superintendent, in charge of structures, and he is assisted by **Gordon Wainwright. R. A. Russell** is superintendent of excavation, with **D. N. South** as his assistant. **W. J. Harrison** is job engineer. **Art Talbot** is job office manager.

* * *

V. L. Noble is the superintendent for R. C. Haas Co. on construction of a new store building at Yuma, Ariz.

* * *

L. E. Guy is the superintendent for F. W. Young, contractor of San Diego, Calif., on construction of the Brawley Community Hospital at Brawley, Calif., a job nearing completion. Carpenter foremen on the job are **E. Westerson, D. H. Buchanan** and **C. P. Peterson. George Edlin** is labor foreman, and **Edward Nelson** is office manager. **W. D. Beasley** is field engineer.

* * *

E. V. Schon is the superintendent for Dinwiddie Construction Co., San Fran-

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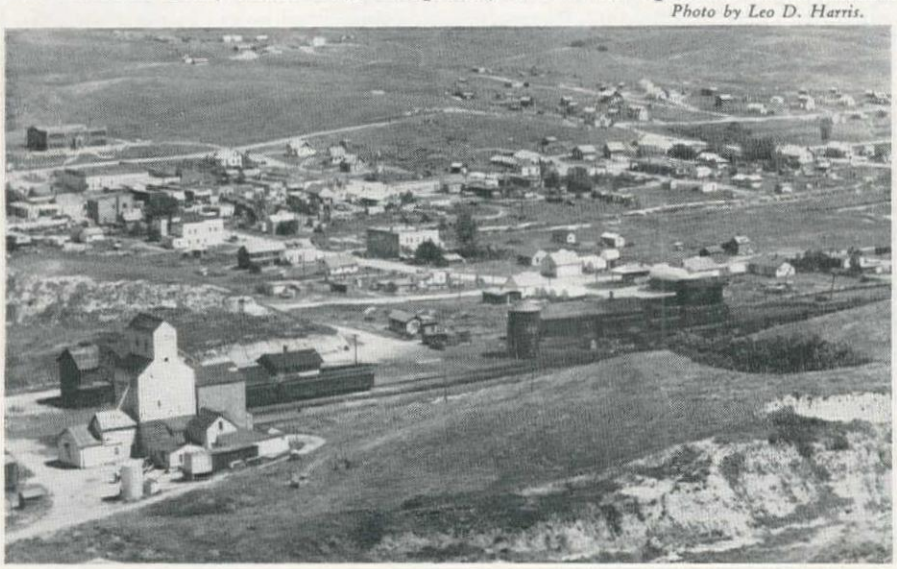
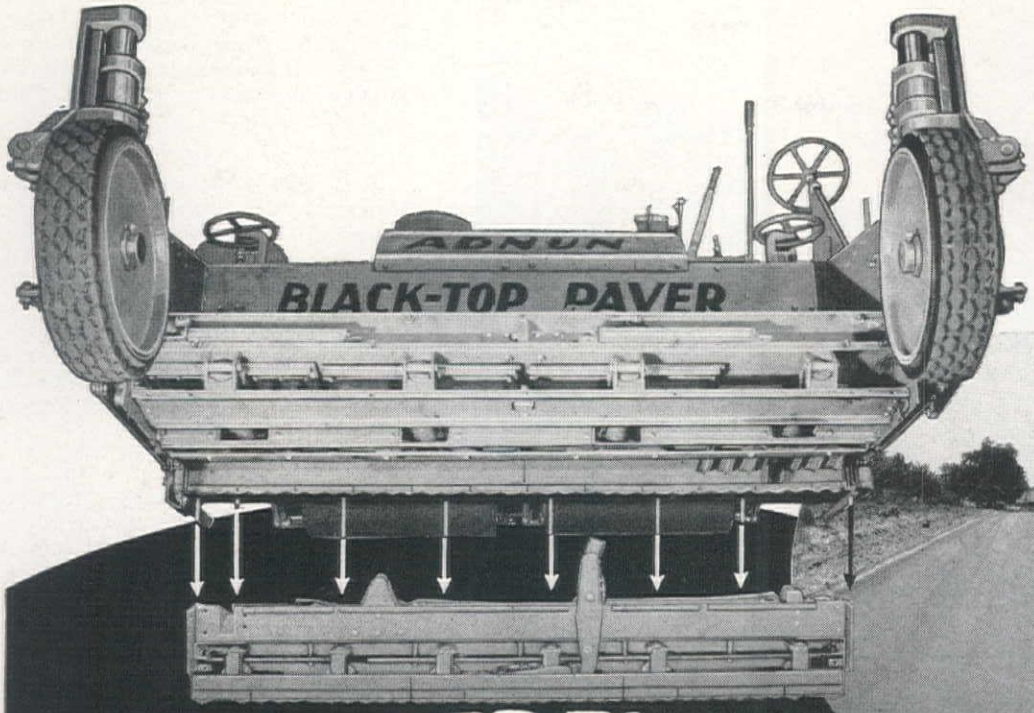
"SANISH WON'T VANISH!"—DESPITE GARRISON DAM RESERVOIR

SITE of the little town of Sanish, N. Dak., (see cut) will be submerged under 40 ft. of water when Garrison Dam's big reservoir starts to fill. Some residents think the town should be moved to nearby Van Hook, joining the two towns under the name "Vanish." But most everybody in Sanish is against the idea, and their battle cry is "Sanish Won't Vanish!" Actually, the town will probably be moved to an entirely new site. Garrison Dam, about 50% completed, is 100 mi. upstream from Sanish.

Photo by Leo D. Harris.





Below Top: Here is a smooth, dense job laid by an Adnum.

Below: The Adnum is far more accurate because it operates from the finished surface.

THE DIFFERENCE

that assures Better Black Top Pavement!

THE Adnun Black Top Paver brings you features of design that mean better black top pavements. The Adnun Cutter Bar is different in that it is provided with teeth! These teeth combined with the oscillating motion "strike off" the material with a smooth *sawing action.* This action eliminates the drag that causes tearing and beveled edges on the teeth provide an initial compaction!

Here is a combination of advantages that assures the dense, tight surface necessary for long life and resistance to traffic and weather.

The rotating Breaker Bar, combined with the design of the Cutter Bar makes it possible to handle the very tough cold materials that make such fine pavements, such as Kyrock, and which other machines find difficulty in laying. Hopper design and Cutter Bar adjustments permit laying narrow sections of pavement and "feathering the edges" for smooth widening on crowned surfaces.

The Adnun brings you mechanical advantages no other Black Top Paver can bring you and combines them with lower cost upkeep and greater versatility. Don't buy a Black Top Paver without securing complete details.

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Subsidiary of Blaw-Knox Co.
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Albuquerque, New Mexico

CONTRACTORS EQUIPMENT COMPANY
Portland, Oregon

LANG COMPANY, INC.
Salt Lake City, Utah

AIR-MACK EQUIPMENT CO.
Seattle, Washington

WESTERN EQUIPMENT COMPANY
Spokane, Washington

WESTERN EQUIPMENT COMPANY
Boise, Idaho Falls, Idaho

TRACTORS WORK ON 57% SLOPE CLEARING LOOKOUT POINT DAM SITE

BIG TD-24 International tractors equipped with Isaacson land-clearing blades are used by Rutherford, Inc., Oakland, Calif., for clearing and stump-grubbing work preliminary to relocation of the main line of the Southern Pacific Railroad and a state highway at Lookout Point Dam site on the Willamette River near Lowell, Ore.

cisco, on the $1,000,000 construction of an apartment house at San Mateo, Calif. **Howard Wilson** is general foreman and **J. A. Black** is job office manager. **Edward Costanoski** is superintendent of steel erection for sub-contractors, the Soule' Steel Co.

* * *

Edgar J. Keeth is superintendent and **Walter Judd** is his assistant on the $250,000 construction of stores and an office building at Hayward, Calif., by the Plymouth Construction Co., Oakland, Calif.

* * *

Ralph Peck is the general superintendent and **Troy Hill** is foreman for Underground Construction Co., Oakland, Calif., on the construction of various sewers for the City of Oakland.

* * *

On the $300,000 construction of the Oakland Viaduct near Lake Merritt in the City of Oakland, Calif., Charles MacClosky Co. of San Francisco has **Clyde Moseman** as superintendent, **Albert Figuereo** as foreman, and **Don Mahony** as job engineer.

On the pile-driving at Lake Merritt by Macco Corp. as subcontractors, **Bill McKinley** is superintendent, and foremen include **Harvey Perkins, Andy Micek** and **H. Happy.**

* * *

V. R. Welton is the excavation superintendent for Stolte, Inc., San Leandro, Calif., on construction of a pumping plant near Tracy, Calif.

* * *

Al Ferreira is the superintendent for J. A. Nelson Co. on plumbing and heating installation for construction of the big Fibreboard plant at East Antioch, Calif. **Lee Eberenz** is assistant superintendent. **Jack McKenna** is general plumber foreman and **Italo Tocchini** and **Paul Glubetich** are general steamfitter foremen. **C. P. Hastorf** and **Jim McMahon** are plumber foremen. **Jim Martin** is welding foreman. Fitter foremen include **Floyd Barnes, Don Brown, Ed Crook, Stewart Hall, Paul Lacy, Frank Larson, Erick Lehfeldt, Larry Medford, Charles Warren** and **Marvin Wulbern. Jack Nicholls** and **Albert Albro** are field accountants.

* * *

N. Witt is the superintendent for K. B. Nichols on the $85,000 construction of the Coachella Storm Drain Bridge at Indio, Calif.

* * *

B. H. Parrett is the superintendent for Holdener Construction Co., Sacramento, on construction of a $65,000 church structure in Sacramento. **Al Wonderley** is foreman.

* * *

Ross Knoeapple is supervising construction of a $50,000 building at Paso Robles, Calif., for contractor Mel H. Corippo of Paso Robles. **Steve Steagall** is concrete foreman and **John Lillo** is masonry foreman.

* * *

Key men at the Brisbane Rock Co. plant at Brisbane, Calif., are **George P. McIndoe,** superintendent; **James C. Bardine,** plant superintendent; **Jack Wehner,** civil engineer, and **Bob Poss,** office manager.

* * *

Alfred Cantor is the superintendent for Ben C. Gerwick and George C. Pollock Co., joint-venture contractors on construction of the $1,687,916 land section of a sewer outfall for the East Bay Municipal Utility District at Oakland, Calif. **John Ford** is assistant superintendent. **Max Silbert** is the job engineer. **Stanley McCoy** and **Harcourt Palmer** are field engineers.

* * *

E. H. Ball is superintendent and **Len Vines** is assistant superintendent for Dinwiddie Construction Co. on construction of the big Metropolitan Life Insurance Co. apartment housing project at San Francisco. **Bud Haley** is the job engineer. Carpenter foremen include **Calvin McNell, Roy Monroe, Leo Olbyrch** and **Lee Harriman. John Olson** is labor foreman, and **Jules Mason** is cement finisher foreman.

* * *

On construction of the J. J. Newberry Co. building at Bakersfield, Calif., **Roy Lautenschlager** is superintendent and **Les Chelf** is foreman for Jackson Bros. of Los Angeles. On construction of the Woolworth building at Bakersfield by the same contractor, **O. E. Petersen** is superintendent, and **Fred Hassman** is carpenter foreman.

* * *

Al Pierini and **R. M. Poore** are construction superintendents for M. & K. Corp. on construction of the hangar and central heating plant at the Hayward Airport, Hayward, Calif., for the Corps of Engineers. **A. G. Guaspari** is utility superintendent; **Oscar Osborn** and **Andrew Barker** are carpenter foremen; **Dick Eldridge** is cement foreman; **Virgil Brunstedt** is job office manager.

* * *

Harold V. Friedman is the superintendent for Empire Construction Co. on the $1,000,000 construction of buildings at San Francisco State College in **San** Francisco. **Louis Mergotti** is general carpenter foreman, and **Joe Grigsby** is carpenter foreman. **John McHale** is labor foreman. **David Diehl** is the job office manager.

* * *

On construction of the big Stonestown apartment buildings at San Francisco by MacDonald, Young & Nelson, Inc., **Lee Arnold** is superintendent. Building superintendents include **Frank Atkinson, Ed Kemp, George Tolley** and **Elmer Koski. Fred Thiery** is concrete superintendent, and **Hall Farley** is labor foreman. Timekeepers are **R. Boyd** and **Jim Kavanagh.**

* * *

Kenneth E. Meadows is the superintendent for H. R. Meadows Construction Co., Phoenix, Ariz., on the firm's $164,000 contract for construction of a church structure at Phoenix. On the $75,000 construction of school buildings in Phoenix by the same firm, **H. H. Doughty** is the superintendent.

* * *

H. T. Holtom, for many years with Normac, Inc., building contractors of Huntington Park, Calif., was chief engineer for that organization in Chile on construction of buildings for the Chile

Exploration Co. He is now in a similar capacity on the firm's contract for apartment house construction at Inyokern, Calif., a job nearing completion. Superintendent on the project at Inyokern is **Ed Springer,** and foremen are **Herb Fassler** and **Henry Roemisch.**

* * *

Chet Orcutt is superintendent for N. M. Ball Sons, Berkeley, Calif., on two contracts for construction of the Hollywood Parkway in Los Angeles from Virgil to Glendale and Glendale to Grand. The contracts are valued at $1,287,000 and $938,000 respectively. **Walter Butler** is equipment foreman, and **N. MacKenzie** is the job engineer. **D. S. Spencer** is the job office manager.

* * *

Rex Dunn is supervising construction of the $10,000,000 industrial plant for Lever Bros. at Los Angeles. Bechtel Corp. of San Francisco is the contractor. **Harry Koons** is the job engineer, **Dick Culler** is general carpenter foreman, and **Mack Taft** is labor foreman. **M. L. Sier** is in charge of materials. Excavation for the big building began Nov. 15 with **Tom Walsh** as superintendent of dirt operations and **A. "Frenchy" Oriet** as foreman.

* * *

George Jurovich is the superintendent for Steve P. Rados, Los Angeles, on construction of storm drains in Long Beach.

* * *

Tommy Thompson is the superintendent for D. O. Norton & Son, contractor of Phoenix, Ariz., on the firm's $145,000 contract for construction of school buildings in Phoenix. On the firm's $74,750 construction of a library at Yuma, Ariz., **Ray E. Pringle** is the superintendent. **Ralph A. Powers** is supervising construction of a $186,000 gymnasium and classroom building at Winslow, Ariz., for the firm. On construction of a $156,970 rectory building at Phoenix, **Ben P. Greenwood** is the superintendent. **D. O. Norton** and **Delbert L. Norton** are acting as project managers on the jobs.

* * *

George Schneider is the project manager for Hathaway Construction Co. on a $149,600 housing project at Ontario, Ore.

* * *

A. J. Johnson is the superintendent and **Coy Cooper** is project manager for H. J. McNeel, Inc., on the $121,000 construction of apartment buildings at Ontario, Ore.

* * *

E. C. Callahan is superintendent, **George Rodemack** is foreman, and **Charles Babbitt** is acting as project manager for Babbitt Construction Co. on erection of a $100,600 Safeway Store building at Boise, Idaho.

* * *

David Chamberlain is the general superintendent for Trewhitt, Shields & Fisher, Fresno, Calif., on construction of the Tulare District Hospital, Tulare, Calif. **H. Higginbotham** is foreman on the job. **Ervin T. Smith** is resident engineer.

* * *

R. E. Overlade is directing construction of armory buildings in Hanford, Reedley, Visalia and Modesto, Calif., for E. A. Kaiser Co., contractors. **George Hayes** is foreman, and **G. E. Overlade** is assisting supervision. The construction is sponsored by the State of California.

* * *

For the Fresno District of Pacific Coast Aggregates, Inc., current personnel are **J. R. Cassidy,** manager; **A. R. McMillan,** assistant manager; **V. R. Horstmann,** district sales manager, and **Glenn Stoner,** general superintendent. **Art Seinknecht** is superintendent of the firm's production plant near Fresno. **R. V. Raulston** is supervising operations at the plant near Lindsay, Calif., and **R. Cowan** is in charge at the Selma plant. **Art Anderson** is manager of the firm's production yard at Visalia, Calif.

* * *

Cliff Larson is the general superintendent for Peter Kiewit Sons' Co. on construction of a Veterans Administration Hospital at Seattle, Wash. **Jim Wickman** is the project engineer; **Art Sharpe** and **Harold Scott** are assistant superintendents; **Glenn Olson** is labor superintendent; **C. J. Hutchinson** is steel superintendent; **Bill Foxwell** is field engineer, and **Floyd Gammill** is job office manager.

Contracts . . .

Summary of Bids and Contracts For Major Projects in the West

Arizona

Fisher Contracting Co., Box 4025, Phoenix, has begun work under a $579,000 contract on construction of the Queen Creek Tunnel on the Superior-Miami Highway. The tunnel will be 1,240 ft. long.

Vinnell Co., Inc., Box 1388, Phoenix, was low bidder at $238,870 for constructing a 3-mi. length of the Phoenix-Black Canyon Highway. The work starts about 38 mi. north of Phoenix.

Packard Construction Co., 601 Luhrs Tower, Phoenix, was low bidder at $205,731 for 14.5 mi. of the St. Johns-Sanders Highway. The contract will call for grading, draining and bituminous road-mix surfacing.

Rubenstein Construction Co., Phoenix, (incorporated during December) will build 350 homes for Williams Field enlisted personnel and 150 dwellings for officers on a tract near the field at a cost of $3,500,000-$4,000,000. The Federal Government has authorized the construction and leased land area to the firm.

California

Morrison-Knudsen Co., Inc., Box 450, Boise, Idaho (and Los Angeles and San Francisco) was low bidder at $5,243,535 before the San Francisco Department of Public Works for construction of the Broadway Tunnel through the Russian Hill in San Francisco. Work on the 600-ft. long twin bore is scheduled to start in March and be completed in about two years.

Stolte, Inc., Fred J. Early Co., Inc., and **Duncanson-Harrelson Co.,** joint venturers, 8451 San Leandro St., Oakland, were low bidders at $4,380,895 before the East Bay Municipal Utility District for construction of sections 5 and 6 of EBMUD's sewage disposal project. The contract will call for installation of more than 4 mi. of reinforced concrete sewer of 7 to 9-ft. diameter, extending to the new treatment plant near the Bay Bridge approach in Oakland.

Clifford C. Bong & Co., 123 N. Third Ave., Arcadia, has been awarded a $726,000 contract for construction of the last section of a road from east of Redlands to a recreational area in the Upper Santa Ana Canyon.

The Bureau of Reclamation has awarded a $3,067,484 contract to **United Concrete Pipe Corp.** and the **Vinnell Corp.,** joint venturers, Box 425, Baldwin Park, Calif., for construction of the final section of the Delta-Mendota Canal. The 18-mi. section near Stockton will be earth-lined, and the job includes 6,700,000 cu. yd. of excavation, placing of 1,793,000 cu. yd. of earth lining and compacting 1,670,000 cu. yd. of embankment material.

Basich Brothers Construction Co. & Basich Brothers, and **W. C. Lefever** and **D. Gerald Bing** (joint venturers), Box 151, Alhambra, Calif., were awarded a $793,306 contract by the California Division of Highways for grading and surfacing with plantmix surfacing on cement-treated base and construction of two reinforced concrete bridges on 5.1 mi. of highway in Los Angeles County near Castaic Creek.

Lowest bid for construction of the 6.4-mi. Tecolote Tunnel on the Bureau of Reclamation's Santa Barbara Project near Goleta was received from **Carl M. Halvorson, Inc.,** 218 Builders Exchange Bldg., Portland, Ore., and **H. Halvorson, Inc.,** Ziegler Bldg., Tacoma, Wash., at $4,750,455. The bid was above the engineers' estimate, but was $732,000 below the low bid for the same project last March which was rejected.

Spencer Webb Co., 4719 Melrose Ave., Los Angeles, was awarded a $377,131 contract by the California Division of Highways for construction of a reinforced concrete bridge for an overcrossing over Hollywood Freeway at Hill St. in Los Angeles.

Hensler Construction Corp., 816 Allen Ave., Glendale, was awarded a $345,505 contract by the California Division of Highways for widening and surfacing with plantmixed surfacing on rock base of 5.5 mi. of the highway between Newport Beach and Laguna Beach in Orange County.

Davies, Keusder & Brown, Los Angeles, was awarded a $214,916 contract by the California Division of Highways for construction

of a reinforced concrete bridge across the San Gabriel River on Florence Ave. in Los Angeles County.

Baker and Pollock, 211 N. Olive St., Ventura, has started work under a $259,445 contract on resurfacing of Highway 101 Alternate, known as Oxnard Blvd. in Oxnard.

Fredrickson Bros., 1259 65th St., Emeryville, Calif., on a bid of $239,505, was awarded the contract by the California Division of Highways for grading and plantmix surfacing on 3.1 mi. of highway in Napa County.

Colorado

Peter Kiewit Sons' Co., Box 4149, S. Denver Sta., Denver, Colo., was awarded a $347,928 contract by the Colorado State Highway Department for a 2-mi. stretch of the new Denver to Castle Rock Highway.

Idaho

A contract for construction of the multi-million dollar pulp and paper mill for Potlatch Forests, Inc., at Lewiston, has been awarded to **W. J. Park & Sons,** Yakima, Wash.

C. H. Ellis Construction Co., Pocatello, submitted the low bid of $981,500 for construction of a gymnasium building at Idaho State College, Pocatello.

New Mexico

Fulton & Hamilton, Roswell, N. Mex., was awarded a $295,249 contract by the New Mexico State Highway Department for constructing a portion of U. S. 85 just inside the city limits of Las Vegas.

W. T. Bookout Construction Co., Box 298, Las Vegas, N. Mex., was awarded a $496,229 contract by the New Mexico State Highway Department to reconstruct 7 mi. of U. S. 85 between Raton and Springer.

Robert E. McKee Corp., Box 1706, Santa Fe, N. Mex., was low bidder at $832,552 for construction of an ordnance laboratory at the Army's White Sands Proving Grounds.

Oklahoma

Contract has been awarded by the Oklahoma State Highway Commission to the **J. A. Raines Construction Co.,** Muskogee, Okla., at $722,202, for construction of a 2,271-ft. steel truss bridge across the Arkansas River on U. S. Highway 60 in Osage and Kay Counties. The bridge will be 28 ft. wide with a concrete deck.

Oregon

Leonard & Slate Oregon, Ltd., and **E. C. Hall Co.,** Lowell, Ore., were awarded a $2,064,758 contract by the Portland District, Corps of Engineers, for railroad and highway relocation in connection with the Lookout Point Dam on the Middle Fork of the Willamette River. The work consists of relocating a 2-mi. length of the Southern Pacific Railroad and a 2-mi. section of Oregon State Highway No. 58. The project includes logging 2,800,000 bd. ft. of timber.

The American Bridge Co., Portland, was low bidder before the Portland District, Corps of Engineers, at $431,838 for fabricating and erecting three bridges and one undercrossing in connection with construction of Lookout Point Dam on the Middle Fork of the Willamette River.

C. E. Leseburg, Nyssa, has been awarded a $198,190 contract by the Oregon State Highway Commission for grading and paving 5.7 mi. of the Pumping Plant Hill section of the Old Oregon Trail at Ontario in Malheur County.

J. H. Wise & Son, 424 Broadway, Boise, Ida., was awarded a $538,798 general construction contract for the St. Charles Hospital building at Bend, Ore.

Utah

Algot Johnson & Son was low bidder at $575,876 for construction of the Olympus Junior High School building at Salt Lake City.

Washington

Two contracts have been awarded for building the third section of the West Canal, Columbia Basin Project, near Ephrata, by the Bureau of Reclamation. **Marshall, Haas & Royce,** and **Haas & Rothschild** (joint venturers), Box 95, Belmont, Calif., were awarded a $983,631 contract for extending the canal from near Winchester to approximately 5 mi. south of Quincy. Contract for construction of a mile-long concrete chute went to **Minnis and Schilling,** Box 492-B, Eugene, Ore., on a low bid of $396,961.

General Construction Co., Box 3244, Seattle, was low bidder at $2,265,325 before the Seattle District, Corps of Engineers, for

excavation work on the intake channel of Chief Joseph Dam near Bridgeport. The specifications call for an approximate total of 3,300,000 cu. yd. of excavation, mostly in rock.

A $4,974,090 contract for the design and manufacture of four 111,300-hp. turbines for the powerhouse at McNary Dam on the Columbia River has been awarded to **S. Morgan Smith Co.**, of York, Pa., by the Walla Walla District, Corps of Engineers.

Utah Construction Co., 1 Montgomery St., San Francisco, was awarded a $3,070,709 contract by the Walla Walla District, Corps of Engineers, for construction of the Union Pacific railroad relocation and Oregon and Washington State highway relocation between Sand Station and the Walla Walla River in connection with McNary Dam on the Columbia River. Involved is a total of 11.4 mi. of railroad, as well as 10.3 mi. of highway.

Harold T. Mast, 502 S. Main St., Colfax, Wash., was awarded a $351,000 contract by the Washington State Highway Department for rehabilitation and resurfacing with light bituminous material of the 7.6-mi. Paha to Ritzville road in Adams County.

A $919,485 contract for construction of 58 mi. of laterals from the East Low Canal of the Columbia Basin Project north of Moses Lake and northeast of Ephrata has been awarded by the Bureau of Reclamation to **J. J. Collins Concrete & Steel Pipe Co.**, Portland, Ore.

Strong & McDonald, Inc., 4045 Ruston Way, Tacoma, was awarded a $612,215 contract by the Seattle District, Corps of Engineers, for construction of 10.5 mi. of the access road to the Chief Joseph Dam site near Bridgeport. **D & H Paving Co.**, Vancouver, was awarded a $179,182 contract for hotmix paving of the road.

Strand & Sons, 3939 University Way, Seattle, was low bidder at $1,298,000 for construction of an addition to the University of Washington Stadium. The contract will call for construction of a structural steel balcony with a 145-ft. cantilevered roof, and concrete levels and ramps.

Wyoming

Etlin E. Peterson, Casper, was awarded a $124,572 contract by the Wyoming State Highway Department for construction of 4023-ft. steel I-beam bridge over the North Platte River in Converse County.

Alaska

Puget Sound Bridge & Dredging Co., 2929 16th Ave. S.W., Seattle, Wash., was low bidder before the Corps of Engineers at $1,034,305 for dredging an estimated 815,000 cu. yd. of material in Wrangell Narrows lying between Mitkof Island and Lindenberg Peninsula of Kupreanof Island. The dredging will provide a channel 300 ft. wide and 24 ft. deep between Sumner Strait and Frederick Sound.

Miscellaneous

Two contracts for construction of a $13,500,000 pipeline from Boise, Ida., to Pasco, Wash., have been awarded by the Salt Lake Pipe Line Co., subsidiary of the Standard Oil Co. of Calif. **Morrison-Knudsen Co., Inc., Macco Corp.** and **Bechtel Corp.** will construct the section from Boise to Baker, Ore., and **Pacific Pipeline Engineers, Ltd.** will construct the Baker-Pasco section.

Bird Construction Co., Lethbridge, was the low bidder at $444,752 for construction of a new federal customs and immigration building at Coutts on the Canada-United States Border.

Manufacturer Activity In the Western States

John J. Pike, President of the REPUBLIC SUPPLY CO. of California, has announced a new organization of the company's sales and service department. **Roy Johnson** has been appointed Vice-President in Charge of Sales. In this capacity, he will have charge of the company's entire sales

PIKE

JOHNSON

operations, including the three regional sales divisions and the manufacturing division. **M. D. "Mac" Jayred** has been appointed Manager of Republic's Northern Region and will have charge of Republic's branch stores in Oakland, Fresno, San Jose and Stockton. The firm's newly-created Central Region is under Manager **G. E. Pitts. R. L. Temple** was appointed Manager of the firm's Southern Region. Republic's Manufacturing Division, heretofore operated as a separate division of the company has now been consolidated into an integral part of the overall Republic Supply Co. sales and service organization. **Walter Moore** has been appointed General Manager of Machinery Sales.

☆ ☆ ☆

J. J. "Jerry" Reichart has joined CATERPILLAR TRACTOR CO. at San Leandro, Calif., as Western News Service Representative. He joined the News Service of Caterpillar at Peoria in 1941.

☆ ☆ ☆

The factory branch sales and service operations in Denver, Colo., of INDEPENDENT PNEUMATIC TOOL CO., Aurora, Ill., have been moved to newly-erected headquarters at 1040 Speer Blvd.

☆ ☆ ☆

Loren J. Westhaver has been named to the position of Manager of Operations of GENEVA STEEL CO. at Geneva, Utah.

☆ ☆ ☆

Ferdinand Schmitz, Vice-President of the PACIFIC CAR AND FOUNDRY CO., Renton, Wash., has resigned to accept the position of Vice-President of SEATTLE STEEL CO. and the INLAND EMPIRE STEEL CO.

☆ ☆ ☆

The millionth ton of steel ingots for the calendar year 1949 was poured Dec. 22 at the Fontana plant of KAISER STEEL CORP., marking the first time that any Pacific Coast steel company has produced a million tons of steel ingots in a single year.

☆ ☆ ☆

Roy H. Compton has been appointed advertising and sales promotion manager for the Western Division of FRUEHAUF TRAILER CO., comprising the eleven western states in which are located sixteen factory branches. For 4 years Compton has been identified with Kudner Agency, Inc., and Zimmer-Keller, Inc., national advertising agencies, as their West Coast representative assigned to the Fruehauf account.

TRADE WINDS

☆ ☆ ☆

New appointments have been made by ALLIED STEEL PRODUCTS, INC., of Cleveland, Ohio, manufacturer of special steels for maintenance of construction equipment, as follows: **Frank L. Shoemaker,** 1016 First Ave., So., Seattle, Wash., for Washington and Oregon, and **William Barron,** 5020 California St., San Francisco, for Northern California. **C. H. Richardson,** sales manager of Allied, says in announcing the appointments, that all state areas will be covered by direct factory representatives to work with the Allied dealer organization. Sales through jobbers will be discontinued so that dealers will have more close contact with the factory. Present jobbers will be continued as dealers. **L. R. Edminster,** 2751 S.W. Hume Court, Portland, Ore., has been advanced to Division Sales Manager on the Pacific Coast.

☆ ☆ ☆

STOODY CO., manufacturer of hard-facing alloys at Whittier, Calif., announces the advancement of **Charles E. Rogers** to sales metallurgist. For the past 3 years, he has been in charge of the Metallurgical Laboratories. His new duties will include general engineering help and advice to users of Stoody Hard-Facing Alloys. Stoody Co. has recently acquired the serv-

Continued on page 116

At the Chicago National A.E.D. Convention—

Distributors Face a Buyer's Market

Western distributors "box a few friendly rounds with their manufacturers" at the largest A.E.D. convention ever held — Stiff competition seen ahead, but distributors are optimistic

REPRESENTING *Western Construction News* at the A.E.D. National Convention were **Arthur J. Urbain,** News Editor, and **Arthur C. Petersen,** District Manager at the Chicago Office.

THE LARGEST convention ever held by the construction equipment industry took place last month as nearly 2,000 distributor and manufacturer members met at the Stevens Hotel in Chicago for the 31st Annual Meeting of Associated Equipment Distributors. Sharing the spotlight were a number of outstanding business sessions and open forum panels, and generous portions of excellent food, top-notch entertainment and good fellowship.

Not in the spotlight, but probably of greatest importance to the attendants, were the distributor-manufacturer individual conferences. A full day-and-a-half of the four-day convention was set aside for open-house and such individual conferences. As it was expressed by one distributor member, the distributors welcomed this opportunity "to box a few friendly rounds with his manufacturers."

Into a buyer's market

The sentiment of all A.E.D. members in attendance was that, during the year 1949, the sales picture completed its post-war transition from a seller's market to a buyer's market. It was evident that, with the outlook pointing toward all-out competition to increase or even maintain sales volume, manufacturers were adopting a more solicitous attitude toward distribution outlets.

It was equally evident at the convention that manufacturers were making a strong bid for major position among distributors. Undoubtedly, many repercussions will be felt from this year's A.E.D. convention. A direct result, of course, will be that many Western distributor firms will take on new lines of equipment. *Western Construction News* is prepared to report these new appointments as they become "official." Both the manufacturers and distributors concerned are reluctant to release announcements of such changes until the contract is "signed, sealed and delivered."

An indirect but equally important result of the interchange of ideas at the convention is indicated by evidence that

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manufacturers are planning to work more closely with distributors on problems relating to sales promotion and training, trade-ins, cooperative advertising, inventories and financing. As stated by Frank G. Knight, Executive Secretary of A.E.D., it is confidently expected that the manufacturers will make strong efforts to overcome discontent brought about in some instances by casual interest in their distributors during wartime.

However, as Knight also pointed out, the construction equipment distributor occupies an "in-the-middle" position, and a glance over his shoulder at the picture on the other side (the customers) is apt to dispel much of his pleasure. For customers are expecting better repair service, better parts service, and more efficient operation of equipment from the outset. Pressure for higher trade-in allowances will be continued. There will be a greater demand for financing and keener competition on prices. The distributor will have to bear down to improve salesmanship and to curb the rise of "break-even" points.

Optimism

Based on a survey of distributors' sales volume during 1949, a number of vital problems lie ahead for the individual distributor, according to Knight. Seventy-five per cent of distributors in the United States reported a drop in 1949 sales. (The picture was more optimistic in the West, and in Canada where 50% reported a decline.) But according to the year-end survey, distributors as a whole are looking forward to a better year in 1950. Fifty per cent predicted an increase in sales volume, while a decrease was forecast by 35% of the distributors.

The quartet of business conferences held during the convention were concerned—as the result of previous membership surveys—with subjects of the greatest importance in view of present day business conditions.

The convention program officially opened on Monday, Jan. 16, with a welcome from Retiring President W. W. Bucher. Referring to the report of the Hoover Commission and to the hundreds of hidden taxes which add to the cost of nearly every commodity, he urged distributors to carefully analyze their business operations in an effort to

1950 OFFICERS of the Associated Equipment Distributors. Left to right—R. J. FYFE, Canadian A.E.D. president; FRANK G. KNIGHT, executive secretary, Chicago; H. J. HUSH, vice-president, New York City; C. F. HALLADAY, president, Sioux Falls, S. D.; E. J. CROSBY, treasurer, Boston, Mass.; R. L. ARNOLD, executive vice-president, Salt Lake City, Utah, and J. A. BENSON, vice-president, Houston, Texas.

LYMAN E. JONES, president of the Hall-Perry Machinery Co., Butte, Mont., is Director of A.E.D.'s Region 12 for 1950.

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BEAL SHAW, president and treasurer of Shaw Sales & Service Co., Los Angeles, is Director of A.E.D.'s Region 11 for 1950.

eliminate the "leaks" and hidden costs which add to the cost of doing business.

A 6-man distributor panel then took the floor to discuss "Today's Problems and Tomorrow's Profits." Harry E. Shaw of Service Supply Co., Philadelphia, led off with a review of important developments affecting the equipment rental picture. He cautioned distributors to determine their objectives in entering into the rental field, and to pattern their organization accordingly. A discussion of rental purchases brought out many of the fundamental problems and considerations underlying this type of agreement.

The final participant on the morning program was C. M. Weinberg of **Brown-Davis Equipment Co.**, Los Angeles, whose observations on present-day

Westerners Who Attended the A.E.D. Convention

Arizona

Neil B. McGinnis Co., Phoenix——Neil B. McGinnis.
O. S. Stapley Co., Phoenix——H. E. Walters.
Superior Equipment Co., Phoenix——John F. Fisher.

California

Edward R. Bacon Co., San Francisco——G. G. Curto and Jack H. How.
Brown-Bevis Equipment Co., Los Angeles——John A. Beynon, E. R. Johnson and C. M. Weinberg.
Coast Equipment Co., San Francisco——B. G. Walker and W. M. Nosman.
Garlinghouse Brothers, Los Angeles——A. F. Garlinghouse and L. H. Garlinghouse.
C. H. Grant Co., Berkeley——C. H. Grant.
Harron, Rickard & McCone Co. of Southern California, Los Angeles——A. B. Todd and Kemp E. Yorke.
Industrial Equipment Co., Los Angeles——C. E. Skidmore and W. W. Colley.
Jenison Machinery Co., San Francisco——E. S. Jenison.
Le Roi-Rix Machinery Co., Los Angeles——W. Z. Bancroft and R. F. Deane.
Merrill-Brose Co., San Francisco——George B. Brose.
Peterson Tractor & Equipment Co., San Francisco——Bill Beatty.
Shaw Sales & Service Co., Los Angeles——Beal Shaw.
Smith Booth Usher Co., Los Angeles——Alex Kostyzak and S. P. Morse.
Spears-Wells Machinery Co., Oakland——H. A. Olds.
Western Machinery Co., San Francisco——L. M. Jones, H. J. Mayer, L. T. McGuire and H. A. Myers.

Colorado

Colorado Builders Supply Co., Denver——James D. Maitland, Charles E. Berry and Charles B. Hansen.
Constructors Equipment Co., Denver——D. C. Gibson and T. M. Sanders.
Ray Corson Machinery Co., Denver——R. E. Corson.
Liberty Trucks & Parts Co., Denver——F. V. Altvater, R. F. Carlson and W. W. Carlson.
McKelvy Machinery Co., Denver——J. R. McKelvy and Rex P. McKelvy.
H. W. Moore Equipment Co., Denver——John C. Moore and Walter Babcock.
Power Equipment Co., Denver——Jack Munroe and R. A. St. Clair.

Idaho

Engineering Sales Service, Inc., Boise——H. W. Hurd.
Intermountain Equipment Co., Boise——R. W. Stevens and P. A. Dufford.
Olson Manufacturing Co., Boise——H. J. Agee.
The Sawtooth Co., Boise——Peter H. Cohn.
Western Equipment Co., Boise——G. M. Gehrke.

Montana

Caird Engineering Works, Helena——Howard W. Bugie.
Hall-Perry Machinery Co., Butte——L. E. Jones and R. M. Bowen.
Industrial Equipment Co., Billings——W. C. Hardie.
Montana Powder & Equipment Co., Helena——W. T. McCullough.
Normont Equipment Co., Great Falls——J. B. Beatty.
Seitz Machinery Co., Billings——Melvin Seitz.
Western Construction Equipment Co., Billings——Harold M. Doolen.

New Mexico

J. D. Coggins Co., Albuquerque——Harold R. Bone and J. D. Coggins.
Contractors Equipment & Supply Co., Albuquerque——Frank Skidmore and George Weidner.
Harry Cornelius Co., Albuquerque——W. H. Cornelius.
Lively Equipment Co., Albuquerque——W. E. Lively.
N. C. Ribble Co., Albuquerque——N. C. Ribble.

Oregon

Clyde Equipment Co., Portland——Oscar B. Bjorge and W. H. Booth.
Columbia Equipment Co., Portland——F. B. McBath and R. R. Hicks.
Contractors Equipment Corp., Portland——Robert D. Vial.
Cramer Machinery Co., Portland——Charles P. Cramer.
P. L. Crooks Co., Inc., Portland——Paul L. Crooks, Jr.
Feenaughty Machinery Co., Portland——D. J. Feenaughty and M. B. Mack.
Howard-Cooper Corp., Portland——T. B. Holmes, Jr., F. R. Cooper and W. A. Wylie.
Loggers & Contractors Machinery Co., Portland——A. F. Sersanous.
Western Equipment Co., Portland——A. E. Vanstrom.

Utah

Arnold Machinery Co., Salt Lake City——R. L. Arnold and J. W. Plant.
Cate Equipment Co., Salt Lake City——David E. Hughes.
Foulger Equipment Co., Salt Lake City——B. L. Foulger and J. T. Holland.
Heiner Equipment & Supply Co., Salt Lake City——Meade Harker and K. P. Heiner.
C. H. Jones Equipment Co., Salt Lake City——Russell S. Stewart.
Kimball Equipment Co., Salt Lake City——John F. Kimball.
The Lang Co., Inc., Salt Lake City——Walter E. Kershaw and John Lang.
Lund Machinery Co., Salt Lake City——Joseph N. McRae.
H. H. Nielsen Co., Salt Lake City——Herbert H. Nielsen.
J. K. Wheeler Machinery Co., Salt Lake City——J. K. Wheeler.

Washington

Bow Lake Equipment Co., Seattle——S. B. McDonald.
Construction Equipment Co., Spokane——C. A. Burnette.
A. H. Cox & Co., Seattle——J. A. Widrig.
General Machinery Co., Spokane——E. J. Simons, Jr.
Modern Machinery Co., Inc., Spokane——C. H. Davis.
Pacific Hoist & Derrick Co., Seattle——Elmer R. Schoen.
Star Machinery Co., Seattle——J. T. Haaten.
Fred M. Viles & Co., Inc., Spokane——Gordon L. Viles.

Wyoming

Wilson Equipment & Supply Co., Cheyenne——Glen Moss and H. R. Wilson.

Western A.E.D. Directors

AMONG the Regional Directors of the Associated Equipment Distributors for 1950 are the following:

J. B. McWethy, Dakota Tractor & Equipment Co., Fargo, N. Dak.—Region 8.

J. A. Benson, Benson Tractor Co., Houston, Texas—Region 10.

Beal Shaw, Shaw Sales & Service Co., Los Angeles, Calif.—Region 11.

L. E. Jones, Hall-Perry Machinery Co., Butte, Mont.—Region 12.

Frank Skidmore, Contractors Equipment & Supply Co., Albuquerque, N. Mex.—Region 14.

financing, credit and collection problems brought out the increasing importance of these subjects to all members.

Following the noon luncheon, the panel resumed with P. A. Dufford of **Intermountain Equipment Co.,** Boise, Idaho, outlining the factors governing a distributor's inventory policy. The problem of maintaining adequate turnover while meeting the needs of the equipment user was described as the key to this.

The present-day trade-in situation and the 1950 outlook in this regard was discussed by T. M. Sheehan of **Empire Equipment Co.,** Sioux Falls, S. D., who

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called attention to the importance of establishing adequate yard-sticks for measuring the true value of trade-ins. Discussion also centered about the matter of compensating salesmen who take part in a trade-in transaction.

Finally J. T. Hatten of **Star Machinery Co.,** Seattle, delivered one of the outstanding talks of the entire panel with a summary of the major questions that must be solved by distributors in any approach to the matter of effective sales training.

Tuesday, Jan. 17, was entirely devoid of scheduled business sessions in order to facilitate individual contacts between distributor and manufacturer members, as was the afternoon of Wednesday, Jan. 18.

Wednesday morning's program opened with the election of 1950 officers, and the adoption of a resolution urging support of the Taft-Hartley law through widespread dissemination of factual information dealing with this subject by members favoring the act. The resolution further stated that "it is our considered opinion that the election of senators and representatives unfavorable toward the Taft-Hartley law will be detrimental to our national economy."

Speakers on the Wednesday program included Frank G. Knight, A.E.D. executive secretary; Walter L. Couse, president-elect of Associated General Contractors, of Walter L. Couse & Co., Detroit, and Clarence Y. Palitz, president of Credit-America Corporation, New York.

The official business portion of the 1950 convention program was concluded on Thursday morning, Jan. 19, with an outstanding open forum panel, composed of six leading distributors and six leading manufacturers of construction equipment. Sponsored by the Association's manufacturer members, this session was devoted to informal discussion of more than a score of key problems affecting "Development and Retention of Markets for Construction Equipment." Distributor members who took part in the panel discussion included R. L. Arnold, **Arnold Machinery Co.,** Salt Lake City, and J. A. Benson, **Benson Tractor Co.,** Houston, Tex. A wide variety of subjects relating to service, finance, advertising and promotion, training and education, production, inventories, general trade practice and the general market situation received the attention of this panel.

Among the entertainment highlights which featured the four-day program were the 31st Annual Birthday Party, in honor of Retiring President W. W. Bucher, and an Early Bird's Breakfast on the opening day, also given in his honor. Luncheons on Monday, Jan. 16, and Thursday, Jan. 19, were addressed by top-ranking speakers, while the Installation Luncheon on Jan. 18 saw 1950 officers and directors take office.

C. F. Halladay of **Halladay Dettman Co.,** Sioux Falls, S. D., was installed as president to succeed W. W. Bucher of R. E. Brooks Co., New York. Other 1950 officers who will lead the Association during the coming year are R. L. Arnold, **Arnold Machinery Co.,** Salt Lake City, executive vice-president; H. J. Hush, Griffin Equipment Corp., New York, vice-president; J. A. Benson, **Benson Tractor Co.,** Houston, Tex., vice-president; R. J. Fyfe, R. J. Fyfe Equipment Co., Regina, Sask., Canada, vice-president; and E. J. Crosby, Hedge & Mattheis, South Boston, Mass., treasurer.

News Round-up of the Western Distributors

New president of the Utah Chapter of the Associated Equipment Distributors is **Robert G. Arnold,** Secretary-Treasurer of ARNOLD MACHINERY CO., Salt Lake City.

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Newly-named dealers for ALLIS-CHALMERS MANUFACTURING CO. General Machinery Division are the HILD ELECTRIC & MANUFACTURING CO., Stockton, Calif., and NORTHWEST CHAIN & SPROCKETS, INC., Portland, Ore.

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To promote closer cooperation between the factory and its distributing organization, THE WHITE MOTOR CO., Pacific Coast Region, under the leadership of **Wilson D. Patterson,** Regional Manager, recently held the first of a newly-inaugurated Factory-Distributor Council meeting in San Francisco. These meetings will be held semi-annually, with a factory meeting to be held each year attended by one elected

member of the Distributor Committee from each region. Patterson serves as chairman, and each year selects five members from the distributor group to serve on the council. These men will serve one year and are rotated each year so that ultimately each distributor will serve. Recently elected to serve on the Council were **Frank Sawyer,** SAWYER MOTOR CO., Long Beach; **Austin B. McCoy,** McCOY AUTO CO., Vancouver, Wash.; **M. A. Lindner** of LINDNER & WOOD, Salt Lake City, Utah; **A. G. Strecker,** JONES-WHITE TRUCK CO., Spokane, Wash., and **J. H. Abrew,** WHITE TRUCK SALES, Oakland, Calif.

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NELSON EQUIPMENT CO. of Portland, with branches in Seattle and Spokane, has been appointed distributor for the equipment of Link-Belt Speeder Corp.

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P. G. Habicht recently joined the sales staff of ANDREWS MACHINERY CO., Seattle, Wash. He was formerly with the Machinery & Storage Co. and Sundfelt Equipment Co., both of Seattle. His title will be Assistant to the President.

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BOW LAKE EQUIPMENT CO. of Seattle, Wash., recently appointed **Ken Winslow** to its sales staff. He comes to the firm directly from the Marine Corps. His territory will be western Washington.

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HOWARD-COOPER CORP. of Seattle, Wash., has moved into its new quarters at 5055 4th Ave. So., in Seattle.

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GARDNER SUPPLY CO., INC., Reno, Nev., has been appointed a representative for the "Trouble Saver" Sectional Steel Scaffolding manufactured by The Patent Scaffolding Co., Inc., Los Angeles.

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PASTERIS CO., Oakland, Calif., distributor of construction equipment, has been taken over by former employees and is now the MONARCH TRUCK EQUIPMENT CO., located at 999 Seventh St., Oakland. Officers are now **W. P. Scott,** president; **Herb. Ross,** general manager, and **Roy Scott,** sales manager. Entire stock of Pasteris Co. was purchased by the above-named group. The new firm is retaining distributorship of old lines, and announcement of new lines will be made soon.

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GEORGE M. PHILPOTT CO., Portland, recently added **"Chuck" Hoskins** to its sale staff. Hoskins will specialize in bearings.

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LOGGERS & CONTRACTORS MACHINERY CO., Portland, announces the appointment of **R. G. Fitzgerald** as manager of its Eugene branch. Fitzgerald was previously credit manager at the Portland office of the company.

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James Borror recently joined the sales staff of the LOGGERS & CONTRACTORS MACHINERY CO., Portland. He was formerly Northwest Representative for GALION IRON WORKS & MFG. CO.

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CONTRACTORS EQUIPMENT CORP., Portland, recently announced its appointment as distributor for DIAMOND IRON WORKS and MINNEAPOLIS-MOLINE.

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R. R. Hicks, General Sales Manager of COLUMBIA EQUIPMENT CO., Portland, was recently elected vice-president of that company. He will continue as general sales manager.

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HOWARD-COOPER CORP., Portland, has recently added several men to its sales staff. **B. A. Fennern** will headquarter out of the Longview, Wash., branch. He has been connected with the construction industry since his discharge from the Service. **Wayne Robertson,** formerly in the service department, will work out of the Albany branch. **R. S. Sears,** who was formerly with MACK INTERNATIONAL TRUCK CO., will be attached to the Seattle branch, and **P. O. Nelson,** will specialize in fire fighting equipment and will be attached to the office in Portland. His territory will cover Idaho, Montana and eastern Washington.

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INTERSTATE TRACTOR & EQUIPMENT CO., Portland, has been appointed distributor for the JOHN AUSTIN CO. of Denver, Colo.

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NELSON EQUIPMENT CO., Portland, is now distributor for LINK-BELT SPEEDER CORP.

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FRUEHAUF TRAILER CO. of Seattle, Wash., is now located in new and spacious headquarters at 2411 6th Ave., So.

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Continued from page 111

ices of **Paul Irish** as plant metallurgist, supervising production of their many hard-facing alloys. Irish has spent the last 8 years as metallurgist with Pacific Car & Foundry, Renton, Wash., where, among other things, he supervised melting practice, carbon and alloy steels and high alloy cast iron. He will work with Stoody toward improvements and development of new hard-facing alloys.

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John V. Pooler, superintendent of KAISER GYPSUM's Long Beach plant, has been promoted to manager of all the company's plants and quarries. In addition, he will supervise shipping and construction activities of the organization from his office in the Kaiser Building at Oakland, Calif. **John O. Lewis,** formerly superintendent of the firm's Redwood City plant, will assume the duty of supervising production of the company's Long Beach plant.

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Harold Duncan, formerly District Engineer in Texas for EUTECTIC WELDING ALLOYS CORP., New York City, has been promoted to the position of Assistant Regional Manager, and will be in charge of a group of Eutectic District Engineers servicing users of Eutectic products throughout the Southwest. His office will be at Houston, Texas.

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C. W. Hancock has been appointed Northern District Manager for THE PARAFFINE COMPANIES, INC., and located at the company's offices in Portland, Ore., will supervise sales of Pabco Building Materials in the Northwest.

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E. A. Trask, former head of the San Francisco office of JOHN A. ROEBLING'S SONS CO. of California, has assumed new duties as manager of sales of the company's Chicago corporation. **G. C. Bukowsky,** former manager of the Portland, Ore., branch, has succeeded Trask at San Francisco.

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CONCRETE SAWING EQUIPMENT, INC., formerly Hurstco, Inc., manufacturer of concrete cutting machines, announces the withdrawal and resignation from the company of **Hurst Lewis** and **E. S. Lewis** as directors and officers, and the election of **Harold F. Petee, Jr.,** as President, **John I. Bolen** as Vice-President, and **Raymond P. Massey** as Secretary-Treasurer. The firm has moved its offices to 200 Union National Bank Bldg., Pasadena.

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THE TRAILMOBILE CO., national manufacturers of trailers, has appointed **James Bardsley** general manager of its Pacific Coast Division which has its general office and factory in Berkeley, Calif. Bardsley joined the firm in 1944 as branch manager in Indianapolis. In July of last year he was sent to the Pacific Coast as sales manager.

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Fred Kaiser, midwest regional manager for MINNEAPOLIS-HONEYWELL REGULATOR CO. has been named field sales manager, and **Clarence L. Peterson,**

UNIT BID SUMMARY

Highway and Street . . .

California—San Bernardino and Riverside Cos.—State—Plantmix on Cement-Treated Base

Fredericksen & Kasler, Sacramento, with a bid of $1,143,443, was low before the California Division of Highways for the grading and surfacing with plantmixed bituminous surfacing on cement-treated base of about 9.6 mi. of State Highway between 2.3 mi. east of Redlands and Beaumont. A portion of the new surfacing will use existing surfacing as base. Unit bids were submitted as follows:

(1) Fredericksen & Kasler.....$1,143,443
(2) Basich Bros. Construction Co. and Basich Bros. 1,161,803
(3) Westbrook & Pope and Clements Co. 1,172,706
(4) Gibbons & Reed Co..... 1,176,616
(5) Peter Kiewit Sons' Co..... 1,188,000
(6) United Concrete Pipe Corp..... 1,190,429
— Griffith Co. $1,204,020
— Cox Brothers Construction Co. and J. E. Haddock, Ltd..... 1,234,566
— Vinnell Co., Inc. 1,248,937
— Winston Bros. and Yount Constructors, Inc. 1,254,248
— Claude Fisher Co., Ltd..... 1,265,035

	(1)	(2)	(3)	(4)	(5)	(6)
1,000 cu. yd. removing concrete	2.00	3.00	3.00	8.50	2.75	2.40
8,500 cu. yd. removing existing surfacing	.60	1.00	1.50	3.30	1.00	1.40
Lump sum, clearing and grubbing	$11,600	$5,000	$8,000	$5,900	$7,239	$10,000
630,000 cu. yd. roadway excav.	.28	.30	.25	.23	.30	.26
9,800 cu. yd. structure excav.	2.00	2.00	2.25	1.70	2.35	1.50
1,100 cu. yd. structure excav. (br.)	3.00	2.00	2.25	.90	1.20	2.00
800 cu. yd. struct. backfill (br.)	3.00	1.00	3.50	2.35	2.00	2.00
4,000 cu. yd. ditch and channel excav.	.65	.75	1.00	.80	.80	1.00
9,900,000 sta. yd. overhaul	.0025	.0025	.003	.005	.002	.004
124,000 sq. yd. compact. orig. ground	.04	.04	.03	.05	.045	.04
130,000 cu. yd. imp. borrow	.735	.80	.50	.70	.88	.82
140,000 sq. yd. cultivat. (eros. cont.)	.05	.02	.05	.06	.045	.06
390 ton straw (eros. cont.)	50.00	55.00	40.00	60.00	42.50	60.00
14,200 lb. seed (eros. cont.)	.19	.17	.25	.30	.14	.50
Lump sum, dev. wat. supp. and furn. wat. equip.	$3,000	$15,000	$7,000	$6,000	$1,500	$25,000
39,000 M. gal. applying water	1.08	1.35	1.15	1.60	1.00	.60
Lump sum, finishing roadway	$4,300	$10,000	$7,000	$12,000	$3,000	$8,000
65,000 tons mineral aggre. (P.M.C.T.B.)	1.69	1.68	2.10	1.50	1.60	1.85
17,500 bbl. P.C. (P.M.C.T.B.)	3.32	3.40	3.20	3.10	3.25	3.30
255 tons asph. emuls. (cur. sl. and pt. bdr.)	38.00	32.00	35.00	27.00	34.00	35.00
160 tons liq. asph. MC-2 (pen. tr. and pr. ct.)	21.00	19.00	20.00	18.60	18.00	30.00
87 tons liq. asph. SC-4 (B.S.T.)	23.00	18.00	18.00	16.50	19.00	30.00
14,000 sq. yd. prep. mix. and shap. surface (B.S.T.)	.11	.08	.10	.10	.11	.10
67,000 ton min. aggre. (P.M.S.)	2.26	2.00	2.50	2.00	2.80	1.95
3,350 ton pav. asph. (P.M.S.)	16.50	15.00	16.00	14.90	15.00	17.00
295 ton asph. emuls. (sl. cts.)	26.00	35.00	25.00	27.00	30.00	30.00
2,800 ton screen (sl. ct.)	4.00	6.00	3.50	4.00	4.50	4.00
480 lin. ft. raised bars	.80	1.00	1.00	1.00	1.00	1.00
18,500 lin. ft. placing P.M.S. (dikes)	.10	.10	.15	.16	.24	.10
18,800 sq. yd. placing P.M.S. (median strip gutters)	.32	.25	.30	.11	.23	1.00
330 sq. yd. paved spillways	.80	.45	1.00	1.00	1.00	2.00
222 lin. ft. timber br. rail.	2.40	4.50	3.50	3.20	3.50	5.00
3,100 cu. yd. Class "A" P.C.C. (struct.)	42.00	42.00	50.00	52.00	45.00	45.00
475,000 lb. bar reinf. steel	.082	.086	.09	.08	.085	.08
3,325 lb. misc. steel	.27	.33	.25	.35	.37	.30
410 lin. ft. steel railing	6.65	8.00	8.00	7.00	7.00	7.00
1,920 lin. ft. furn. treated timber piling	1.30	1.40	1.30	1.50	1.30	1.55
96 ea. driving timber piles	22.00	25.00	35.00	31.00	23.00	40.00
800 lin. ft. furn. conc. piling	3.90	4.25	3.00	3.05	4.25	4.00
30 ea. driving conc. piles	43.00	50.00	50.00	86.00	45.00	120.00
84 sq. yd. flexible rock-filled mattress	6.00	7.00	11.50	3.00	5.50	12.00
580 cu. yd. Class "A" P.C.C. (curbs and gutters)	34.00	36.00	40.00	46.50	32.50	35.00
410 ea. right-of-way mon.	5.00	5.00	4.00	6.00	6.00	5.00
76 lin. ft. timber guard railing	3.60	4.50	5.00	2.85	3.50	5.00
5,700 lin. ft. metal plate, guard railing	2.60	3.00	2.60	2.45	2.60	3.00
732 ea. install. culv. markrs. and guide posts	2.00	2.50	2.00	3.00	4.85	2.00
4 ea. clearance markers	10.00	10.00	11.50	6.00	10.00	5.00
67 ea. horiz. reflector units	6.00	7.00	6.00	6.50	7.50	5.00
5,800 lin. ft. chain link fence	1.14	1.20	1.50	1.60	1.20	1.50
19 mi. new property fence	$1,200	750.00	800.00	$1,100	800.00	$1,100
44 ea. 10-ft. drive gates	35.00	35.00	50.00	35.00	45.00	60.00
37 ea. 14-ft. drive gates	43.00	40.00	50.00	40.00	50.00	70.00
16 mi. salv. exist. property fences	720.00	400.00	230.00	400.00	350.00	300.00
320 lin. ft. 24-in. R.C.P. culv. (std. str.)	5.50	5.50	5.30	5.30	6.30	4.00
64 lin. ft. 30-in. R.C.P. culv. (std. str.)	8.00	7.00	6.50	6.70	7.75	5.00
22 lin. ft. 36-in. R.C.P. culv. (std. str.)	10.00	10.00	8.75	8.90	10.00	7.00
34 lin. ft. 48-in. R.C.P. culv. (std. str.)	15.00	15.00	17.00	13.00	14.00	10.00
268 lin. ft. 18-in. C.M.P. (16 ga.)	2.50	2.80	3.00	2.50	2.60	3.00
3,896 lin. ft. 24-in. C.M.P. (14 ga.)	4.00	3.75	4.00	3.50	4.00	3.50
332 lin. ft. 30-in. C.M.P. (14 ga.)	5.00	5.25	6.00	4.50	4.50	4.00
1,190 lin. ft. 36-in. C.M.P. (12 ga.)	7.50	6.85	8.00	6.70	7.00	8.00
74 lin. ft. 48-in. C.M.P. (12 ga.)	12.00	10.00	13.00	10.90	9.00	10.00
1,060 lin. ft. salv. exist. pipe culv.	.80	1.00	1.50	1.00	1.00	.70
510 lin. ft. salv. exist. spillway assem. dn. drn.	.40	.75	1.00	1.00	.50	.80
24 ea. salv. spillway assemblies	7.00	4.00	5.00	5.00	5.00	6.00
37 lin. ft. relay. salv. C.M.P. culv.	1.20	1.50	2.00	1.00	.75	1.00
334 lin. ft. relay salvd. 8-in. C.M.P. dn. drns.	.50	1.50	1.20	2.25	1.15	.60
7 ea. spillway assem. dn. drn. slip joints	10.00	15.00	25.00	28.00	14.00	15.00

Utah—Salt Lake County—State—Pave and Surf.

Gibbons & Reed Co., Salt Lake City, with a bid of $287,394, was low before the State Road Commission of Utah for 3½-in. plantmixed bituminous surfacing on about 2.1 mi. and concrete paving on portions of State St. in Murray (U. S. Highway Nos. 89, 91 and 50). Unit bids were submitted as follows:

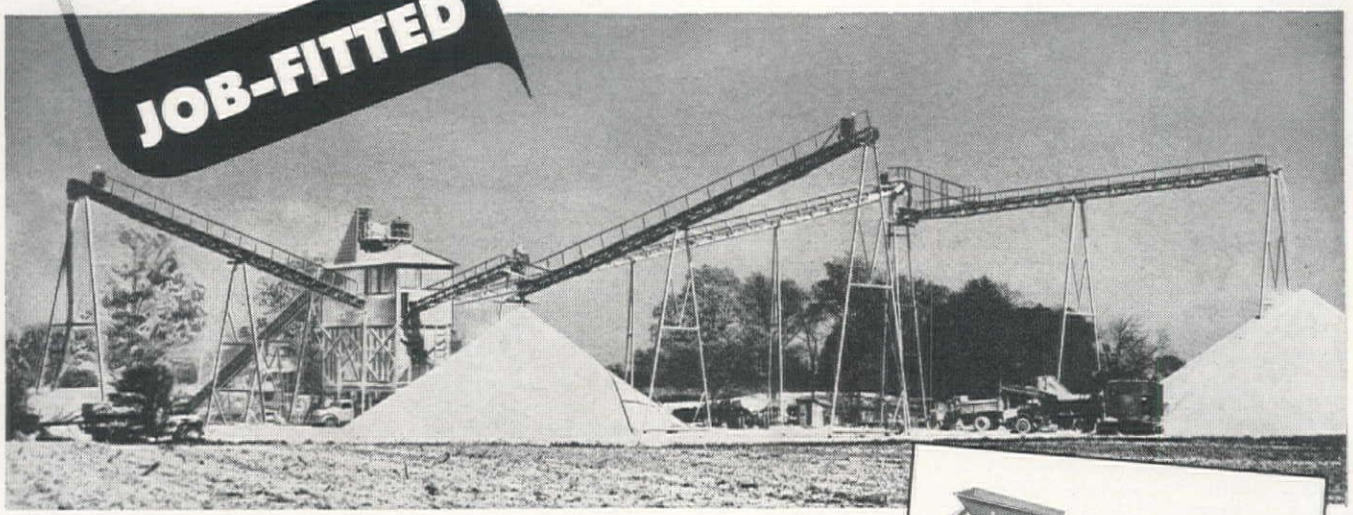
(1) Gibbons & Reed Co.....$287,394
(2) Parson & Fife Construction Co..... 335,565
(3) W. W. Clyde & Co..... 337,986
(4) Strong Co. $384,149
(5) Engineer's Estimate 363,682

	(1)	(2)	(3)	(4)	(5)
21,200 sq. yd. concrete pavement 8 in. thick	2.51	2.90	3.25	3.54	3.10
39,000 sq. yd. concrete pavement 6 in. thick	1.71	2.30	2.15	3.02	2.55
19,500 ton plantmixed bituminous surfacing	2.24	2.30	2.30	2.40	2.50
108,000 gal. bit. matl., Type 85-100 penetra.	.10	.11	.115	.11	.115
105,500 gal. bit. matl., Type 120-150 penetra.	.10	.11	.105	.10	.115
43,000 gal. bituminous matl., Type RC-4	.11	.12	.125	.12	.12

(Continued on next page)

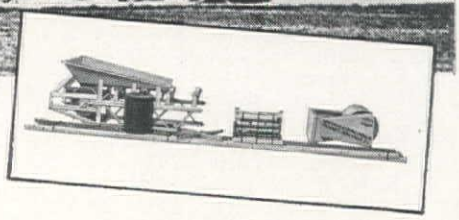
Announcing THE NEW Baughman CONVEYOR ASSEMBLIES

JOB-FITTED



Prefabricated—Conveyor assemblies "Job-fitted" to the efficient operation of this aggregate plant.

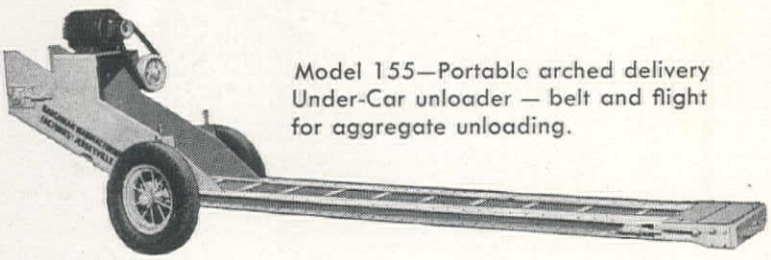
Many features make the *Baughman* "Job-fitted" assemblies a first in efficiency and economy . . . set up on the job by the distributor in but a few hours time . . . lower freight costs . . . lower initial cost . . . immediate delivery of equipment and repairs.



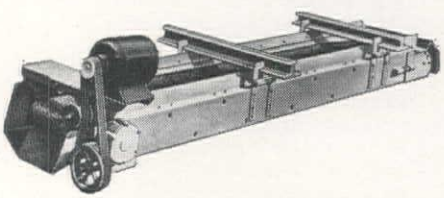
Above . . . prefabricated conveyor assembly packaged ready for shipment.

Baughman Hi-Speed Portable Conveyor assembled of "Prefabricated" Units—mounted on sturdy scissors-type hoist. Also available with tower hoist and swivel wheels.

WRITE FOR FREE CATALOG NO. 57 FOR FULL INFORMATION AND ENGINEERING DATA OR SEE YOUR NEAREST BAUGHMAN DISTRIBUTOR



Model 155—Portable arched delivery Under-Car unloader — belt and flight for aggregate unloading.



Model 190 Semi-Permanent Horizontal Under-track Unloader — troughed belt — an efficient unloader for many materials.

BAUGHMAN HI-SPEED SPREADING AND CONVEYING EQUIPMENT

manufactured by **BAUGHMAN MANUFACTURING CO., Inc.**

1020 ARCH STREET, JERSEYVILLE, ILLINOIS

TRADE WINDS

Pacific regional manager with offices in San Francisco, will succeed him in the midwest. Taking Peterson's former position will be **Gavin S. Younkin,** branch manager in Los Angeles since 1934. He will continue to headquarter in Los Angeles. **Reginald C. Cushing** has been promoted to branch manager in San Francisco.

☆ ☆ ☆

J. A. Cuneo, branch manager for FAIRBANK-MORSE & CO. at Los Angeles, has been transferred to Chicago to become manager of the company's branch in that city. He is succeeded in Los Angeles by **A. M. McLaren.** Another change in the organization makes **William H. Kingsley** manager of the electrical division, with headquarters in the Chicago executive offices.

☆ ☆ ☆

ARCH RIB TRUSS CORP., Los Angeles, has new principals. The personnel and assets of the company have been taken over by **Theodore C. Combs,** structural engineer, and **Calvin R. Cameron,** vice-president and incumbent general manager. Featured products will be bowstring roof trusses and structural members fabricated of glued laminated wood. Metal building specialties such as joist straps and split ring timber connectors will also be manufactured. Quality and service will be given particular emphasis.

☆ ☆ ☆

Erection of a new plant at Vancouver, B. C. next year, has been announced by **E. E. Ellis,** technical superintendent of TIMBER STRUCTURES, INC., of Portland, Ore. The plant, which will cost about a million dollars, will use B. C. fir, and manufacture trusses, arches, frames, girders, and other structural lumber items.

☆ ☆ ☆

William F. U'Ren has resigned from Columbia Steel Co., a United States Steel subsidiary, to accept a position as sales engineer for COLUMBIA STEEL CASTING CO., Portland, Ore. He will operate in California and Nevada.

☆ ☆ ☆

H. A. "Bus" Kindler, for the past 5 years Manager of the Air Compressor Division of the JAEGER MACHINE CO., Columbus, Ohio, has been promoted to District Manager in the 5-state area of Illinois, Iowa, Missouri, Nebraska and Kansas. **Dale D. Murray,** formerly Western Representative at San Francisco, replaces Kindler.

☆ ☆ ☆

E. J. Gottula, formerly sales-engineer in the San Francisco area, has been named to the post of Seattle district manager for the SOULE' STEEL CO.

☆ ☆ ☆

C. Stewart Ferguson of Troy, N. Y., engineering manager of the Chemicals Division of the GENERAL ELECTRIC COMPANY's Chemical Department, has been appointed West Coast Manager of that Division. His new headquarters will be at the Division's plant at Anaheim, Calif.

☆ ☆ ☆

STANDARD STEEL CORP. of Los Angeles, fabricator of heavy steel plate, has announced the outright purchase of the Drying Machinery Division of Hersey

6,700	gal. bituminous matl., Type MC-1	.11	.12	.125	.12	.12
1,275	ton cover material	2.75	2.50	2.75	3.00	3.00
15,500	ton cr. rock or cr. gravel surf. course	.74	.75	1.05	.95	1.00
20,000	cu. yd. unclassified excavation	.26	.50	.40	.42	.50
175,000	sta. yd. overhaul, Class "A"	.01	.01	.015	.015	.01
6,500	yd. mi. overhaul, Class "B"	.12	.15	.20	.15	.12
315	hr. rolling	5.00	4.50	5.00	6.00	5.00
525	1,000 gal. watering	1.20	2.00	1.50	1.50	2.00
620	lin. ft. curb and gutter, Type 3-H	2.05	2.60	2.50	2.58	2.50
855	lin. ft. gutter, Type 2-E	1.85	2.40	2.25	2.25	2.00
460	lin. ft. concrete curb, Type "A"	1.35	1.50	1.50	1.12	1.50
218	lin. ft. conc. driveway and driveway curb, Type "B-2"	8.00	3.00	6.00	10.00	5.00
390	sq. yd. sidewalk pavement 4 in. thick	3.40	2.50	2.50	4.45	2.75
822	lin. ft. 15-in. conc. irrigation pipe	1.90	2.00	1.85	2.00	1.75
2,036	lin. ft. 18-in. conc. irrigation pipe	2.45	2.75	2.50	2.50	2.25
106	lin. ft. C.G.M. pipe arches 18 in. x 11 in. (soldered jts.)	2.90	3.00	2.95	3.25	3.00
844	lin. ft. C.G.M. pipe arches 43 in. x 27 in. (soldered jts.)	8.40	10.00	9.15	9.60	9.90
12	lin. ft. 12-in. C.G.M. pipe	3.00	2.00	2.00	2.50	2.00
184	lin. ft. 18-in. C.G.M. pipe (soldered jts.)	3.15	3.50	3.30	3.50	3.35
75	lin. ft. 8-in. underdrains	1.00	1.40	1.00	.75	.75
3,300	lin. ft. 10-in. underdrains	1.10	1.40	1.05	.93	.95
4,125	lin. ft. 12-in. underdrains	1.35	1.50	1.25	1.17	1.20
1,825	lin. ft. 15-in. underdrains	1.80	1.90	1.90	1.80	1.75
5,500	cu. yd. gravel backfill	1.25	1.50	1.75	1.25	1.25
5,100	cu. yd. excavation for structures	.95	1.25	1.25	2.50	3.00
253	cu. yd. concrete, Class "A"	60.00	65.00	65.00	60.00	70.00
3,300	sq. yd. removal of existing pavement	.70	.75	.60	.65	1.00
42,600	lb. reinforcing steel	.10	.12	.12	.12	.12
12,500	lb. structural steel	.25	.25	.24	.40	.20
Lump sum,	clearing and grubbing	$1,000	500.00	200.00	750.00	400.00
156	ea. moving mail box posts	7.50	7.00	3.00	3.00	8.00
2	ea. F.A.P. markers	12.00	25.00	20.00	25.00	20.00

New Mexico—Lea County—State—Grade and Surf.

Wylie Brothers, Albuquerque, was awarded a $377,594 contract by the New Mexico State Highway Department for the grading and bituminous surfacing of approximately 15 mi. of U. S. Highway 62-180 between Carlsbad and Hobbs. Unit bids were submitted as follows:

(1) Wylie Brothers $377,594
(2) Skousen-Hise Construction Co. 407,816
(3) Allison & Haney 418,769
(4) Brown Contracting Co. $433,474
(5) Engineers' Estimate 404,741

		(1)	(2)	(3)	(4)	(5)
Lump sum,	removal of old structs.	$4,700	$3,000	$2,500	$1,000	$1,075
Lump sum,	removal of obstructions	300.00	300.00	100.00	100.00	250.00
163,100	cu. yd. excav.—unclassified	.24	.38	.31	.26	.30
280	cu. yd. excav. for structs.	3.00	3.00	4.00	3.00	2.00
475	cu. yd. excav. for pipe culverts	3.00	2.00	3.00	3.00	2.00
299,100	sta. yd. overhaul	.02	.02	.02	.02	.02
154,000	¼ mi. yd. haul	.06	.07	.05	.07	.06
438,500	ton mi.	.085	.07	.07	.08	.08
125	hr. mechanical tamping	3.00	6.00	4.00	4.00	5.00
2,060	hr. rolling—sheepsfoot roller	5.00	4.50	5.00	4.00	5.00
645	hr. rolling—steel tired roller	4.00	6.00	5.00	7.00	5.00
2,420	hr. rolling—pneumatic tired roller	3.50	4.00	3.50	4.00	5.00
118,100	ton ballast	.55	.48	.66	.73	.50
52,100	ton leveling course	.70	.90	.90	.88	.60
9,285	M. gal. watering	1.50	1.75	1.75	2.50	2.50
240	cu. yd. Class "AE-AR" concrete	50.00	70.00	60.00	50.00	45.00
25,800	lb. reinforcing steel	.12	.20	.14	.11	.13
788	lin. ft. corr. galv. metal culv. pipe—24-in. diam.	4.50	4.50	4.80	4.85	4.00
156	lin. ft. corr. galv. metal culv. pipe—30-in. diam.	5.50	5.50	5.70	5.60	5.00
400	lin. ft. corr. galv. metal culv. pipe—36-in. diam.	8.00	8.50	8.90	8.50	8.00
4	each monuments and markers	50.00	75.00	75.00	50.00	50.00
144,600	lin. ft. galv. barbed wire fence	.16	.16	.16	.16	.15
30	each gates—Texas type	10.00	10.00	10.00	10.00	10.00
207	each bracing	8.00	5.00	5.00	5.00	7.00
201	each tr. timb. warn. posts (6-in. diam. reflect)	8.00	8.00	7.00	8.00	7.00
43	each right-of-way markers	6.00	6.00	7.00	6.00	5.00
108	each remov. and reset. right-of-way markers	4.00	4.00	5.00	5.00	3.00
434	lin. ft. removing and rebuilding fence	.10	.20	.15	.10	.15
1.6	mi. obliterating old road	150.00	300.00	250.00	200.00	200.00
9,160	bbl. cutback asphalt, Type MC-3	5.10	5.12	5.20	5.80	7.00
13,900	ton top course surfacing	.85	.85	.93	.88	.60
14.451	mi. mixing asphalt and aggregate	400.00	700.00	600.00	600.00	700.00
1,685	bbl. cutback asph., Type RC-4 (seal coat)	5.50	6.00	5.75	5.80	7.00
2,370	ton aggregate (for seal coat)	4.00	5.00	5.50	5.00	5.00
11	each removing and rebuilding cattleguard	200.00	200.00	200.00	400.00	200.00
14.451	mi. asphalt processed base	400.00	500.00	500.00	500.00	500.00

Oregon—Malheur County—State—Grade and Pave

C. E. Leseberg, Nyssa, Ore., with a bid of $198,187, was low before the Oregon State Highway Department for the grading and paving with asphaltic concrete of 5.72 mi. of the Pumping Plant Hill-Ontario Section of the Old Oregon Trail Highway. Unit bids were submitted as follows:

(1) C. E. Leseberg $198,187
(2) Spada Bros. and K. C. Dack Construction Co. 199,128
(3) Babler Bros. 215,078
(4) Porter W. Yett 221,752
(5) Heavy Hauling Co. 223,165
(6) D. F. McKenzie 227,840
— Quinn Bros. & Robbins 230,034
— K. F. Jacobson Co., Inc. 232,521
— Parker Schram Co. 234,394
— Stevenson Construction Co. 234,437
— Del R. Beebe Construction Co. $242,365
— Vernie Jarl 243,529
— Vernon Bros. Co. 243,697
— E. C. Hall Co. 243,720
— Tom McCorkle Construction Co 244,574
— Erland & Blickle and F. H. McEwen 249,024
— J. N. & M. J. Conley 263,825
— Floyd Graham Construction Co. 268,879
— Morrison & Fisher 279,388
— McNutt Bros. 307,210

		(1)	(2)	(3)	(4)	(5)	(6)
Lump sum,	clearing and grubbing	250.00	$3,500	$3,000	$4,700	$8,000	$4,400
400	cu. yd. struct. excav., unclassified	2.00	1.50	2.00	2.00	2.00	2.00
70	cu. yd. trench excav., unclassified	2.00	1.50	2.00	2.00	2.00	2.00
97,000	cu. yd. special borrow excav., unclassified	.28	.22	.29	.22	.30	.35
21,000	cu. yd. general excav., unclassified	.18	.24	.25	.35	.25	.22
52,200	yd. sta. short overhaul	.02	.01	.02	.02	.02	.015
700	yd. sta. long overhaul	.40	.50	.50	.40	.50	.50
121,000	yd. mi. truck haul on special borrow	.09	.08	.12	.15	.10	.15
2,000	lin. ft. rounding cutbanks	.20	.15	.20	.15	.10	.15
5.72	mi. finishing roadbed and slopes	300.00	450.00	350.00	300.00	300.00	300.00
1,200	lin. ft. 12-in. concrete pipe	1.05	1.60	1.75	2.00	1.30	1.40
260	lin. ft. 18-in. concrete pipe	2.40	2.80	3.00	3.10	2.40	2.75
180	lin. ft. 24-in. concrete pipe	3.60	4.20	3.50	4.10	3.80	4.00
40	lin. ft. 36-in. concrete pipe	8.00	8.00	7.00	8.50	7.50	9.00
70	lin. ft. 18-in. concrete siphon pipe	2.40	3.80	3.00	4.00	2.80	4.00

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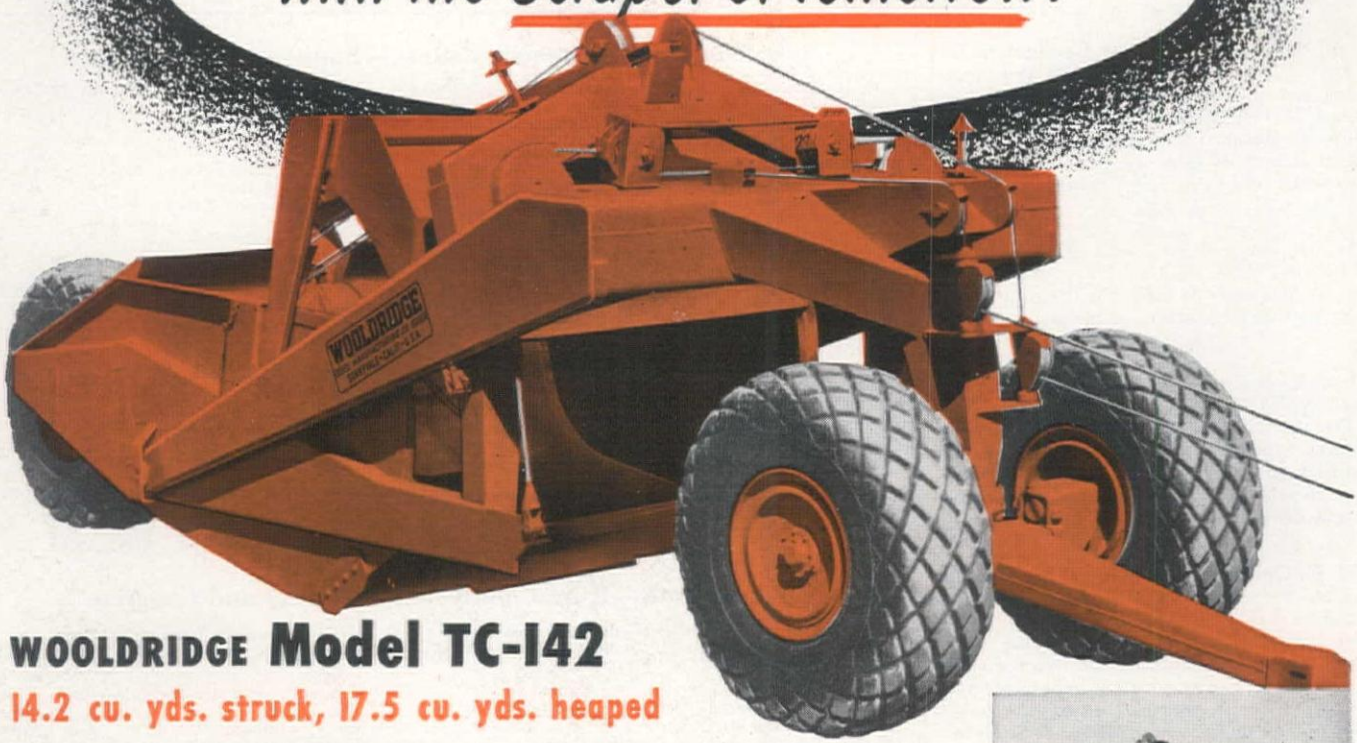
Move more yardage today with the Scraper of tomorrow!



WOOLDRIDGE Model TC-142

14.2 cu. yds. struck, 17.5 cu. yds. heaped

BETTER!

Even faster loading is achieved by instant penetration of new 3-piece cutting edge. WIDER 65-inch apron opening and new curved ejector allow faster complete discharge of load. The rugged new TC-142 is built to "take" the heavier stresses imposed by today's more powerful tractors. Modern formed steel construction minimizes welding, increases structural strength. Higher yoke and ground clearance make maneuvering easy.

PROVED!

Proved Wooldridge advantages have been maintained. Original boiling bowl loading permits heaping volumes to surge freely into bowl. Pivot-tilt forced ejection dumps load faster with less cable strain. Rear-draft fulcrum leverage insures positive blade penetration. Cable is easily accessible, simply reeved over minimum of sheaves, all located away from load.

PROFITS!

Job-proved, clean-lined, this IS the scraper of tomorrow—for greater production—for minimum operating cost—for highest profits TODAY! Contact your dealer or write for Bulletin TC-202 now for details. Other Wooldridge Scrapers from 7.5 to 27.5 cu. yd. heaped capacities.

TERRA COBRA high-speed self-propelled earthmovers.
14.0 cu. yds. struck.
17.5 heaped.

RIPPERS

BULLDOZERS

POWER CONTROL UNITS

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

WOOLDRIDGE EARTH MOVING EQUIPMENT

PROVED AND APPROVED FOR EVERY TYPE OF EARTH-MOVING JOB

TRADE WINDS

Manufacturing Co. of Boston, Mass. Standard Steel has for many years manufactured drying and dehydration equipment for chemicals, fertilizers and by-products. Plans of the firm for 1950 call for manufacturing in the East as well as in the main plant at Los Angeles, and expansion of sales, service and plant facilities already under way. Key personnel of the acquired organization will be retained.

☆ ☆ ☆

Appointment of **Andrew Carrigan** as assistant to **Harold Q. Noack,** Division Vice-President of the Central Sales Division of COLUMBIA STEEL CO., has been announced. Before his advancement, Carrigan was manager of sales for the Central Division, with offices in San Francisco.

☆ ☆ ☆

H. P. Fogle has joined STANDARD PIPEPROTECTION, INC., St. Louis, Mo., as Manager of Sales for the Southwest Area with headquarters at Houston, Texas.

☆ ☆ ☆

Employees of the ARMCO DRAINAGE AND METAL PRODUCTS, INC., at Denver, Colo., have been honored by the Armco Steel Corp., parent company, for completion of 500,000 man hours of work in a 365-day period without a single lost time accident.

☆ ☆ ☆

H. D. Collier has announced his resignation as chairman of the board of directors of the STANDARD OIL COMPANY OF CALIFORNIA. He will continue as a director and chairman of the finance committee. **R. G. Follis,** vice-chairman and formerly president, was elected by the board of directors to succeed Collier. **T. S. Petersen** will continue as president.

☆ ☆ ☆

Manufacturing News From the East and Midwest Regions

Appointment of **Robert J. Binford, Jr.,** as sales manager of the D-A LUBRICANT CO., INC., Indianapolis, Ind., manufacturer of heavy-duty lubricants and engine oils, has been announced by **Frank L. Binford,** president. The new sales manager has been with the company since 1939, excepting two war years, and most recently was a sales supervisor working out of the factory.

☆ ☆ ☆

J. H. Berryman has been appointed assistant to the manager, Technical Sales Division, according to **J. J. Lincoln,** vice-president of AIR REDUCTION SALES CO., New York City. Berryman will assist **Scott D. Baumer,** manager, Technical Sales Division.

☆ ☆ ☆

Robert W. Persons has been named products sales manager of the Drill Steel Division of CRUCIBLE STEEL CO. This is a new division of the company, created to handle the rapidly expanding business in the drilling field. Persons has been with the company since 1930.

☆ ☆ ☆

Appointment of **Albert G. Crockett** as manager of distributor sales for MACK-

16 cu. yd. Class "A" conc. in miscl. structs.	43.00	65.00	60.00	60.00	50.00	50.00
260 lin. ft. salvaging culvert pipe	2.00	2.00	2.00	1.00	1.00	1.50
110 cu. yd. Class "A" concrete in box culverts	36.00	48.50	55.00	55.00	50.00	55.00
18,700 lb. metal reinforcement	.145	.12	.14	.12	.10	.12
45,000 cu. yd. pit-run gravel in base	.56	.52	.45	.45	.80	.48
8,100 cu. yd. ¾-in. - 0-in. gravel in base and shoulders	2.25	1.80	2.40	2.30	2.00	2.50
1,200 M. gal. sprinkling	2.00	2.00	2.00	3.00	2.00	2.00
5.72 mi. preparation of base	150.00	150.00	200.00	200.00	175.00	100.00
800 cu. yd. ¾-in. - 0-in. gravel in binder course	3.25	1.80	3.00	2.30	3.75	3.00
130 ton furn. and placing RC-3 asphalt in binder crse.	39.00	45.00	40.00	40.00	45.00	44.00
13,300 Class "B" asphaltic concrete	5.75	6.20	6.20	6.80	5.90	6.30
2,000 cu. yd. ¾-in. - ½-in. crushed material in stockpile	2.00	2.20	2.40	2.15	1.95	2.50
2,000 cu. yd. ½-in. - ¼-in. crushed material in stockpile	2.00	2.20	2.40	2.15	1.95	2.50
1,000 cu. yd. ¼-in. - 0-in. crushed material in stockpile	2.00	2.20	2.40	2.15	1.95	2.50

Bridge and Grade Separation . . .

California—Alameda County—State—Steel Girder

C. B. Tuttle Co., Long Beach, Calif., with a bid of $680,741, was low before the California Division of Highways for construction of a steel girder bridge across San Leandro Creek and the tracks of the Southern Pacific Co. at the south city limits of Oakland. Unit bids were submitted as follows:

(1)	C. B. Tuttle Co.	$680,741	
(2)	Fredrickson Bros.	697,790	
(3)	Carl N. Swenson Co., Inc.	705,610	
(4)	Erickson, Phillips & Weisberg	706,917	
(5)	Bates & Rogers Construction Corp.	707,626	
(6)	Fredrickson & Watson Construction Co.	707,778	
—	J. H. Pomeroy & Co., Inc.	709,695	
—	Underground Construction Co.	710,534	
—	H. W. Ruby	713,394	
—	Charles MacClosky Co.	716,843	
—	Granite Construction Co.	$716,863	
—	Johnson, Drake & Piper, Inc.	718,491	
—	A. Soda & Son	723,595	
—	Dan Caputo and Edward Keeble	732,419	
—	Stolte, Inc., and The Duncanson-Harrelson Co.	736,852	
—	Guy F. Atkinson Co.	739,907	
—	Lew Jones Construction Co., Inc., and Brighton Sand and Gravel Co.	748,039	
—	Healy, Tibbits Construction Co.	773,682	
—	S. J. Amoroso Construction Co.	781,152	

		(1)	(2)	(3)	(4)	(5)	(6)
3,830	cu. yd. structure excavation	2.00	1.50	3.75	1.50	2.85	2.00
5,140	cu. yd. Class "A" P.C.C. (structures)	32.60	32.00	29.00	40.00	37.00	33.00
160	cu. yd. Class "A" P.C.C. (footing blocks)	32.60	35.00	17.50	13.00	28.50	15.70
3,744,000	lb. structural steel	.08	.086	.0875	.076	.0782	.0853
Lump sum,	cleaning and painting steel bridge	$21,000	$30,000	$23,119	$31,255	$29,840	$30,000
41,720	lin. ft. furn. treated Douglas fir piling	1.05	1.03	1.15	1.00	1.06	1.06
4,372	lin. ft. furn. steel piling	2.80	2.50	2.85	2.30	2.57	2.75
1,248	ea. driving piles	27.00	20.00	30.00	30.00	23.50	28.10
66	ea. steel pile splices	12.00	20.00	15.00	10.00	25.00	20.00
793,000	lb. bar reinf. steel	.0675	.07	.07	.0675	.07	.0644
5,715	lin. ft. steel railing	6.25	6.00	6.00	6.00	6.05	6.11

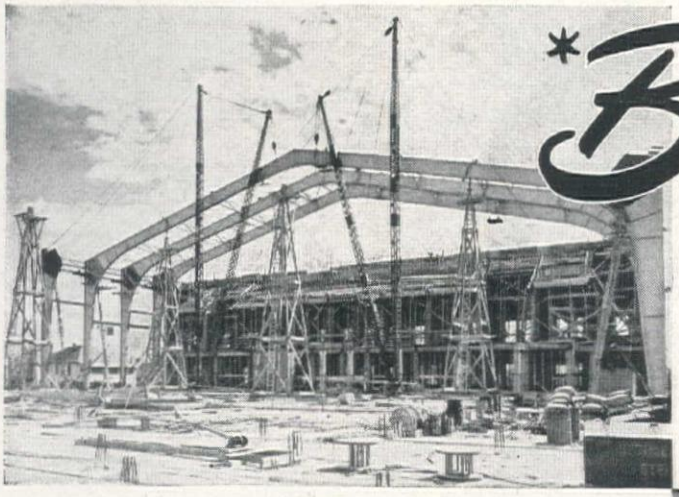
Washington—King County—State—Steel and Concrete

MacRae Brothers, Seattle, Wash., with a bid of $1,193,911, was low before the Washington Department of Highways for construction of the first unit of the Alaskan Way Viaduct at Seattle. Unit bids were submitted as follows:

(1)	MacRae Brothers	$1,193,911	—	Manson Construction & Engineering Co.	$1,358,883
(2)	Morrison-Knudsen Co., Inc.	1,224,780	—	Guy F. Atkinson Co.	1,362,474
(3)	Lease & Leighland	1,266,947	—	General Construction Co.	1,364,694
(4)	Puget Sound Bridge & Dredging Co. and Johnson, Drake & Piper, Inc.	1,284,272	—	M. P. Butler & Carl M. Halvorson, Inc.	1,383,157
(5)	Henrick Valle Co., Inc.	1,295,732	—	Kuney Johnson Co.	1,461,075
(6)	J. C. Boespflug Construction Co.	1,300,293	—	Peter Kiewit Sons' Co.	1,498,932
—	S. S. Mullen, Inc.	1,346,263			

		(1)	(2)	(3)	(4)	(5)	(6)
Lump sum,	preparation of site	$11,000	$9,400	$11,000	$10,467	$25,000	$19,742
250	cu. yd. unclassified excav., incl. haul	1.10	1.18	.65	5.82	6.00	.66
2,100	cu. yd. embankment in place	1.20	4.00	1.00	1.57	1.80	1.04
130	cu. yd. cr. stone surf. top course in place	6.00	4.50	4.00	8.72	4.20	6.33
290	cu. yd. cr. stone surf. base course in place	6.00	4.35	4.00	7.79	4.20	6.33
92	ton plant mix in place	17.00	10.60	16.00	17.45	12.00	17.25
1,240	sq. yd. cem. conc. pave. std. 14 day mix Sec. 8 in pl.	4.40	5.00	4.00	5.00	5.00	4.76
4,200	lb. pavement reinf. Type No. 2 in place	.10	.105	.10	.093	.11	.085
51	only dowel bars with rubber caps in place	.75	.92	.70	1.00	1.00	.52
100	bbl. ex. for furn. High Early Str. cement in lieu of Standard Portland cement	1.00	.82	1.50	1.20	1.50	1.44
25	sq. yd. conc. placed as extra thickness	3.00	1.00	5.00	5.50	3.00	3.63
1,285	lin. ft. integral cem. conc. curb in place	.80	.75	.80	.93	1.25	1.04
8	cu. yd. special curb in place	65.00	48.00	45.00	81.00	150.00	92.00
2,960	lin. ft. Type A precast white reflec. curb in pl.	.70	1.65	2.00	2.74	2.00	1.69
2,525	lin. ft. plain conc. or V.C. sewer pipe 6-in. dia. in place	2.50	3.50	1.50	3.50	3.50	2.53
950	lin. ft. plain conc. or V.C. sewer pipe 8-in. dia. in place	3.50	4.00	2.00	4.05	4.00	6.33
374	lin. ft. plain conc. or V.C. sewer pipe 12-in. dia. in place	7.50	4.75	5.00	4.70	5.00	13.80
30	lin. ft. cast iron soil pipe 6-in. dia. in place	5.00	7.85	5.50	5.80	8.00	11.50
15,500	lb. cast iron specials in place	.28	.32	.30	.34	.35	.46
5	only manholes (City of Seattle std.) in place	230.00	225.00	200.00	221.00	220.00	345.00
1	only manhole (City of Seattle std.) with recl. cover in place	210.00	200.00	150.00	200.00	200.00	322.00
17	only catch basins (City of Seattle std.) in place	173.00	265.00	150.00	186.00	250.00	201.25
2	only catch basins (City of Seattle std.) with reclaimed cover in place	160.00	241.00	100.00	163.00	250.00	161.00
16	lin. ft. addtl. depth of manhole or catch basin	15.00	17.40	10.00	15.00	20.00	28.75
7	only st. inlets (City of Seattle std.) in place	40.00	88.00	110.00	53.00	100.00	92.00
8	only remov. and reset. st. inlets (City of Seattle std.)	30.00	66.00	100.00	46.50	65.00	69.00
1,514	sq. yd. removing pavement, sidewalks and curbs	.90	1.47	1.25	1.00	1.50	1.14
986	sq. yd. removing conc. basement floors	.50	1.75	2.00	.75	1.50	2.33
220	sq. yd. one crse. Port. cem. conc. sidewk. in pla.	3.00	2.65	3.00	3.25	3.00	7.80
42	sq. yd. cem. conc. alley cross. (City of Seattle std.) in place	3.75	4.75	4.00	4.10	4.00	4.60
4	only twin danger lights (City of Seattle std.) complete in place	25.00	61.00	100.00	70.00	50.00	69.00
	BRIDGE—MAIN STRUCTURAL ITEMS						
8,100	cu. yd. structure excavation	4.90	4.90	1.50	6.40	5.00	7.30
17,000	lin. ft. furn. steel piling	3.40	3.23	3.00	3.38	3.50	3.34
595	only driv. steel piles, first 10 ft. of penetration	31.00	25.60	55.00	32.60	40.00	176.36

(Continued on next page)

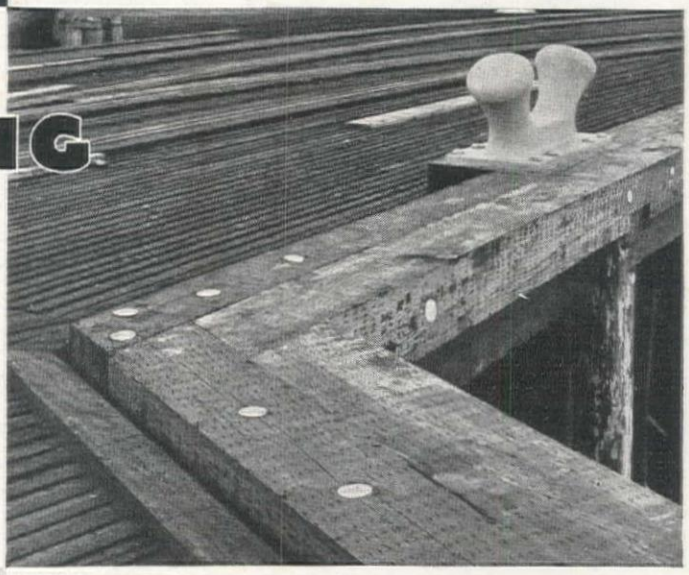


*BUILDING

One of the largest rigid steel-frame structures in the nation will be the Oregon State College Pavilion shown here during erection. Designed to seat 10,000 people, it has a height of 84 ft, a length of 260 ft, and a clear-span width of 222 ft.

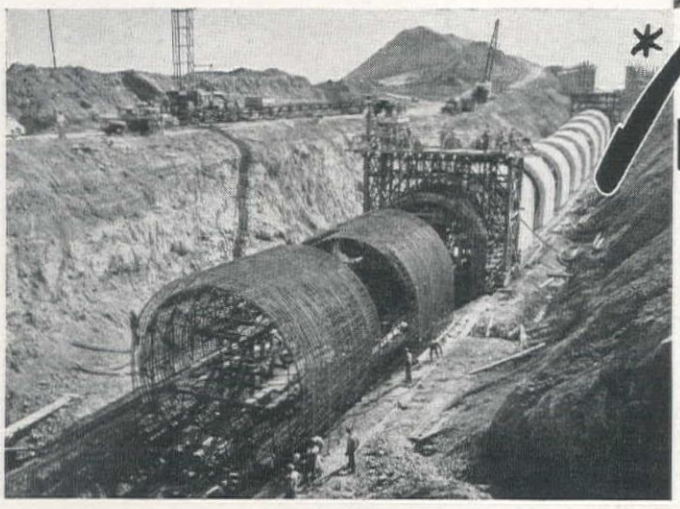
Bethlehem Pacific fabricated and erected approximately 1000 tons of steel for this building.

*SHIPPING



A timber pier in the timber country, this structure is part of the new waterfront improvement program for the Port of Portland. 1100 ft long and covering 180,000 sq ft, the pier will readily accommodate three vessels at a time.

More than 50 tons of Bethlehem Pacific galvanized timber bolts, button-head bolts, track spikes, and boat spikes were used to secure the timbers and rails of this pier.



*IRRIGATION

Casting alternate concrete sections of a 1010-ft siphon of the Delta-Mendota Canal in the Central Valley Irrigation Project. The finished tube will have an inside diameter of more than 24 ft and will carry water under a creek and a highway at Tracy, California.

Bethlehem Pacific has supplied many thousand tons of reinforcing bars for this and other United States Bureau of Reclamation projects.

*with steel made by Bethlehem Pacific

Bethlehem Pacific, with an ingot capacity of 650,000 tons per year, produces steel in many forms for the growing industries and projects of the West. This company's three steelmaking plants are located at Los Angeles, South San Francisco, and Seattle, each in the center of major industrial regions.

BETHLEHEM PACIFIC COAST STEEL CORPORATION

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

★ BETHLEHEM PACIFIC ★ BETHLEHEM STEEL ★

TRADE WINDS

INTERNATIONAL MOTOR TRUCK CORP. has been announced by **A. C. Fetzer,** vice-president. In his new position, Crockett will head up Mack's entire domestic and Canadian wholesale organization of some 500 distributors. Director of Mack's market research department since the war, Crockett joined the company in 1927. His headquarters will remain in Mack's general offices at New York City.

☆ ☆ ☆

KLAUS

M. O. Stockland, Jr., Director of Sales of the FOUR WHEEL DRIVE AUTO CO., has announced the appointment of **W. G. Klaus** as Office Sales Manager for the company and of **G. F. DeCoursin** as Field Sales Manager. Klaus has been Assistant to the General Manager and Manager of Manufacturer's Sales since 1945.

☆ ☆ ☆

The appointments of **John Stolarz** as manager of Delta Multiplex sales and **Irving G. Meyer** as consumer sales manager have been announced by the Power Tool Division of ROCKWELL MANUFACTURING CO., Milwaukee, Wis.

☆ ☆ ☆

J. A. Hill, president of AIR REDUCTION CO., INC., has announced the appointment of **H. R. Salisbury** as president of AIR REDUCTION SALES CO. Salisbury has been with the organization over 23 years in various executive capacities. Appointed vice-presidents were **H. F. Henriques,** general sales; **J. J. Lincoln, Jr.,** railroad sales and sales services; **S. B. Stouffer,** distribution, and **N. L. Wisser,** field office management.

☆ ☆ ☆

Julius P. Heil, founder and chairman of the board of THE HEIL CO., Milwaukee, died Nov. 30, after suffering a heart attack while pheasant hunting. He was 73 years of age. The huge equipment manufacturing company that bears his name was founded in 1901, and its first products were truck bodies and tanks. He has been manufacturing bulldozers and scrapers since 1936. He was honored by the citizens of his state by being elected governor for two terms.

☆ ☆ ☆

William F. Campbell, vice-president and director of McKIERNAN-TERRY CORP., died recently. He had been associated with the National Hoisting Co. and McKiernan-Terry Corp. for over 30 years in the manufacture of hoisting machinery, pile hammers and special heavy machinery.

☆ ☆ ☆

David J. Rohrer, Vice-President of the FOUR WHEEL DRIVE AUTO CO. and a director of the company since its organization in 1910, died Jan. 9. He was 76 years old.

☆ ☆ ☆

Edward Hanson Conner, former vice-president and chief engineer of the MISSOURI VALLEY BRIDGE & IRON CO. of Leavenworth, Kansas, died Dec. 28.

11,100 lin. ft. driv. steel piles, beyond first 10 ft. of penetration	.95	.59	.15	.12	.50	.11
250 only pile splices	18.00	26.50	11.00	11.65	20.00	13.80
1,260 cu. yd. conc. class A (for founda.) in place	24.00	29.73	32.00	29.75	25.00	58.94
220 cu. yd. conc. class E (for founda.) in place	23.50	31.10	21.00	29.10	24.50	46.95
110 cu. yd. conc. class F (for founda.) in place	23.00	36.00	55.00	48.20	24.00	55.18
11,480 cu. yd. conc. class A (for col. bird., beams and slabs) in place	49.00	50.70	51.50	52.70	53.50	43.19
375 cu. yd. conc. class A (for decks of steel struct.) in place	49.00	51.40	40.00	61.35	52.00	45.90
2,986,000 lb. steel reinf. bars in place	.085	.087	.095	.087	.09	.0891
624,000 lb. struct. carbon steel in place	.1225	.115	.125	.13	.12	.118
330 lb. cast bronze in place	2.00	1.90	.15	2.32	1.50	1.79
7,200 lin. ft. reinf. conc. bridge railing in place	4.90	4.25	11.00	6.40	5.00	2.86
56 only bridge drains Type A complete in place	78.00	64.00	60.00	71.00	80.00	72.63
3 only bridge drains Type B complete in place	150.00	49.00	50.00	142.00	175.00	142.60
24 only bridge drains Type C complete in place	46.00	38.00	40.00	43.00	50.00	247.25
2,400 lin. ft. downspouts	6.00	6.00	4.50	5.20	7.50	6.90
5 only furn. and driv. steel test piles	390.00	825.00	150.00	465.00	500.00	920.00

Sewerage . . .

Arizona—Pima County—District—Interceptor Sewer

R. H. Martin Contracting Co., Tucson, with a bid of $323,609, was awarded a contract by Sanitary District No. 1, Pima County, for construction of the Prince Road Interceptor Sewer, a 9-mi. line extending to the Tucson outfall sewer. The line will be composed of vitrified clay pipe in diameters from 8 to 21 in. and reinforced concrete pipe of 24-, 27- and 30-in. diameters. Unit bids were submitted as follows:

(1)	R. H. Martin Contracting Co.	$323,609	
(2)	Pipeline Construction Co.	341,070	
(3)	J. H. Welsh & Son	353,074	
(4)	Mark Cockrill Contracting Co., Inc.	356,721	
(5)	R. H. McManus & Co.	371,339	
(6)	M. M. Sundt Construction Co.	393,981	
—	Fisher Construction Co.	$397,705	
—	San Xavier Rock & Sand Co.	409,628	
—	C. Dudley DeVelbiss Co.	414,078	
—	H. S. Raymond	421,579	
—	Pioneer Constructors	476,898	
—	M. G. R. Construction Co.	512,130	

	(1)	(2)	(3)	(4)	(5)	(6)
42,500 cu. yd. excavation	.75	1.02	1.03	.3607	1.20	1.95
8 sq. yd. conc. pavement repl. (Ariz. Hwy. Std.)	4.00	10.00	10.00	3.53	12.00	10.00
18 sq. yd. asph. pvmt. replacement (Ariz. Hwy. Std.)	1.50	6.00	8.00	3.53	7.00	10.00
7,200 sq. yd. asph. pvmt. replacement (Pima Co. Std.)	1.50	1.61	2.60	2.92	3.00	4.78
3,128 lin. ft. 8-in. V.C.P.	.75	1.18	1.16	1.56	1.20	1.45
2,636 lin. ft. 10-in. V.C.P.	1.30	1.63	1.66	2.25	1.70	2.05
6 lin. ft. 12-in. V.C.P.	1.60	2.22	2.00	2 14	2.26	3.25
5,882 lin. ft. 15-in. V.C.P.	2.75	3.31	3.36	3.79	3.33	3.45
2,972 lin. ft. 18-in. V.C.P.	3.50	4.38	4.48	5.095	4.52	4.60
2,175 lin. ft. 21-in. V.C.P.	5.00	5.65	5.41	6.55	5.97	5.96
6,000 lin. ft. 24-in. R.C.P.	6.00	5.70	5.66	6.10	5.85	5.00
13,140 lin. ft. 27-in. R.C.P.	6.80	6.58	6.52	6.93	6.95	5.71
2,140 lin. ft. 30-in. R.C.P.	8.20	7.40	7.43	7.85	7.95	6.60
76 ea. 4-ft. diam. M.H. up to including 6-ft. - 0-in.	150.00	125.00	133.50	157.23	128.00	116.92
102 ver. ft. additional depth	15.00	17.50	18.50	23.38	20.00	17.73
76 ea. 24-in. nom. diam. M.H. frames and covers	45.00	42.35	36.20	34.13	38.30	34.20
55 ea. 24-in. x 36-in. catch basin frames and covers	90.00	75.35	65.00	87.21	74.00	61.33
Lump sum, Sou. Pac. R.R. crossing	$1,500	444.00	$2,250	$4,016	$2,769	$2,250
350 cu. yd. Class "A" concrete	50.00	44.40	62.50	49.05	40.00	51.17
30,000 lb. reinforcing steel	.12	.135	.15	.1275	.15	.10
Lump sum, sewage flow measuring equipt. and appurt.	700.00	$1,252	650.00	840.00	900.00	758.15
7 ea. monuments and mon. frames and covers	20.00	33.30	32.50	34.14	30.00	29.48

Water Supply . . .

California—Various Counties—City and County—Pipeline

United Concrete Pipe Corp., Baldwin Park, Calif., was awarded a $4,246,464 contract by the City and County of San Francisco for construction of Sections A & C of the Bay Division Pipe Line No. 3 consisting of construction of approximately 17 mi. of 78- and 72-in. reinforced concrete pipe (Schedule XII). Alternate bids were received using 79-in. lined and coated steel pipe. Artukovich Bros. and Steve P. Rados, Los Angeles (joint venturers) were awarded a $4,097,546 contract for construction of Section B of the project, consisting of 17 mi. of lined and coated steel pipe (Schedule III). The 34-mi. length of pipeline placed under contract is from Irvington Portal to Pulgas Portal. Unit bids for certain schedules were submitted as follows:

SCHEDULE XII

SECTIONS A & C (16.7 mi.)	Construction Using 79- and 72-in. lined and coated steel pipe	Construction Using 78- and 72-in. reinforced concrete pipe
(1) United Concrete Pipe Corp.	$4,572,274	$4,246,464
(2) Morrison-Knudsen Co., Inc.	4,518,742	.....
(3) Macco Corp.	4,805,631	.....

SECTION A (Construction using 79-in. lined and coated steel pipe)	(1)	(2)	(3)
21,820 lin. ft. furn. and lay 79-in. steel pipe of 3/8-in. plate	29.00	29.00	31.00
12,220 lin. ft. furn. and lay 79-in. steel pipe of 7/16-in. plate	31.00	32.00	34.57
11,150 lin. ft. furn. and lay 79-in. steel pipe of 1/2-in. plate	34.50	35.00	38.16
60 lin. ft. furn. and lay 79-in. steel pipe of 5/8-in. plate	45.15	54.00	60.00
2,350 lin. ft. of seam, F. & I. bev. courses for curved sects. weld. st. pipe	5.00	7.40	8.00
250 lin. ft. removal of pipe from trench and relaying	10.00	10.00	15.60
942,000 sq. ft. lining steel pipe	.27	.21	.232
943,000 sq. ft. coating steel pipe	.27	.25	.274
28,500 lb. furn. and lay. steel pipe or pipe specials not incl. in other items	.50	.40	.52
10,000 lb. F. & I. C. S. companion flanges and fittings	.50	.50	.52
9,600 lb. F. & I. miscl. steel work	.40	.70	.67
42 ea. F. & I. manholes	300.00	360.00	260.00
3 ea. furn. 2-in. gate valves	30.00	18.00	30.00
3 ea. furn. 4-in. gate valves	40.00	30.00	58.00
3 ea. furn. 6-in. gate valves	50.00	50.00	100.00
16 ea. furn. 8-in. gate valves	100.00	84.00	174.00
38 ea. furn. 8-in. gate valves, bevel geared	150.00	130.00	244.00
7 ea. furn. 12-in. gate valves	220.00	190.00	350.00
3 ea. const. 2-in. air bleeder assemblies	100.00	75.00	64.00
3 ea. const. air release valve assemblies	150.00	170.00	140.00
12 ea. const. 8-in. vacuum valve assemblies	550.00	770.00	710.00
26 ea. const. 8-in. vac. valve and A. R. V. assemblies	600.00	880.00	765.00
10 ea. const. 8-in. top blowoff assemblies	280.00	240.00	216.00
3 ea. const. 12-in. top blowoff assemblies	380.00	420.00	480.00
6 ea. const. 8-in. bottom blowoff assemblies	330.00	340.00	372.00
4 ea. const. 12-in. bottom blowoff assemblies	550.00	560.00	575.00
145,000 cu. yd. trench excav.	.65	.76	.65

(Continued on next page)

Who handles the XYZ line in Blank City?
Where's the nearest factory branch for ABC equipment?
Who's head of Blank Machinery Co.?
Where can I get parts and service for So-and-so equipment?
Does So-and-so Manufacturing Co., make excavators?
Who all manufactures widgeters for construction work?
Who are the nearest dealers?
What equipment lines does Doe Distributor Co. carry?

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2. MANUFACTURERS

Names of construction equipment manufacturers (listed alphabetically for entire U. S.), together with products, locations of their Western branches, and names of their Western distributors.

3. PRODUCTS

Alphabetical listing of products with names of all manufacturers making each product.

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650	ea. remove certain trees 4-in. to 12-in. diam.	10.00	6.00	1.70
30	ea. remove certain trees over 12-in. diam.	30.00	40.00	23.00
1,100	cu. yd. structure excavation	1.00	3.80	2.80
3,100	cu. yd. bench excavation	.70	1.00	.65
79,000	cu. yd. backfill	.35	.57	.50
8,000	sta. yd. overhaul	.10	.10	.03
700	cu. yd. furn. sand for backfill	3.00	5.70	3.50
1,700	sq. ft. repaving rds. and sts. with 2-in. asph. wearing surface	.25	.25	.45
1,070	cu. yd. concrete work for structures	40.00	74.00	50.00
76,000	lb. furn. and placing reinf. steel	.08	.14	.12
18,000	lb. F. & I. st. frames and covers for valve and M.H. boxes	.30	.62	.34
4,600	lb. F. & I. steel bolts, nuts, washers and gaskets	1.00	.64	.34
600	lb. F. & I. st. castings not covered by other items	.40	.75	.45
Lump sum,	install. venturi meter throat, inlet taper, manometer and register	$3,000	$1,100	$1,000
Lump sum,	const. venturi meter house	$2,000	$2,700	$1,400
2	ea. const. gate valve houses	$1,000	570.00	600.00
Lump sum,	const. butterfly valve house	$6,200	$3,800	$1,700
80,000	lb. install. butterfly gate and check valves furn. by City	.04	.09	.09
26,000	lb. F. & I. C. I. pipe and fittings and cast iron manhole frames	.30	.40	.22
2,000	lb. F. & I. corrugated metal pipe culverts	.15	.30	.22
Lump sum,	F. & I. 96-in. I.D. manifold at Irvington Portal	$20,000	$17,000	$16,000
5,000	lb. F. & I. structural steel	.20	.30	.22

SECTION A (Construction using 78-in. reinforced concrete pipe)

		(1)
1,070	lin. ft. furn. and lay 79-in. steel pipe of 3/8-in. plate	37.00
270	lin. ft. furn. and lay 79-in. steel pipe of 7/16-in. plate	41.00
120	lin. ft. furn. and lay 79-in. steel pipe of 1/2-in. plate	45.00
60	lin. ft. furn. and lay 79-in. steel pipe of 5/8-in. plate	54.00
800	lin. ft. of seam, F. & I. bev. courses for curved sects. steel pipe	5.00
250	lin. ft. removal of pipe from trench and relaying	10.00
36,500	sq. ft. lining steel pipe	.27
28,000	sq. ft. coating steel pipe	.27
28,500	lb. furn. and laying steel pipe or pipe specials not included in other items	.50
10,000	lb. F. & I. cast steel companion flanges and fittings	.50
9,600	lb. F. & I. miscellaneous steel work	.40
42	ea. F. & I. manholes	300.00
3	ea. furn. 2-in. gate valves	30.00
3	ea. furn. 4-in. gate valves	40.00
3	ea. furn. 6-in. gate valves	50.00
16	ea. furn. 8-in. gate valves	100.00
38	ea. furn. 8-in. gate valves, bevel geared	150.00
7	ea. furn. 12-in. gate valves	220.00
3	ea. const. 2-in. air bleeder assemblies	100.00
3	ea. const. air release valve assemblies	150.00
12	ea. const. 8-in. vacuum valve assemblies	550.00
26	ea. const. 8-in. vac. valve and A.R.V. assemblies	600.00
10	ea. const. 8-in. top blowoff assemblies	280.00
3	ea. const. 12-in. top blowoff assemblies	380.00
6	ea. const. 8-in. bottom blowoff assemblies	330.00
4	ea. const. 12-in. bottom blowoff assemblies	550.00
2,960	lin. ft. furn. and lay 78-in. reinf. conc. pipe, Class 78-160	27.00
340	lin. ft. furn. and lay 78-in. reinf. conc. pipe, Class 78-180	29.00
4,760	lin. ft. furn. and lay 78-in. reinf. conc. pipe, Class 78-200	31.00
1,300	lin. ft. furn. and lay 78-in. reinf. conc. pipe, Class 78-220	33.50
5,500	lin. ft. furn. and lay 78-in. reinf. conc. pipe, Class 78-240	34.25
2,370	lin. ft. furn. and lay 78-in. reinf. conc. pipe, Class 78-260	36.00
1,470	lin. ft. furn. and lay 78-in. reinf. conc. pipe, Class 78-280	38.00
2,860	lin. ft. furn. and lay 78-in. reinf. conc. pipe, Class 78-300	40.00
4,300	lin. ft. furn. and lay 78-in. reinf. conc. pipe, Class 78-320	42.00
5,230	lin. ft. furn. and lay 78-in. reinf. conc. pipe, Class 78-340	43.25
4,400	lin. ft. furn. and lay 78-in. reinf. conc. pipe, Class 78-360	45.50
1,860	lin. ft. furn. and lay 78-in. reinf. conc. pipe, Class 78-380	47.00
6,560	lin. ft. furn. and lay 78-in. reinf. conc. pipe, Class 78-400	48.50
48	ea. tension joints in 78-in. pipe	50.00
20	ea. adapters for connection to 79-in. steel pipe	50.00
176,000	cu. yd. trench excavation	.50
650	ea. remove certain trees 4-in. to 12-in. in diam.	10.00
30	ea. remove certain trees over 12-in. in diam.	30.00
1,600	cu. yd. structure excavation	1.00
3,100	cu. yd. bench excavation	.70
90,000	cu. yd. backfill	.35
9,000	sta. yd. overhaul	.10
800	cu. yd. furn. sand for backfill	3.00
1,160	cu. yd. concrete work for structures	40.00
85,000	lb. furn. and placing reinf. steel	.08
18,000	lb. F. & I. steel frames and covers for valve and manhole boxes	.30
4,600	lb. F. & I. steel bolts, nuts, washers and gaskets	1.00
600	lb. F. & I. steel castings not covered by other items	.40
Lump sum,	install Venturi meter throat, inlet taper, manometer and reg'st'r in Bay Div. P. L. No. 3	$2,200
Lump sum,	constructing Venturi meter house	$2,000
2	ea. constructing gate valve houses	$1,000
Lump sum,	constructing butterfly valve house	$6,200
80,000	lb. installing butterfly, gate and check valves furn. by City	.04
26,000	lb. F. & I. cast iron pipe and fittings and cast iron manhole frames	.30
2,000	lb. F. & I. corrugated metal pipe culverts	.15
Lump sum,	F. & I. 96-in. manifold at Irvington Portal	$20,000
5,000	lb. F. & I. structural steel	.20

SECTION C (Construction using 73-in. lined and coated steel pipe)

		(1)	(2)	(3)
41,860	lin. ft. furn. and lay 73-in. steel pipe of 3/8-in. plate	30.00	27.50	29.06
140	lin. ft. furn. and lay 91-in. steel pipe of 1/2-in. plate	60.00	48.50	55.00
6,300	lin. ft. of seam F. & I. bev. courses for curved sects. steel pipe	5.00	7.20	8.00
250	lin. ft. removal of pipe from trench and relaying	10.00	10.00	15.60
812,000	sq. ft. lining steel pipe	.29	.23	.255
810,000	sq. ft. coating steel pipe	.29	.27	.30
40,800	lb. furn. and lay. steel pipe or pipe special not included in other items	.50	.40	.52
8,500	lb. F. & I. cast steel companion flanges and fittings	.50	.50	.52
9,500	lb. F. & I. miscellaneous steel work	.40	.70	.67
52	ea. F. & I. manholes	300.00	360.00	260.00
3	ea. furnishing 2-in. gate valves	30.00	18.00	30.00
3	ea. furnishing 4-in. gate valves	40.00	30.00	58.00
3	ea. furnishing 6-in. gate valves	50.00	48.00	100.00
38	ea. furn. 8-in. gate valves	100.00	80.00	174.00
58	ea. furnishing 8-in. gate valves, bevel geared	150.00	130.00	244.00
5	ea. furnishing 12-in. gate valves	220.00	180.00	350.00
3	ea. constructing 2-in. air bleeder assemblies	100.00	70.00	64.00
3	ea. constructing air release valve assemblies	150.00	170.00	140.00
12	ea. constructing 8-in. vacuum valve assemblies	550.00	720.00	710.00
45	ea. construct 8-in. vac. valve and A.R.V. assemblies	600.00	780.00	765.00
12	ea. constructing 8-in. top blowoff assemblies	280.00	230.00	216.00
3	ea. constructing 12-in. top blowoff assemblies	380.00	410.00	480.00
26	ea. constructing 8-in. bottom blowoff assemblies	330.00	330.00	372.00
2	ea. constructing 12-in. bottom blowoff assemblies	550.00	550.00	575.00
125,000	cu. yd. trench excavation	1.10	.94	2.12
950	ea. remove certain trees 4-in. to 12-in. in diam.	10.00	6.00	1.70
350	ea. remove certain trees over 12-in. in diam.	30.00	40.00	23.00

(Continued on next page)

1,650 cu. yd. structure excavation	1.00	3.70	2.80
4,200 cu. yd. bench excavation	1.00	1.20	2.12
73,000 cu. yd. backfill	.40	.71	.62
7,000 sta. yd. overhaul	.10	.10	.03
1,800 cu. yd. furnishing sand for backfill	3.00	5.00	3.50
90 cu. yd. repaving roads, streets, sidewalks, curbs and gutters with Portland cement concrete	40.00	50.00	50.00
70 cu. yd. repaving roads and streets with asph. conc. or waterbound macadam	30.00	25.00	33.00
4,800 sq. ft. repaving roads and streets with 2-in. asph. wearing surface	.25	.25	.45
1,160 cu. yd. concrete work for structures	42.00	72.00	50.00
87,000 lb. furnishing and placing reinforcing steel	.08	.14	.12
25,700 lb. F. & I. steel frames and covers for valve and manhole boxes	.30	.60	.34
3,000 lb. F. & I. steel bolts, nuts, washers and gaskets	1.00	.60	.34
600 lb. F. & I. steel castings not covered by other items	.40	.75	.45
Lump sum, install Venturi meter throat, inlet taper, manometer and register in Bay Div. Pipe Line No. 3	$3,000	$1,100	$1,000
Lump sum, install Venturi meter throat inlet taper, manometer and register in Bay Div. Pipe Line 1 & 2	$5,565	$3,200	$2,500
Lump sum, constructing Venturi meter house	$2,000	$2,600	$1,400
4 ea. constructing valve houses	$1,000	560.00	600.00
80,000 lb. installing butterfly, gate and check valves furnished by City	.04	.09	.09
36,000 lb. F. & I. cast iron pipe and fittings and cast iron manhole frames	.30	.36	.22
2,000 lb. F. & I. corrugated metal pipe culverts	.15	.30	.22
30 lin. ft. encasement for pipes at railroad and highway crossing by jacking method	100.00	140.00	100.00
3 M.B.M. F. & I. Douglas fir lumber	200.00	250.00	225.00
2 M.B.M. F. & I. Redwood lumber	400.00	310.00	280.00
Lump sum, F. & I. 108-in. I.D. steel manifold at Pulgas Portal	$18,550	$20,000	$16,000
813 lin. ft. excavation for tunnel	50.00	92.00	78.00
813 lin. ft. steel pipe tunnel lining	100.00	102.00	44.00
5,000 lb. F. & I. structural steel	.20	.30	.22

SECTION C (Construction using 72-in. reinforced concrete pipe)

	(1)
4,300 lin. ft. furn. and lay 73-in. steel pipe of 3/8-in. plate	34.00
140 lin. ft. furn. and lay 91-in. steel pipe of 1/2-in. plate	41.00
1,600 lin. ft. of seam F. & I. bev. courses for curved sects. weld. steel pipe	5.00
250 lin. ft. removal of pipe from trench and relaying	10.00
91,000 sq. ft. lining steel pipe	.27
82,000 sq. ft. coating steel pipe	.27
40,800 lb. furn. and laying steel pipe or pipe specials not included in other items	.50
8,500 lb. F. & I. cast steel companion flanges	.50
9,500 lb. F. & I. miscellaneous steel work	.40
25 ea. F. & I. manholes	300.00
3 ea. furnishing 2-in. gate valves	30.00
3 ea. furnishing 4-in. gate valves	40.00
3 ea. furnishing 6-in. gate valves	50.00
38 ea. furnishing 8-in. gate valves	100.00
57 ea. furnishing 8-in. gate valves, bevel geared	150.00
5 ea. furnishing 12-in. gate valves	220.00
3 ea. constructing 2-in. air bleeder assemblies	100.00
3 ea. constructing air release valve assemblies	150.00
12 ea. constructing 8-in. vacuum valve assemblies	550.00
45 ea. constructing 8-in. vac. valve and A. R. V. assemblies	600.00
12 ea. constructing 8-in. top blowoff assemblies	280.00
3 ea. constructing 12-in. top blowoff assemblies	380.00
26 ea. constructing 8-in. bottom blowoff assemblies	330.00
2 ea. constructing 12-in. bottom blowoff assemblies	550.00
6,170 lin. ft. furn. and lay 72-in. reinf. conc. pipe Class 72-160	28.70
800 lin. ft. furn. and lay 72-in. reinf. conc. pipe Class 72-180	30.20
8,170 lin. ft. furn. and lay 72-in. reinf. conc. pipe Class 72-200	31.70
500 lin. ft. furn. and lay 72-in. reinf. conc. pipe Class 72-220	33.70
5,730 lin. ft. furn. and lay 72-in. reinf. conc. pipe Class 72-240	35.70
400 lin. ft. furn. and lay 72-in. reinf. conc. pipe Class 72-260	36.70
8,370 lin. ft. furn. and lay 72-in. reinf. conc. pipe Class 72-280	39.20
2,770 lin. ft. furn. and lay 72-in. reinf. conc. pipe Class 72-300	40.70
4,650 lin. ft. furn. and lay 72-in. reinf. conc. pipe Class 72-320	42.20
155 ea. tension joints in 72-in. pipe	40.00
50 ea. adapters for connection to 73-in. steel pipe	50.00
151,000 cu. yd. trench excavation	.75
950 ea. remove certain trees 4-in. to 12-in. in diam.	10.00
350 ea. remove certain trees over 12-in. in diam.	30.00
3,550 cu. yd. structure excavation	1.00
4,200 cu. yd. bench excavation	1.00
82,000 cu. yd. backfill	.40
8,000 sta. yd. overhaul	.10
2,200 cu. yd. furnishing sand for backfill	3.00
100 cu. yd. repaving roads, streets, sidewalks, curbs and gutters with Portland cem. conc.	40.00
80 cu. yd. repaving roads and streets with asphaltic concrete or waterbound macadam	30.00
5,400 sq. ft. repaving roads and streets with 2-in. asphaltic wearing surface	.25
1,350 cu. yd. concrete work for structures	42.00
106,000 lb. furnishing and placing reinforcing steel	.08
25,700 lb. F. & I. steel frames and covers for valve and M. H. boxes	.30
3,000 lb. F. & I. bolts, nuts, washers and gaskets	1.00
600 lb. F. & I. steel castings not covered by other items	.40
Lump sum, install Venturi meter throat, inlet taper, manometer and reg. in Bay Div. P. L. No. 3	$3,000
Lump sum, install Venturi meter throat inlet taper, manometer and reg. in Bay Div. P. L.'s 1 & 2	$5,600
Lump sum, constructing Venturi meter house	$2,000
4 ea. constructing gate valve houses	$1,000
80,000 lb. install butterfly, gate and check valves furnished by City	.04
36,000 lb. furnish and install cast iron pipe and fittings and cast iron manhole frames	.30
2,000 lb. F. & I. corrugated metal pipe culvert	.15
30 lin. ft. encasement for pipes at railroad and highway crossings by jacking method	100.00
3 M.B.M. F. & I. Douglas firm lumber	200.00
2 M.B.M. F. & I. Redwood lumber	400.00
Lump sum, F. & I. 108-in. I. D. steel manifold at Pulgas Portal	$20,000
813 lin. ft. excavation for tunnel	50.00
813 lin. ft. steel pipe tunnel lining	100.00
5,000 lb. F. & I. structural steel	.20

SECTION B (17.1 mi.)

	Schedule III Construction Using 73-in. lined and coated steel pipe	Schedule IV Construction Using 72-in. reinforced concrete pipe
(1) Artukovich Bros. and Steve P. Rados	$4,097,546	.....
(2) Utah Construction Co.	4,227,707	.....
(3) P. & J. Artukovich, Inc.	4,249,612	.....
(4) M & K Corp., Fredrickson & Watson Construction Co. and Parish Bros.	4,277,932	.....
(5) Morrison-Knudsen Co., Inc.	4,317,086	.....
— Guy F. Atkinson Co. and Charles L. Harney	4,457,267	.....
— Peter Kiewit Sons' Co. and Stolte, Inc.	4,467,665	.....
— United Concrete Pipe Corp.	4,492,867	$4,471,630
— Macco Corp.	4,511,556	.....
— Pacific Pipeline & Engineers, Ltd., and Engineers, Ltd.	5,053,661	.....

(Continued on next page)

SECTION B (Construction using 73-in. S. D. cylinder—lined and coated steel pipe)

		(1)	(2)	(3)	(4)	(5)
13,250	lin. ft. furn. and lay 73-in. steel pipe of 3/8-in. plate	26.50	25.04	24.25	31.00	27.00
32,050	lin. ft. furn. and lay 73-in. steel pipe of 7/16-in. plate	29.30	26.54	27.60	33.00	30.00
45,700	lin. ft. furn and lay 73-in. steel pipe of 1/2-in. plate	33.45	32.10	30.35	36.10	33.00
3,750	lin. ft. of seam F. & I. bev. courses for curved sects. welded steel pipe	8.00	6.10	9.50	9.75	7.30
500	lin. ft. removal of pipe from trench and relaying	10.00	90.00	15.00	10.80	10.00
1,745,000	sq. ft. lining steel pipe	.22	.184	.225	.19	.22
1,756,000	sq. ft. coating steel pipe	.25	.26	.25	.22	.25
11,200	lb. furn. and lay steel pipe or pipe specials not incl. in other items	.50	.40	.30	.52	.50
5,000	lb. F. & I. C. S. companion flanges and fittings	.60	.80	.40	.65	.50
5,300	lb. F. & I. miscellaneous steel work	.50	1.00	.40	.52	.70
75	ea. F. & I. manholes	400.00	378.00	275.00	294.00	360.00
6	ea. furn. 2-in. gate valves	20.00	25.00	30.00	15.00	18.00
6	ea. furn. 4-in. gate valves	35.00	45.00	50.00	25.00	30.00
6	ea. furn. 6-in. gate valves	55.00	70.00	75.00	41.00	50.00
22	ea. furn. 8-in. gate valves	80.00	120.00	120.00	69.00	85.00
42	ea. furn. 8-in. gate valves, beveled geared	145.00	175.00	145.00	110.00	130.00
10	ea. furn. 12-in. gate valves	175.00	285.00	230.00	160.00	190.00
6	ea. const. 2-in. air bleeder assemblies	85.00	90.00	35.00	75.00	75.00
6	ea. const. air release valve assemblies	150.00	215.00	130.00	120.00	170.00
6	ea. const. 8-in. vacuum valve assemblies	550.00	175.00	600.00	450.00	760.00
36	ea. const. 8-in. vac. valve and A. R. V. assemblies	600.00	$1,050	675.00	485.00	800.00
12	ea. const. 8-in. top blowoff assemblies	275.00	300.00	150.00	200.00	240.00
6	ea. const. 12-in. top blowoff assemblies	475.00	520.00	320.00	335.00	420.00
10	ea. const. 8-in. bottom blowoff assemblies	310.00	450.00	300.00	260.00	340.00
4	ea. const. 12-in. bottom blowoff assemblies	515.00	745.00	450.00	290.00	560.00
258,000	cu. yd. trench excavation	.50	1.25	1.95	.45	.89
2,100	ea. removing certain trees 4-in. to 12-in. in diam.	5.00	10.00	2.50	2.80	6.00
60	ea. removing certain trees over 12-in. in diam.	30.00	30.00	4.00	90.00	40.00
1,100	cu. yd. structure excavation	2.00	4.75	3.00	2.17	3.80
144,000	cu. yd. backfill	.30	.48	.40	.30	.58
14,000	sta. yd. overhaul	.10	.10	.04	.055	.10
1,600	cu. yd. furnishing sand for backfill	4.50	4.70	2.00	2.28	5.30
110	cu. yd. repaving roads, and streets with asph. conc. or water bound macadam	22.00	28.00	20.00	40.00	25.00
4,300	sq. ft. repaving roads and streets with 2-in. asphaltic wearing surface	.12	.35	4.00	.40	.25
940	cu. yd. concrete work for structures	48.00	54.00	45.00	52.00	73.00
74,000	lb. furnishing and placing reinforcing steel	.11	.10	.11	.087	.14
29,100	lb. F. & I. frames and covers for valve M. H. boxes	.40	.80	.40	.40	.62
3,200	lb. F. & I. steel bolts, nuts, washers and gaskets	.70	.50	.30	.22	.63
600	lb. F. & I. steel castings not covered by other items	.65	.50	.40	.54	.75
2	ea. constructing gate valve houses	500.00	750.00	350.00	540.00	570.00
50,000	lb. install. butterfly gate and check valves furn. by City	.05	.08	.05	.03	.09
30,000	lb. F. & I. C. I. pipe & fitgs. & cast iron m h. frames	.40	.35	.10	.30	.40
2,000	lb. F. & I. corrugated metal pipe culverts	.40	.37	.18	.22	.30
300	lin. ft. encasement for pipes at railroad and highway crossings using liner plates	95.00	165.00	80.00	123.00	140.00
165	lin. ft. encasement for pipes at railroad and highway crossings by jacking method	97.00	165.00	75.00	123.00	140.00
3	M.B.M. F. & I. Douglas fir lumber	110.00	290.00	125.00	160.00	250.00
2	M.B.M. F. & I. Redwood lumber	165.00	335.00	130.00	220.00	430.00
5,000	lb. F. & I. structural steel	.15	.37	.20	.22	.30

NEW EQUIPMENT

MORE COMPLETE INFORMATION of any of the new products or equipment briefly described on the following pages may be had by sending your request to Equipment Service, Western Construction News, 609 Mission Street, San Francisco 5, Calif. For quicker service, please designate the item by number.

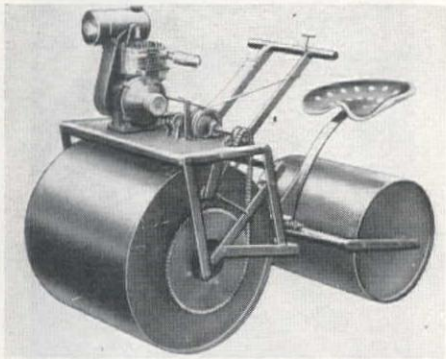
201

Convertible Tandem Roller

Manufacturer: Gabb Mfg. Co., East Hartford, Conn.

Equipment: Tandem roller that converts in a matter of seconds to a standard model or castor model.

Features claimed: The Gabb Tandem Motoroller (illustrated) weighs 325 lb. empty, full weight, 860 lb. It turns in a 3-ft. radius and gives a 24 x 16-in. tandem roll.



Because of its weight, continuous rolling features and ability to compact large areas and hot surfaces, it is particularly adaptable for black top surfaces, ditch construction, sidewalks, driveways and patch work. In a few seconds, the rear roller can be removed to create a standard model with full weight of 610 lb. that turns on its own axis and is good for compacting very soft areas. Again, as a castor model with full weight of 595 lb., the roller is particularly suitable for confined areas and mobility, since it turns on its own axis, 6 x 6 in.

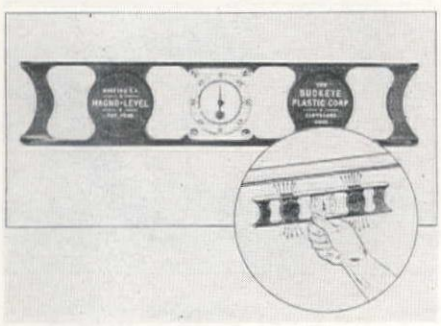
202

Magnetized Level

Manufacturer: The Buckeye Plastic Corp., Cleveland, Ohio.

Equipment: Level and angle indicator equipped with a magnet to stick to either round or flat surfaces at any angle.

Features claimed: The Magno-Level sticks like a leach to a pipe or any other



piece of ferrous metal. It should be ideal for steam fitters, plumbers, welders, sheet metal, construction and maintenance workers. It has a clock-faced angle gauge with balanced gravity needle, rotating on jewel bearings, which immediately and accurately determines any angle. It comes in a convenient mechanics' pocket-size, measuring 9 by 2 in., and weighs only 10 oz.

203

Dispenser for Rust Inhibitor

Manufacturer: Tarrant Mfg. Co., Saratoga Springs, N. Y.

Equipment: Metering dispenser for adding the recommended amount of the rust inhibitor "Banox" to de-icing salt.

Features claimed: The new dispenser permits addition of Banox in the proper amount while the truck carrying the spreader is in operation. Capacity is 23 lb. of Banox. The dispenser is demountable and may be removed quickly and easily.

204

Corrosion-Resistant Plastic Pipe

Manufacturer: Carter Products Corp., Cleveland, Ohio.

Equipment: New extruded plastic pipe featuring light weight, flexibility, corrosion resistance and long service life.

Features claimed: Carlon "EF" is extruded from a specially compounded organic plastic. While its tensile strength is not as great as that of metallic pipe, it is more than sufficient for normal applica-

tions. It is practically unbreakable and its impact at temperatures ranging from —50 to 140 deg. F., is similar to that of soft rubber. In addition, this new pipe has excellent resistance to chemicals and sunlight, and it has a projected service life many times that of metallic pipe. The problem of electrolytic corrosion does not exist with this pipe. Suggested uses are for the transmission of natural or artificial gases, plating tank solutions, chemicals, domestic and industrial sewage, corrosive gases and for radiant heating coils. Standard pipe sizes are from ½ to 6 in.

205

Variable Speed Motor

Manufacturer: Sterling Electric Motors, Inc., Los Angeles, Calif.

Equipment: Totally enclosed fan-cooled variable speed unit.

Features claimed: Ample cooling is accomplished by forced draft ventilation by means of a generous size external fan, which is protected by a streamlined fan cover. The motor is considered ideal for applications located in dusty or damp places which are considered unsuitable for Drip-Proof or open motors (i.e., rock and gravel plants, sewage disposal plants). An outstanding feature of the "Speed-Trol" motors is the fingertip control of speed with the large, easy-to read speed indicator. The motor is built integrally with pulleys, shafts, and belts in one compact unit for ease of installation.

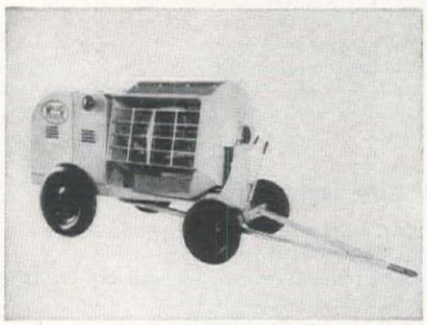
206

Plaster and Mortar Mixer

Manufacturer: Muller Machinery Co., Inc., Metuchen, N. J.

Equipment: 10-cu. ft. mixer designed to supply 40 to 50 plasterers with sufficient mixed material.

Features claimed: The mixer is of the Tip Over type having a mixing drum with



36 in. diameter and 37 in. long. Heads and shell are of heavy tank steel and mixing blades give end to end action. Provided with a Power Tilt and specifically engineered for simple and easy repairing in the field, the mixer is driven by a Wisconsin Air Cooled Engine rated at 18.7 h.p. at 2,000 r.p.m.

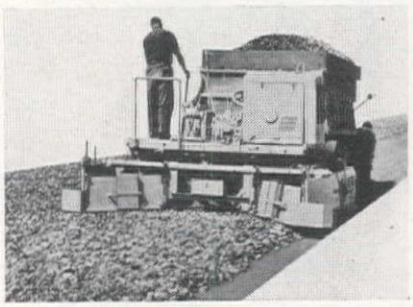
207

Aggregate Spreader

Manufacturer: Jaeger Machine Co., Columbus, Ohio.

Equipment: Self-propelled spreader that lays accurately all base and surface aggregates, free flowing bituminous mixtures and plantmixed stabilized soils.

Features claimed: The spreader is easily adjusted for laying materials in any width from 8 to 12½ ft. The machine has many



unusual design and mechanical features for accuracy, speed and flexibility of operation. Four-wheel drive is always on the subgrade or rolled course. The machine lays any size of aggregate up to 4-in. stone, in thicknesses up to 10 in. Its strikeoff screed is carried by long straightedge runners which glide smoothly on the subgrade despite any up or down motion of the machine. Screed is quickly and easily adjusted from the top by handcrank for any

desired thickness of material, crown, wedge or leveling course. For widths from 10 to 12½ ft., a hand-operated crank extends the transverse telescopic shaft between the straightedge runners and simple inserts increase screed width in increments of 6 in.

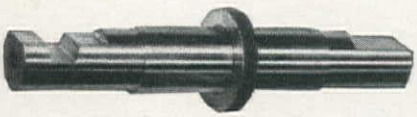
208

D-8 Tractor Roller Shafting

Manufacturer: Allied Steel Products, Inc., Cleveland, Ohio.

Equipment: Roller shafts to fit the Caterpillar D-8 Tractor Rollers.

Features claimed: Allied has produced a shaft by upset forging which forms the center flange in an unbroken grain which



makes it stronger and with less possibility of wear or cracking. The shafts are made of special precision steel, heat-treated on all bearing surfaces by the induction method to eliminate possible distortion, checking and cracking. They are machined and ground to extra close tolerances to assure positive fit.

209

Rotary Snow Plow Chute

Manufacturer: Wm. Bros Boiler & Mfg. Co., Minneapolis, Minn.

Equipment: New loading and casting chute for Bros Rotary Snow Plows.

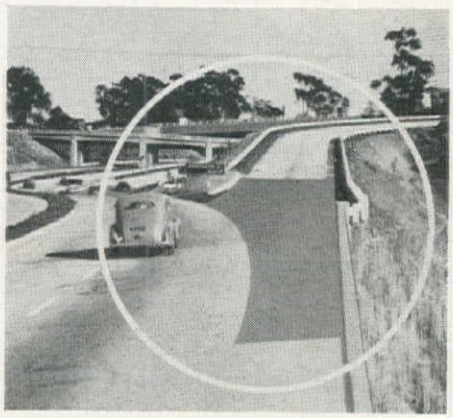
Features claimed: The chute, developed to increase the flexibility of the Bros Rotary in highways, city streets and airport work, revolves with a 270-deg. swing from side to side so that snow can be loaded into trucks on either side of the plow. Forward casting is often used in cleaning alleys or narrow lanes where space is not available for side casting or loading. When the chute is telescoped, it serves as a snow caster, throwing snow in any position with the 270-deg. arc.

210

Permanent Concrete Coloring

Manufacturer: Rohloff & Co., Los Angeles, Calif.

Equipment: Concrete stain for traffic control applications.



Features claimed: Applied to sections of the new Cabrillo Freeway (illustrated) entering San Diego, Kemiko concrete stain was found to offer extended visibility, reduction of glare and extreme durability despite heavy highway traffic. An important feature of the coloring material is that it is not a surface paint but a chemical solution which penetrates the pores and through chemical reaction becomes a permanent part of the concrete itself.

211

Chipping Hammers

Manufacturer: Ingersoll-Rand Co., Phillipsburg, N. J.

Equipment: The Controlled Power Chipping Hammer line, offering a selection of 15 power sizes to meet the requirements of every job.

Features claimed: Each basic hammer size is available in normal-cut, extra-cut, or super-cut type, which is made possible by a design variation in one part interchangeable throughout the whole line. Through the new hard-surfacing Iramet process, piston life has been increased 12.3 times. The new Airite valve accurately pro-

portions the amount of air fed to the front and rear of the piston to maintain top cutting efficiency under all conditions. The hammers are designed and streamlined for better weight distribution, and comfortable handles enable operators to do their work with greater speed and less effort than formerly possible.

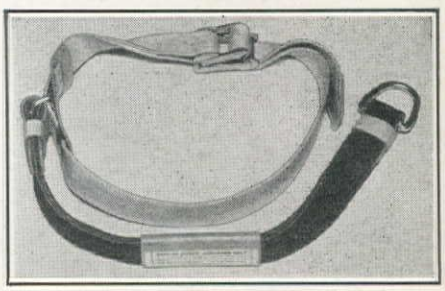
212

Safety Belts

Manufacturer: Rose Mfg. Co., Denver, Colo.

Equipment: Safety belts with shock absorbers to break the fall more gently.

Features claimed: Notable feature of the belt is the shock absorber built in of a nylon-type material that "puts on the



brakes" instead of stopping a falling man with a violent jerk. In the Safe-Hi Shock Absorber Belt, the draw load and the length of the nylon-type extension are determined to get full deceleration within a few feet to minimize the hazard of the man striking a girder or any projection before he is fully stopped.

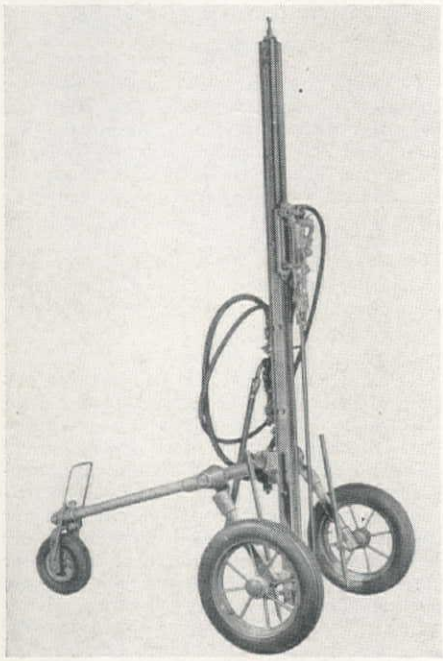
213

Light Wagon Drill

Manufacturer: Chicago Pneumatic Tool Co., New York City.

Equipment: Wagon mounting for handling sinker drills of the 55-lb. class or 3-in. drifters.

Features claimed: Designed for increased footage in one-man operation, the G-150 Lightweight Wagon Mounting features:



Longer steel changes—6-ft., materially increasing actual throttle time; no operator fatigue since a newly-developed feed motor does the work; powered steel puller that eliminates wrenching of steel and loss of holes in bad drilling ground; positive and uniform feeding pressure that promotes faster unit drilling speed with lower air consumption per foot drilled; a universal type saddle, adjustable laterally on the crossbar that assures quick positioning for drilling at any angle, and ball bearing wheels with pneumatic tires that make moving of the unit easy.

214

Lamp for Outdoor Lighting

Manufacturer: Sylvania Electric Products, Inc., New York City.

Equipment: A "built-in" 300-watt weather-proof incandescent reflector lamp.

Features claimed: The new R-40 lamp is enclosed in a heat-resistant glass bulb which absorbs the thermal shocks caused by rain, snow, oil and other elements more efficiently than standard reflector bulbs. It has a rated average life of 1,000 hours. Using the mogul base, the bulbs can be mounted either singly or in clusters, allowing a wide range of light output to meet virtually every conceivable lighting requirement.

215

Motor Grader

Manufacturer: W. A. Riddell Corp., Bucyrus, Ohio.

Equipment: Warco's 76-hp. model general duty motor grader.

Features claimed: This model incorporates the many new features already built into the Warco 4D-100 which went into service with great success earlier this season. Working advantages for the two Warcos include: A blade which revolves in a full circle without removing scarifier or teeth and which travels from 90-deg. elevation on one side to 90-deg. elevation on the other without the operator leaving the cab; effortless hydraulic control; a sliding moldboard for extra side reach; a powerful Diesel motor, and ample working clearances.

216

Lightweight Drill for Body Shops

Manufacturer: Cummins Portable Tools, Chicago, Ill.

Equipment: Drill weighing 4¼ lb. and measuring 8¾ in. overall length, designed for continuous use.

Features claimed: The drill is designed for continuous day-long use at the most efficient speed and under severe conditions. Capacity is ¼ in. for metal, ½ in. for wood. No-load speed is 1,300 rpm. The drill is equipped with a Jacobs Model 7B geared chuck. A ball thrust bearing is mounted on the chuck spindle. Chuck spindle is directly in line with the armature shaft, for increased accuracy in drilling.

217

Arc-Welding Electrode

Manufacturer: General Electric Co., Schenectady, N. Y.

Equipment: The W-22 electrode, designed specifically for vertical and overhead welding of all types of joints in mill steel.

Features claimed: Because of its penetrating arc, the W-22 is suited also for welding galvanized plate stock; and penetration also facilitates the welding of lap joints and edge welds. High tensile strength and ductility with good impact resistance are featured properties of the W-22 electrode welding bead. It may be used for the repair welding of castings because of its low volume slag-forming characteristics.

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.

218

ALLIS-CHALMERS' HD-5 Crawler Tractor—A 220-page service manual featuring Allis-Chalmers' HD-5 crawler has been released by the company's Tractor Division. Instructions include a complete guide on proper operation, maintenance and repair of this new postwar tractor. The book is separated into 23 sections. The portions 1 through 19 feature a general description of the tractor, complete specifications and a detailed pictorial and written description of the various assemblies of the machine as well as instructions for the proper adjustments and repairs when rebuilding these assemblies. Where special tools are required, in making repairs, their application and use are illustrated in Section 20. Sections 21 and 22 are devoted to general maintenance instructions and fits and tolerances respectively. Section 23 contains trouble shooting information and indicates tests which can be made to help determine more easily the cause of mechanical difficulties which may arise. Copies of the manual can be obtained for $3.00 each.

219

LUBRICATING EQUIPMENT—**Lincoln Engineering Co.**, St. Louis, Mo., has published a new lubricating equipment catalog for contractors. The catalog shows how to keep construction machinery properly serviced at all times by providing on-the-job power lubrication.

220

ELECTRIC SHOVELS-DRAGLINES—**Marion Power Shovel Co.**, Marion, Ohio, has published three bulletins describing the Marion Types 151-M, 4161 and 111-M Ward-Leonard electric machines. The units, with respective capacities of 6½, 5 and 3½-4 cu. yd., are described in detail and job applications are given.

221

COMPRESSORS—A catalog on Joy Unitair Compressors is available from the **Joy Manufacturing Co.**, Pittsburgh, Pa. Subtitled "The Compressor of a Thousand Uses," the 16-page booklet gives many illustrations of the Joy WL-80 Compressor as well as sectionalized drawings to point out its various features. An interesting part of the catalog is a "Selector Chart" which makes it possible to choose a compressor according to individual requirements.

222

SELF-PROPELLED ROADBUILDING MACHINES—**Seaman Motors, Inc.**, Milwaukee, Wis., has available a new illustrated brochure titled "Two New Seaman Contributions to More Economical, Accurately Controlled Processing." In it the new Seaman Self-Propelled Pulvi-Mixer and Self-Propelled Trav-L-Plant are fully described with interesting text and more than 19 illustrations. These mixers are described as offering the following advantages: (1) Heavy spill-over ahead of rotor produces repeated re-mixing, (2) finished mix behind easily watched, (3) all controls

within easy reach of the operator, (4) unobstructed and clear operator's view, and (5) easy maneuverability because of short turning radius. The colored brochure tells how the Trav-L-Plant carries a pump, spray bar and tachometer for accurate application of bitumen or water immediately ahead of the mixing rotor. This is said to assure no migration or evaporation of binder as well as no variable in the application.

223

SCREED SUPPORTS—A 4-page bulletin describing a complete line of screed supports for all conditions of light or heavy screeding is now available from **Richmond Screw Anchor Co., Inc.**, Brooklyn, N. Y. According to the bulletin, new additions to the Richmond line include the Offset Screed Head designed to hold either a 1-in. ID pipe or a 11½ x 1½ x 3/16-in. T Bar. This head is completely adjustable from above by means of a speed wrench.

224

MODULAR COORDINATION — Three important questions in the minds of all those who are interested in building homes are answered briefly in a booklet published by the Housing & Home Finance Agency, Washington, D. C. and available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. for 15¢. Questions about modular coordination answered by the booklet are—what it is? how does it work? and will it help reduce housing cost?

225

SERVICE DITCHERS — **Gar Wood Industries, Inc.**, Findlay Division, Findlay, Ohio, has published an 8-page colored booklet describing in detail the Buckeye Service Ditchers—Model 160 for cutting ditches from 18 to 48 in. wide and down to 16 ft. deep, and the Model 120 for cutting ditches from 18 to 36 in. wide and down to 11½ ft. deep, or from 32 to 48 in. wide and to 8 ft. deep. The bulletin illustrates and describes some of the many construction features and operating advantages found in both models. Cited as important among these are: boom shift for ditching close to obstructions, long-life bucket chain, telescopic boom, easy operation, extra heavy welded construction and many more.

226

LOW TEMPERATURE WELDING ALLOYS—Latest metal-joining information on Eutectic products for low-heat welding of all metals is now available to welders in the Directory Welder for 1950 published by **Eutectic Welding Alloys Corp.**, New York City. Featuring 65 outstanding EutecRods for torch welding and EutecTrodes for arc welding, this issue is profusely illustrated with case histories that will be a source of interest to welding engineers and technicians. Listed in this preview of advance 1950 information is the announcement of the new line for Stainless Steel arc welding, which is described as outstanding for highest quality welds at lowest amperages without damage to base metal. A complete Selection Chart is also included in the 8-page bulletin for information on the numerous specialized welding alloys of Eutectic for particular jobs.

227

HARD SURFACING MATERIALS—**Rankin Manufacturing Co.**, Los Angeles, Calif., announces a new catalog. Hard surfacing rods and electrodes for gas and arc welding are illustrated, along with quantities, types and Rockwell hardness. Most interesting is the listing of nearly 200 recommended applications cataloged by industry, and the specific type of welding material that is to be employed for best results.

228

SECTIONAL STEEL ROLLING SCAFFOLDS—How to put workers at job level safely is the subject of a 4-page bulletin on "Trouble-Saver" Sectional Steel Rolling Scaffolds published by **Patent Scaffolding Co.**, Long Island City, N. Y. It describes and illustrates a variety of arrangements of prefabricated steel sections, in use as movable scaffolds for repairing, painting, decorating, plastering and other maintenance work. Typical installations are shown. Text covers erection advantages and safety features.

229

SPECIAL SHAPES OF STAINLESS ALLOYS—**Alloy Metal Wire Co., Inc.**, Prospect Park, Pa., has published a data sheet delineating qualities of Almet cold finished special shapes of Monel, Nickel, Inconel and Almet Stainless Steels. The sheet points out how the purchaser can get precision dimensions, shape and finish at a fraction of former cost. Purchasing agents, estimators, engineers, research men and production men will find all these special shapes the answer to some of their cost and design problems.

230

SPLASH-PROOF MOTORS — **Sterling Electric Motors, Inc.**, Los Angeles, Calif., has published a 4-page bulletin describing a new design of Splash-Proof motor designed for locations which are subject to direct streams of water or other

liquids. The bulletin describes how the motor may be mounted in any position and will still keep its Splash-Proof features, how the end bells permit free passage of ventilating air through integrally-cast baffles preventing splashing liquids reaching the interior of the motor, and how air is drawn through the rear of the motor and exhausted through the shaft end, thereby blowing away foreign materials, water and liquids from not only the Sterling motor but also the assembly it is driving. Different models are illustrated.

231

HIGH DISCHARGE MIXER—**Chain Belt Co.**, Milwaukee, Wis., has published a bulletin explaining and illustrating how the Rex Adjustable Discharge Moto-Mixer provides the most desirable features of the horizontal-type mixer, as well as low maintenance costs, low operating costs, superior mixing, and fast discharging. An insert page of job photos shows the importance of the Adjustable Discharge feature when working on just one job. Mounting dimensions, drawings and specifications are included.

232

PRODUCTION CAPACITY OF PAVERS — **Koehring Co.**, Milwaukee, Wis., has released a catalog containing a pertinent discussion of the relative production capacities of single drum and two compartment drum pavers. The remainder of the booklet is devoted to a complete description of the improved Koehring unit, the 34-E Twinbatch Paver. A total of 45 photographs and illustrations graphically describe the high capacity production features developed in the 34-E Twinbatch. Mechanical features are outlined and described in detail. Job applications are discussed.

233

RUBBER CONTROL JOINT STRIPS — **Williams Form Engineering Corp.**, Grand Rapids, Mich., has published a revised 4-page bulletin describing control joints that are made by tacking to the form sheathing rubber strips which leave narrow vertical grooves in the concrete on the inside and outside of the wall to accomplish the desired result by cracking the wall at the predetermined location. The rubber strip is then left in place to prevent penetration by moisture by sealing the joint. Typical details are shown in the illustrations and drawings.

234

RUBBER TRANSMISSION BELTING—A 4-page catalog section on its rubber transmission belting has been issued by the **B. F. Goodrich Co.**, Akron, Ohio. Various types of belting are pictured and described, recommended uses are listed and specifications given. The publication also outlines in detail the method of making belts endless by the Plylock belt joint, which is now widely used on the job in many industries.

235

LOCOMOTIVE CRANE—A new 25-ton Dieselectric Locomotive Crane is announced by **American Hoist & Derrick Co.**, St. Paul, Minn., in a 4-page brochure. The brochure describes how all deck operations are accomplished by Diesel power direct from the engine. Travel is by electric motors, mounted in each truck. A direct-connected, traction-type generator supplies the current. Thousands of pounds of wearing parts have been eliminated, resulting in sharply reduced maintenance costs, according to the booklet.

236

ROTARY DRILLING HOSE—A 6-page catalog section of its lines of rotary drilling hose has been published by the **B. F. Goodrich Co.**, Akron, Ohio. The section describes in detail the construction materials and methods used in building the hose, widely used in oil drilling operations. Specifications are given, and cutdown sections of the various types of hose are illustrated.

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4	GE Pyranol	1	150	2400	480/240
6	GE Pyranol	1	100	2400	120/240
3	West. Inerteen	1	100	2400	120/240
5	West. Inerteen	1	50	2400	120/240
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