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WESTERN

CONSTRUCTION



MAY 1957

This month . . .

Special concreting rigs
speed channel lining



Jets and air-lift pumps
help sink deep caisson

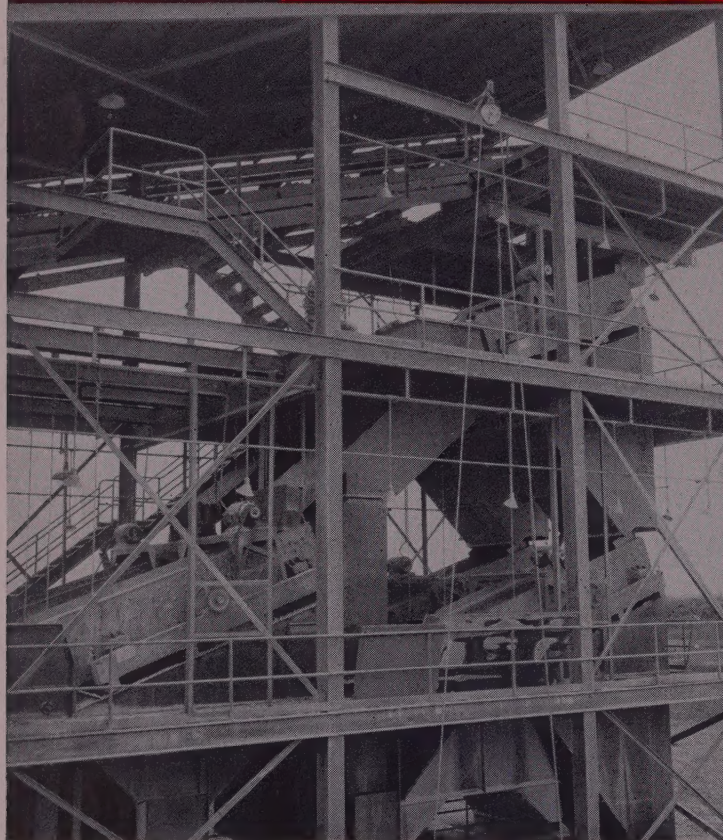


Open-graded mix tested
for reservoir lining

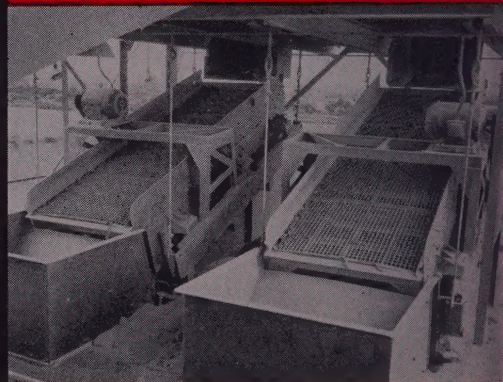
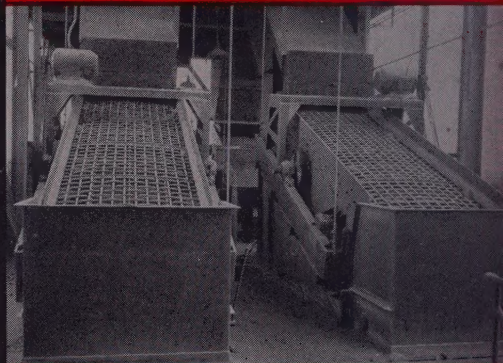


COVER see page 4

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Photographed on-the-job, Morrisville, Pa.



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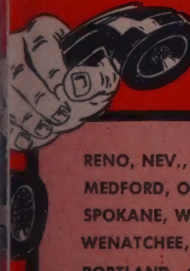
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FRONT COVER

INGENUITY has always been the mark of Western contractors and the rig shown on the front cover is no exception. Famularo - Stromberg Inc. of Santa Ana devised this fine grader. See article which starts on page 23.



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So you're going to be on a panel . . .

ALMOST EVERYONE is called upon some time to take part in a panel discussion. This type of session is becoming more common at all kinds of meetings, from large technical conventions to safety conferences in small contracting organizations. As a panel participant you are allotted valuable minutes of your listeners' time. This audience, large or small, has assembled on the promise of learning something of real value. Your responsibility to the audience should not be taken lightly.

The problem of organizing, directing, and putting over a successful panel session is as old as this form of meeting. Its complexity multiplies with the number of participants. The job of the organizer is to find a qualified group to discuss a subject of mutual interest to those who will attend. The remaining problem represents a joint responsibility on the part of the panel members.

As a participant you have a responsibility not only to the listeners in presenting at least one constructive or stimulating idea, but an equal one to the other panel members. Any encroachment on the time of the other members might choke off some ideas that could be far better than yours. You have a final responsibility to the leader of the panel who could be too considerate or too far away to grab your coat-tails at the end of your allotted time.

Some informal rules might serve as a guide on your next panel assignment:

1. Have something worthwhile to say, or turn down the assignment. If you have no constructive idea why display the fact; better keep it to yourself.
2. Prepare your one best idea and aim it directly at your listeners. The shotgun is not for the panel member. Be conscientious in testing your presentation to have it well within your allotted time.
3. When you get up to speak acknowledge your introduction in the fewest possible words.
4. Don't explain the purpose of the meeting

to your audience. They know, or they wouldn't be there.

5. Don't explain why you cannot cover the entire subject in the allotted time. That will become obvious.

6. Don't waste time telling your listeners about the good ideas you will not have time to cover. Why be irritating?

7. Don't try to be a philosopher or a historian.

8. If you feel you must tell a story to appear professional, confine it to two sentences of build-up and the punch line.

9. Having identified, described, and concluded your statement on your one or two constructive ideas, sit down; don't run down.

If the people charged with organizing the panel have been smart enough to assign a part of the subject to each member you are lucky. Otherwise you are only lucky if you are the first panel member to speak. The last speaker on a general panel discussion rarely can find a fragment of the subject that hasn't been worked over.

If you have not been assigned a particular phase of the general subject it is at least courteous and helpful to get in touch with your fellow members and indicate the one part of the subject you can plan to discuss, asking them for similar information. This should assure you of some fresh subject matter if you are the last speaker, and will keep you from being hated by the others if you are the first.

Lastly, remember that 10 or 15 minutes is an awfully short time to get on your feet, acknowledge an introduction, say something really worthwhile and sit down. Unless you recognize this and act accordingly, you do not deserve your position on the team.

Jim Ballard

Not "How Big?" But "How Good?"

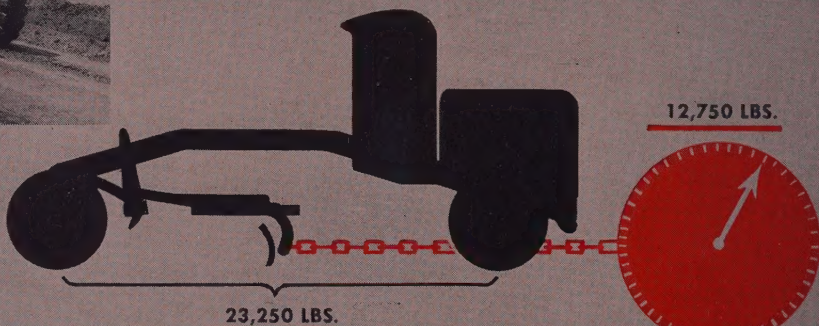


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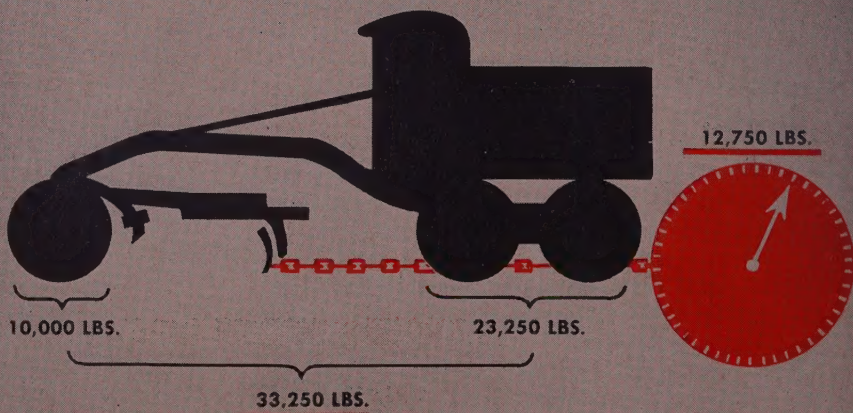
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**WESTERN****CONSTRUCTION****MAY 1957**

Special rigs speed channel lining

The decision to line the Bitterbush Flood Control Channel with concrete presented some construction difficulties because of the restricted access. Equipment devised by the contractor solved the problems.

By H. G. OSBORNE

Flood Control Engineer
Orange County Flood Control District
Orange County, California

THE ORANGE COUNTY Flood Control District has just completed a three-quarter mile concrete-lined channel project in which it proved more economical to line the entire channel with concrete than to earth-line a portion as was originally planned. Lining the entire channel with concrete enabled us to eliminate moving of utilities and to use trapezoidal rather than vertical wall sections. These changes saved a considerable amount of money which would have been necessary under original plans.

The project was the construction of a portion of the Bitterbush Unit of the Olive-Orange Flood Control Channels. Extending from Eckhoff St. to the Santa Ana River in the City of Orange, the project was completed at a total cost of \$126,640. With a major city thoroughfare, Chapman Ave., bisecting the channel route, the project was actually divided into two sections—an upper section from Eckhoff St. to Chapman Ave. and a lower section extending from Chapman to the Santa Ana River. A right-of-way limitation for the upper section created special problems which brought about differences in construction methods for the two sections.

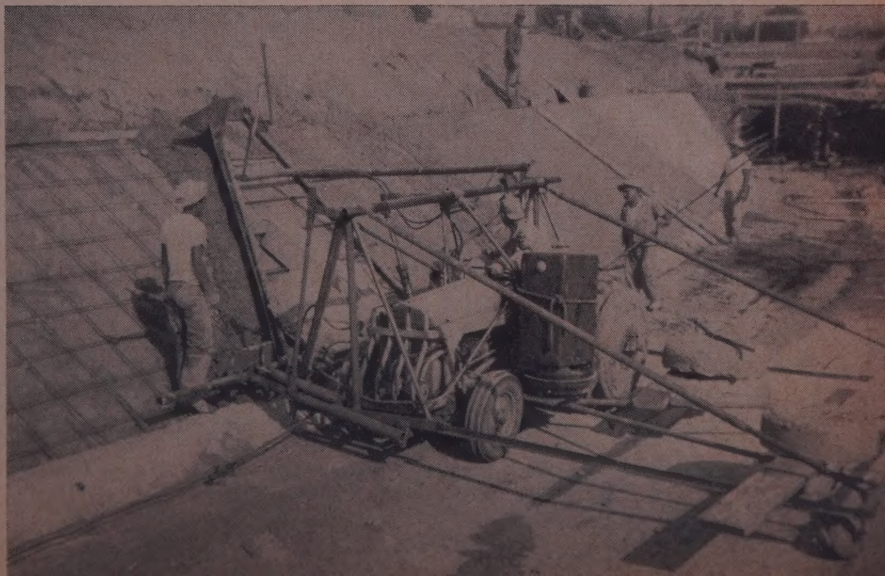
Initial plans for the Bitterbush project called for an earth-lined trapezoidal channel for the lower section and for vertical concrete walls

with paved invert for the upper channel. The lower section was to have been lined with concrete at a later date. These plans were within our limited budget.

Investigation, however, showed that a telephone trunk on Chapman Ave. would have to be relocated as the trunk would have run through the middle of the culvert across Chapman Ave. Relocation of the trunk was estimated at \$25,000.

This led us to consider a re-design of the channel as originally planned. Our objective was to lower the culvert at Chapman Ave. so that the telephone trunk could remain in place. This could be accomplished only by decreasing the slope of the channel downstream. To do this and still maintain the design capacity, it would be necessary to improve the hydraulic efficiency of this portion of the channel. The logical answer was a complete concrete lining.

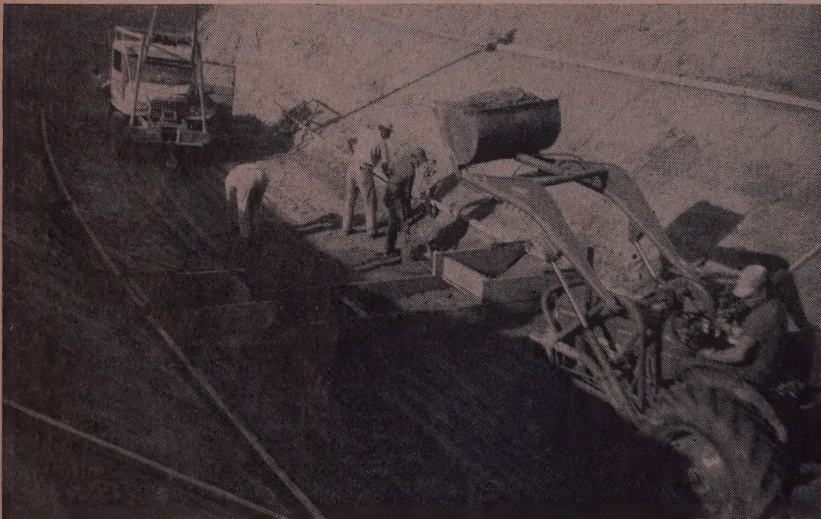
To line the lower half of the channel and stay within funds allotted, we would have to further economize the design of the upper half. The vertical wall was at first considered necessary because of limited right-of-way and because of the hydraulic problem created by a right-angle bend in the channel. Lowering the Chapman Ave. culvert would result in a steeper upstream slope. With the steeper slope it was possible to design a trapezoidal section of sufficient flow capacity which could be constructed within the available right-of-way. Side slopes would be 1:1. This left no working area along the top of the bank, but it was determined that the contractor could operate efficiently from the bottom of the channel. Equipment could be moved in through the single-barrel culvert at Eckhoff St. The hydraulic problem at the right-angle bend was solved by super-elevating the side slopes above and below the bend. Thus, elimination of forming for vertical wall sections for the upper portion of the channel provided added funds for lining the lower half. This economy, combined with the saving from not relocating the telephone trunk and the low maintenance cost



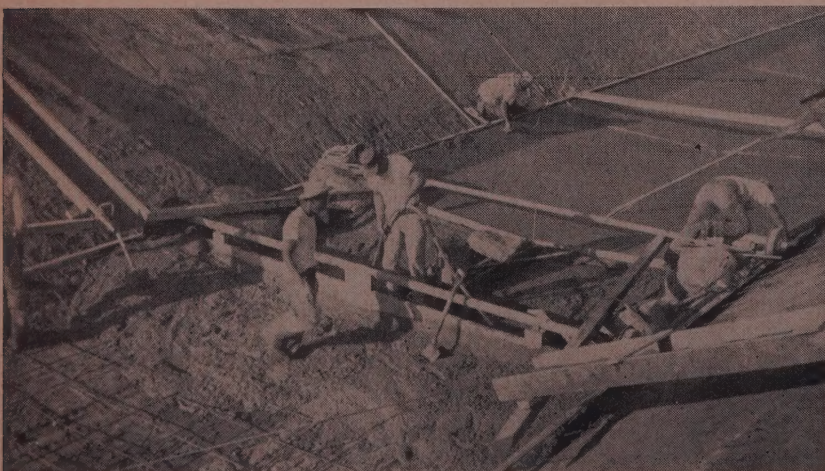
RIGHT—The screed for paving the walls was carried by a small tractor. Note counterweights and wheels on the outrigger.



A LeTOURNEAU-WESTINGHOUSE scraper gets a boost during the excavation of the $\frac{3}{4}$ -mi. channel while a motor grader rough grades the sides. Right-of-way was only 35 ft.



FINAL GRADING of the invert was done by pulling a wooden screed on rails. A front-end loader handled the small amount of backfilling that was necessary.



PAVING was carried out by pulling a screed mounted on wheels with a winch truck positioned about 250 yd. away. Transit-mix trucks and power buggies carried the concrete.

of concrete, made a complete concrete lining the most economical answer.

Construction details

The project was 3,641 ft. long. The upper section is a trapezoidal channel 2,127 ft. in length, designed to carry 1,050 cfs. on a slope of .002 ft. per ft. With only a 35-ft. right-of-way through this area, we built 1:1 slopes to a height of 8.2 ft. on each side. The invert is 8 ft.

The lower section is 1,331 ft. long and is designed to carry 1,100 cfs. on a .001 slope. Side slopes 7.75 ft. high were built $1\frac{1}{2}$ on 1, with a 14-ft. invert.

Unusual equipment

The general contractor, Famularo-Stromberg, Inc., of Santa Ana, devised some unusual and interesting equipment for fine-grading work on the side slopes. He used a rotary-type tiller mounted on a special rig powered by a Ferguson tractor. The rotary tiller was operated up and down the slope on pipes which served as rails. These rails rode an angle-iron rail along the top of the slope which was set to proper line and grade. The operator adjusted the tiller by means of cables on the rig.

Final grading of the invert was done by pulling a wood screed on rails over the channel bottom. The screed was pulled by a winch truck traveling in the invert.

A traveling screed was used to pave the invert. The screed, riding on forms set 1 ft. up the side slopes, was pulled by a winch truck traveling 200 to 300 ft. ahead of the screed. Because of the right-of-way limitation in the upper section, the method of getting concrete into the channel varied considerably in different portions of the project.

For the invert in the lower section, ready-mixed concrete was deposited into hoppers just ahead of the screed from trucks alongside the channel. For the upper section invert, gasoline-powered buggies each carrying $\frac{1}{2}$ cu. yd. of ready-mixed concrete were used to transport the concrete from transit-mix trucks to the screed location.

The right-of-way limitation posed a particularly difficult problem in paving the side slopes. Paving equipment had to be operated from the bottom of the channel after the invert had been placed. A Stinger crane and hopper buckets with $\frac{1}{2}$ -yd. capacity were used to deposit ready-mixed concrete for slope

paving. Slopes in both sections of the project were paved with a shop-built, mobile wall screed hydraulically operated from a Ferguson tractor. The same A-frame rig devised by the contractor for fine-grading of the slopes was used to operate the mobile wall screed. Concrete was placed directly against the front edge of this metal screed, which leveled the surface smoothly and uniformly as it was moved along the slope. The earth cut, top slope rail, and traveling screed were fashioned so that a lip or edge of concrete was integrally formed with the slope.

Only a limited amount of hand-finishing the concrete was necessary throughout the entire paving operation. The one exception was the right-angle where the side slopes were super-elevated 2.1 ft. higher above and below the bend. This area, 67 ft. in length, was hand-screeded and hand-shaped to avoid forming costs.

Long-handled steel trowels were used for troweling. The concrete in invert and side slopes were cured with a membrane curing compound..

The channel was built at an average cost of between \$24 and \$25 per linear foot.

Flood control program

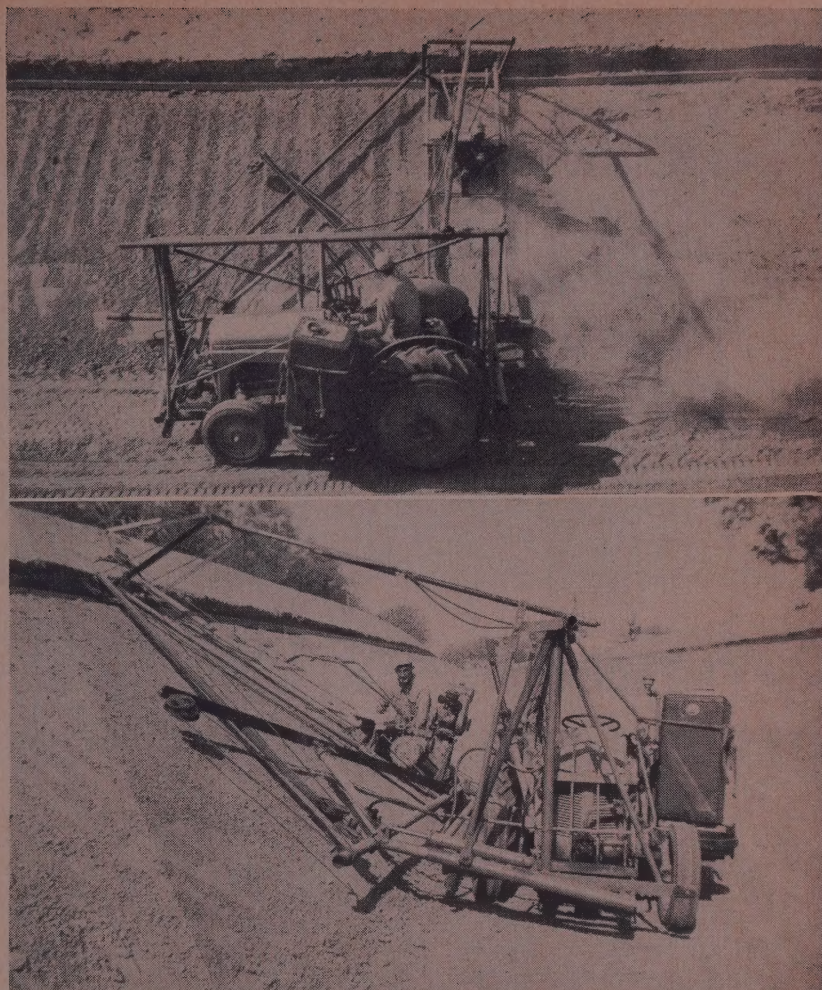
The completion of the first $\frac{3}{4}$ -mi. portion of the Bitterbush Unit eliminates a very troublesome flooding area in Orange County. Homes in that area have been flooded several times in the last five years.

Design of the remaining part of the Bitterbush Unit is being done now and construction is scheduled to begin this summer. An additional one mile of channel is to be built. Right-of-way has already been certified for the remainder of the channel and we will not have such narrow working conditions on this next portion.

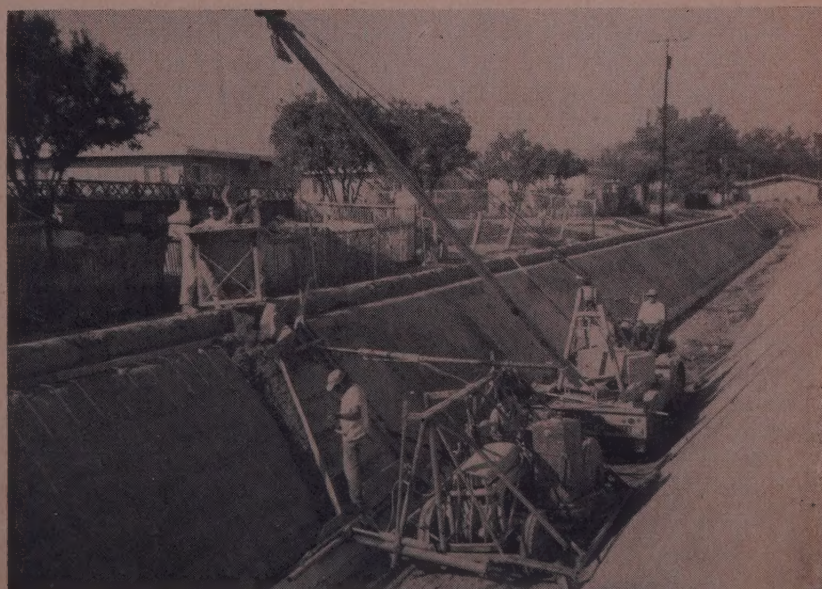
The completion of the Bitterbush Unit is part of the current overall 42,620,000 program for the Orange County Flood Control District.

Personnel

The Bitterbush project was engineered and designed by Jack Schwarze, senior civil engineer for the Orange County Flood Control District. Construction engineer was Robert Brazil, and Jim Norton was the inspector. Leo Stromberg was superintendent for the general contractor, Famularo-Stromberg, Inc. Fox Brothers of Stanton did the clearing and excavating.



FINE GRADING the side slopes was done by a machine built in the contractor's shop. Two views above show how a tubular steel framework was mounted on a tractor. The framework was supported at the top of the slope by an angle-iron rail. Two parallel pipes served as a track for a rotary-type tiller to move up and down the slope, controlled by tractor operator.



A SIMILAR ARRANGEMENT was used to support screed when paving the sides in the narrow section of the channel. Contrast this photograph with the one on first page of this article.



Modern equipment and a novel foot block feature— Diversion tunnel work at Trinity

FIRST MAJOR construction feature to be completed on the Trinity River project was the driving of the diversion tunnel for the main storage dam. This contract was carried out by Gates & Fox Co., Burlingame, Calif., which completed the \$1,348,000 job in March. Lining of the 2,280-ft. tunnel will be part of the overall dam contract. The tunneling operations on the bore that will have a 28-ft. finished diameter were featured by adequate modern equipment and the development of a new type of foot block by Kirk H. Fox, the field partner of the firm.

The job is located in the northwest corner of California where the Bureau of Reclamation will carry out this major program to divert surplus water from the Trinity River into the Sacramento River basin. The overall project will include the record breaking Trinity Dam, a 10.8-mi. delivery tunnel together with two major power drops. General features of the project were reviewed in the last issue (April 1957, page 72).

Diversion tunnel driving was started in May 1956 by the contractors under the supervision of Fox, with G. Clay Gates directing office operations. This organization was formed in 1948 and has specialized in tunnel work.

Portal excavation in heavily faulted Andesite rock proved more extensive than had been anticipated.

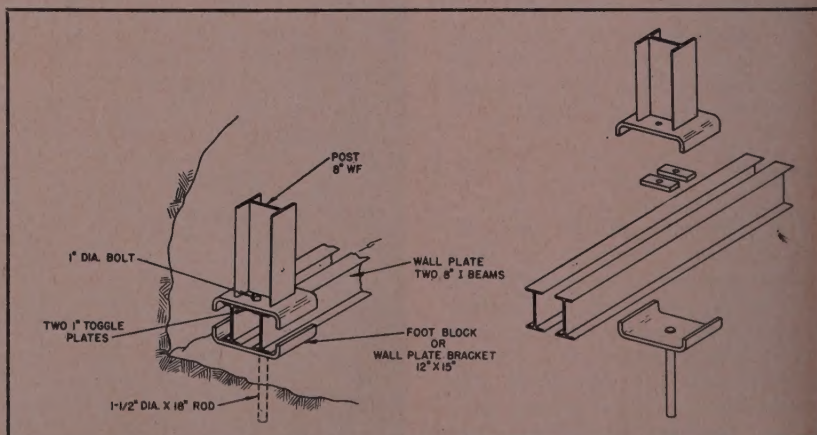
The estimate called for the excavation of 117,000 cu. yd. for the portals and 228,000 yd. were removed to get underground. The type and condition of rock encountered also made necessary at least twice the tonnage of supporting steel that had been originally planned.

At the upstream end the tunnel has an opening of 50 ft. in diameter and this dimension tapers to 34 ft. in a distance of 50 ft. The finished diameter inside the concrete lining will be 28 ft., and the lining will be put in by the dam contractor.

A 3-deck drill jumbo was used by the contractor mounted on a 10-wheel truck. This jumbo as well as

the mucking equipment alternated between the two headings. On the top deck of the jumbo for drilling the crown holes, five or six jackleg drills were used including the new Atlas Copco BBC-22 automatic leg-retracting Lion. On the lower two decks 8 standard drifter drills on hydraulically operated jibs were installed. All drilling equipment used Sandvik Coromant detachable bits, supplied by Atlas Copco Pacific, Inc.

The usual round called for an 8-ft. depth of hole and 6 rounds were fired in a 24-hr. period. Excavation averaged about 28.4 cu. yd. per lin. ft. of tunnel, or about 230 yd. for each round.



FOOT BLOCK designed by Kirk Fox for steel tunnel sets was nicknamed a "sill and toadstool." The anchor rod into rock is a positive aid in resisting lateral pressures.



PORTAL diameter of 50 ft. tapering to 34 ft. called for two separate headings in the tapered section 50 ft. long. This procedure permitted early placement of steel. It also eliminated the need for special drill platforms, since the jumbo was designed for the 34-ft. diameter.



MOUNTED on a 10-wheel truck frame, this 3-deck jumbo had jack-legs on the top level, and drifters on hydraulic booms below.



DETACHABLE bits used for both jackleg and drifters were Atlas Copco and were sharpened on the job with a standard grinder.

One of the important features of the job was a new type of foot block for use with the steel sets designed by Kirk H. Fox and used on this job for the first time. This unit is shown assembled and in parts in the accompanying drawing.

The rib posts (sets were on 2, 4, and 6-ft. centers) rest on the wall plates formed by a pair of 8-in. I-beams which were held together with toggle plates in addition to a specially formed bracket plate. An 18-in. steel rod of 1½-in. diameter is inserted into a drilled hole through the lower bracket to provide a firm anchor. This ingenious design gives the tunnel steel a more substantial footing, particularly in situations where there is more than usual lateral pressure on the ribs. Further, the design has added importance in stabilizing the sets against disturbance caused by later shooting which may be required for excavation of the invert.

Another feature of the tunnel work was the unusual method of raising pre-assembled full rib sections into final position. This operation speeded up the installation and eliminated much heavy handwork.

Major equipment

- 4—4-yd. Koehring dumpers
- 3—No. 105 Eimco muckers
- 1—3 Yot 8-yd. Euclid rock wagon
- 1—D8 Caterpillar bulldozer
- 1—HD-5 Allis-Chalmers bulldozer
- 1—Allis-Chalmers motor patrol
- 1—3-deck drill jumbo, on 10-wheel crane-carrier truck
- 1—Pitman "Hydra-Lift" boom, on F-600 Ford truck
- 2—Gardner-Denver rotary compressors, 900 cfm.
- 2—Ingersoll-Rand rotary compressors, 600 cfm.
- 8—Gardner-Denver Model 93 drifters on hydraulic jibs, with 1½-in. Sandvik Coromant detachable bits
- 6—Jackleg rock drills, with 1½-in. Sandvik Coromant detachable bits

The complete four-piece rib about 69 ft. in total length was pre-assembled on the tunnel floor behind the drill jumbo. A mobile crane with a Pitman Hydra-Lift boom raised this complete unit to the level of the top deck of the jumbo. Here it was set on a carrier operating on rails. The rib on this carrier was moved forward into position at the front of the jumbo, raised into place by a jack.

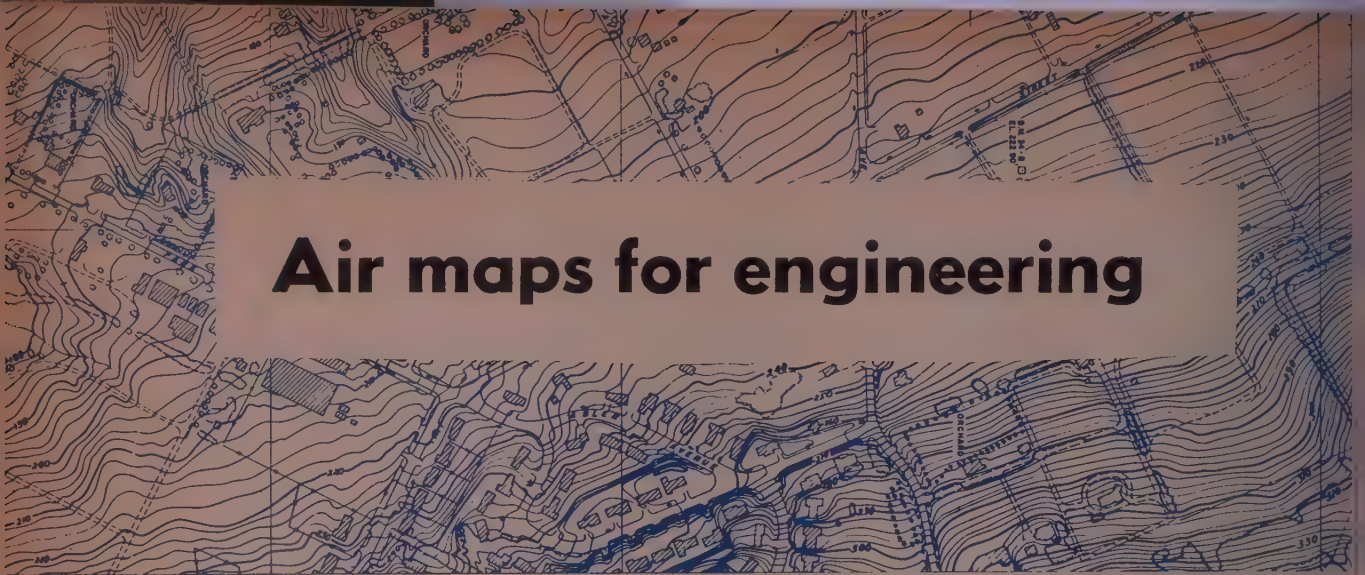
Another piece of equipment was developed on the job to dry pack behind the lagging. This was a piece of mobile equipment developed by Robert Richardson, general foreman, to place crushed river gravel into position by compressed air.

The river gravel was crushed to minus 1-in. size and fed into a hopper mounted on mobile equipment in the tunnel. This hopper discharged onto a lightweight 18-in. width conveyor belt which moved the gravel up to a second hopper which was mounted on a 6-in. diameter pipe with a swivel.

Compressed air was delivered from a team of three compressors which provided 2,000 cfm. through a 2-in. line to the main blow pipe. This air entered through a coupling adjacent to the second or top hopper first passing through a fixed baffle plate that increased its velocity.

The Trinity River project is carried out under the general direction of C. H. Spencer, Director of Region 2, Bureau of Reclamation, Sacramento.

The contractor's personnel, operating under the direction of Kirk Fox, included Ed Hill, tunnel superintendent; Roy Knudsen, office manager; John Lindquist, engineer, and Roy Shoemaker, master mechanic.



Air maps for engineering

Photogrammetry provides accurate contour maps for city expansion and improvement problems without adding to the engineering staff. Aerial pictures are valuable by-products to be used in discussions with public officials and civic groups.

MANY PROBLEMS of municipal engineering and planning find fast solution with the aid of photogrammetry and resulting maps. Today, this is particularly important since it reduces the demand on engineering manpower. The combination of maps and air views also provides engineers with visual aids during their sessions with public officials and non-technical groups.

The adjoining cities of Oceanside and Carlsbad located on the coast about 35 mi. north of San Diego, Calif., have a joint problem of community growth making advisable common studies in planning municipal functions and needs. Consultants needed adequate maps for the preparation of a master plan. Time and engineers were scarce. The answer was the logical decision to use photogrammetry and its scientific methods of producing the required maps, together with the byproduct of adequate aerial pictures.

Pacific Air Industries was selected to conduct this survey. With a combination of precision aerial cameras, first-order stereo plotting instruments and adequate technical experience it was possible to compile a complete topographic map of the entire area representing the two cities in a fraction of the time and the cost which would have been required to create the same maps using ground survey methods.

By LARRY STUMPH

Technical Representative
Pacific Air Industries
Long Beach, Calif.

Probably the most important advantage of this mapping project to the two cities was the fact that the entire job was completed without adding one man to the existing engineering staff of either municipality.

In common with many municipalities of the Southern California area, Oceanside and Carlsbad have been having a population growth and an influx of industries that have created problems requiring a new and broader approach to their common development. The city managers of the two communities—Herbert Nelson of Carlsbad and Frank Lilly of Oceanside—together with the city councils selected the firm of Gordon Whitnall & Associates, planning consultants, to prepare a master plan for guiding the growth and development of the two municipalities.

It is obvious from the outset that an up-to-date and accurate topographic map was essential to the work and development of this master plan. Neither city had available in its records such maps or information and it became necessary to select the fastest and most economical method of carrying out this work. One of the associates in the consulting firm had worked on similar projects in other

municipal areas and recommended an aerial survey as the basis for the maps, because of the speed, accuracy and low cost of the method. It was at this point that Pacific Air Industries was selected to compile the photogrammetric maps.

The next decision related to the selection of scale and contour interval for the maps. Almost any combination is available by this survey method, and the final selection was a scale of 200 ft. to the inch with 2-ft. contour intervals.

Field work started with the taking of a series of vertical aerial photos at pre-determined intervals to secure the necessary amount of overlap for the stereo projection of these pictures. Only a minimum amount of field control was required and precise plotting produced the required maps with a minimum of time. In addition to contour lines on these maps, they contained all physical features such as buildings, fences, trees, reservoirs plotted in their true horizontal position.

All of this information was then drawn on tracing cloth and duplicate tracings were made for the permanent records of the cities. The final step was to produce blue line prints in convenient size and covering required sections of the area for distribution to the engineers and technical personnel working on the planning program. Incidentally, copies of these maps were also available for sub-dividers and others interested in the development of outlying areas.

Many uses for the maps

First, and of major importance is the use of the maps for street design. With the selected scale and the 2-ft



contour intervals it was possible to lay out a plan for realigning some of the existing streets and locating new streets in the outlying areas, taking advantage of topography in the interest of future development and the cost of street construction.

With such maps showing the entire city area available the city planners were able to project major thoroughfares through this existing street plan. These could be extended as designed routes out through new areas still awaiting development. As a result it is now possible for anyone interested in subdivision work to develop areas which conform to the plan.

As another aid to municipal engineering work, the consulting firm of Brown & Caldwell, San Francisco, are able to use the maps extensively in preparing their comprehensive plans for major sewerage and drainage facilities for the City of Carlsbad. The maps together with the use of the aerial photographs enable the firm to reduce the travel time and field trips necessary in completing their design studies. The accurate topographic maps make it possible to estimate storm runoff and sewerage flow for each watershed area. These flows can be integrated into an overall system. Without the photogrammetric maps this work would have been slower and more costly.

Another use of the information developed by the photogrammetric surveys is the connection with rights-of-way. The master plan developed from these surveys delineates all boulevards, streets, sewers and storm drains, and this advance planning makes possible the acquisition of the necessary property far enough in advance to provide the cities with definite advantages in purchasing rights-of-ways.

AERIAL photos like this view of a section of Oceanside are used for studying traffic problems, finding parking areas, planning city parks and as aids in conferences with non-technical groups of citizens.

Zoning, which is always a municipal headache, can also be planned from the maps on an overall city basis rather than through decisions based on the study of smaller areas. By combining the information from the photographs with the maps it is possible for planners and zoning officials to determine with reasonable accuracy the best possible use for any given parcel of land. For example, a 40-ac. area of outlying land with rather difficult topography would be more suitable for $\frac{1}{2}$ -ac. residential lots than for the less expensive four lots to an acre logical for other subdivisions. Also, industrial areas can be selected and delineated. As a basis for this work, Mr. Kalica of the planning firm stated that, "It can not be stressed too much that for proper planning an overall precise map, scaled, is of prime importance."

Advantages of wider application

Potential population growth, both in size and direction, is a problem which must have constant study by all municipalities. With a master plan completed the communities of Carlsbad and Oceanside will be in a position to anticipate with some accuracy, the number of people making up the ultimate population.

Downtown parking is another real and constant problem for those concerned with municipal engineering. A definite aid in this work can be provided by enlarged copies of the air photos used for the original mapping. These enlargements up to a scale of 50 ft. to the in. show at a

glance not only traffic concentrations when the photographs were made, but also the available parking spaces that will be possible near the business area. Access streets and alleys near these potential parking lots can also be studied visually from the photos.

The City of Carlsbad had a complete landscape design prepared for a modern city park almost exclusively from the information provided by the air maps. This site was covered with a heavy growth of trees presenting a particular problem in working out a plan for the recreational facilities and their required areas without losing any more trees than necessary. The air photos were extremely helpful. Designs were prepared without the necessity of making frequent and extended trips over the site.

A further marginal benefit developed from the air photos was their use during conferences between the city council, various commissions and the technical staff. By combining the precise information on the contour maps with the visual appearance shown in the air photos, it was possible for the engineering staff of the city to explain projects to non-technical officials and members of important committees.

One of the latest developments in the field of photogrammetry which is being studied by Pacific Air Industries is the coordination of an electronic computer which would be able to deliver complete information from the photogrammetric maps to show the cut-and-fill data required for actual road construction. This possibility has created much engineering interest as a further step in speeding engineering work and reducing man hours. It will be a further step in the effective use of photogrammetry in all types of street and highway work.

Forming is fast on ammo buildings

Five ammunition storage buildings are being built at Washington's Paine Air Force Base. Prefabricated forms 1 5/8 in. thick are enabling contractor to set fast pace.

PREFABRICATED PLYWOOD forms are enabling the Roy T. Earley Construction Co. of Tacoma, Washington, to maintain a fast pouring schedule on a \$903,000 Air Force contract. Earley is building five identical ammunition storage structures at Paine Air Force Base near Everett, Washington. The job is of special interest as the buildings are the first of many expected to be built in the Western states.

Each structure consists of a center wall 3 ft. thick, 13 ft. high, and 147 ft. long, with 15 bays on each side. Bay walls are 12 in. thick, 10 ft. high, and 17½ ft. long. The roofs will be constructed with precast concrete panels. A total of 400 cu. yd. of concrete is required for each building.

During the bidding stage of the job many forming systems were considered. Purchase, rental, and labor costs were estimated as closely as possible. The contractor's decision was to purchase 8,000 sq. ft. of Superior plywood panels, enough to form one-half of a building at one time. The panels were obtained from Construction Supplies Co. of Seattle, which also furnished a layout of the job and erection drawings.

The schedule calls for four carpenters to erect the forms in three days. Pouring is done on the fourth. Only one-half day is required to strip the forms. Bad weather caused some delays but the project was carried out on the basis of one-half building per week. To date four buildings are finished and the panels have been used eight times.

Superior forms can be set and stripped using only a hammer. Fillers are easily made because the forms are the same thickness as 2 x 4s or 2 x 6s. This thickness also cuts down on bracing. Superintendent for contractor Roy T. Earley was Louis Fest. Project Manager for the U. S. Air Force is G. Barcroft. Ray Clawson was inspector.



FOUR VIEWS of construction of one ammunition storage building are shown above in chronological order from top to bottom. Four men set forms in 3 days, strip them in ½ day.



Pay-As-You-Depreciate Plan Financing

Positioning granite capstone on the Redondo Beach breakwater



JOB-ENGINEERED FINANCE PLANS



Juggling huge rocks, weighing up to 20 tons each, was "all in a day's work" on this Redondo Beach breakwater extension in California. Heavy-duty, job-rated equipment like the Manitowoc 3900-B Speed Crane shown here, enabled the J. B. Stringfellow Company to place 1100 tons of these monster rocks daily.

C.I.T. Corporation financing paved the way for Mr. Stringfellow's equipment purchases from the Casey-Metcalf Machinery Company in Los Angeles. In his own words, "C.I.T.'s PAY-AS-YOU-DEPRECIATE financing helped

me get the best equipment for this job while still retaining my operating capital. And I pay for it out of earnings from my new rig."

C.I.T. Pay-As-You-Depreciate Plan financing can solve your equipment purchase plans with these helpful features: small cash outlays, terms up to six years and an instalment payment plan closely related to the schedule of depreciation allowances on your new equipment. In effect, you write off the payments as expense. Call or write any office below for details.

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THE OCEAN is in the background in this aerial view of the borrow pit for the Huntington Beach Steam Station. The plant site is about $\frac{1}{2}$ mi.

to the right. Excessive groundwater, visible as ponds in the photo, complicated earthmoving. Moisture content of soil reached 57%.

Tough foundation problems solved

Excessive groundwater made excavation and compaction difficult at Southern California Edison's Huntington Beach Steam Station. Scrapers were discarded in favor of draglines and trucks, and before material could be compacted it had to be stored for drying.

By PHILIP L. CARANCI

Construction Engineer
Southern California Edison Co.
Los Angeles, California

THE SITE selected by the Southern California Edison Company for its new Huntington Beach steam-electric generating station is situated on the coast at the intersection of Newland Road and the Pacific Coast Highway in the city of Huntington Beach.

Geological characteristics show that the site lies in the seaward terminus of the Downey Plain approximately one mile from the mouth of the Santa Ana River, that the area is underlain by 200 to 250 ft. of geologically recent deposits, largely fluvial, but locally including marine strand line deposits.

Since the surface soil of this marsh area consists chiefly of clay silt with a natural ground level two feet in elevation above mean lower low

water, company designers concluded that suitable foundations for the structures contemplated could be constructed by first removing the clayey silts to reach underlying coarse sand and then replacing the unsuitable material with coarse sand compacted to 100% of optimum dry density. In the areas where minor settlement of the foundations was not so critical, such as the electric switchyard and the fuel oil tank farm, the excavation would go to a predetermined depth where a comparatively sound foundation soil was known to exist, and be backfilled with random material which would be compacted to 95% of optimum dry density.

The area chosen for the construction office, warehouse, and equipment yard would require no excavation, but would be backfilled with random material to bring grades up to the prescribed site elevation. The remainder of the site would be back-

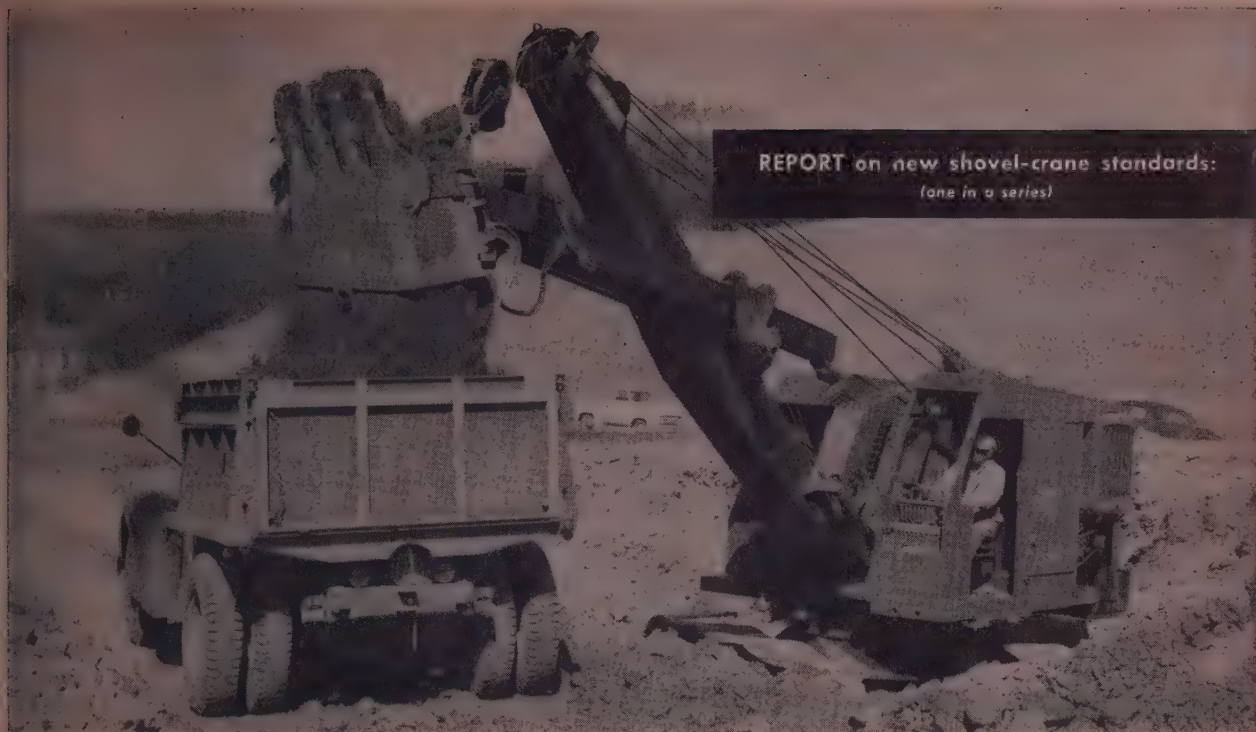
filled to the final elevation with lower grade material excavated from the site and borrow area. The contract for the grading was awarded to Clyde W. Wood & Sons, Inc., for the low bid sum of \$746,720.

Dewatering of site and borrow area

The first problem to confront the contractor was the unwatering of the site and borrow area. This was accomplished by a system of wellpoints jetted into place. The installation at the plant site, consisting of 600 wellpoints, one 8-in. header, and two 6-in. vacuum pumps proved successful, for it unwatered the intended perimeter and also the switchyard which was adjacent to, but not within, the enclosed area.

The borrow area required two stages of wellpoints because of the greater depth that had to be excavated. The first stage was to penetrate to 20 ft. below ground surface and the second to 40 ft. It was determined that these two stages would unwater to a depth of 32 ft., the estimated depth required to yield the cubic yards of fill necessary.

The first stage jetting was completed in three weeks, the second stage in two weeks. In the two instal-



REPORT on new shovel-crane standards:
(one in a series)

503 TRUCK LOADS IN ONE DAY — Here's an example of a real money-making operation! A Minnesota contractor reports his LS-98 shovel with 1¼-yard dipper loaded out 503 five-yard trucks in eleven

hours. That's real production. Owner and operator give credit to Speed-o-Matic controls, hydraulic-power steering and bonus horsepower that brings up a full dipper every pass.

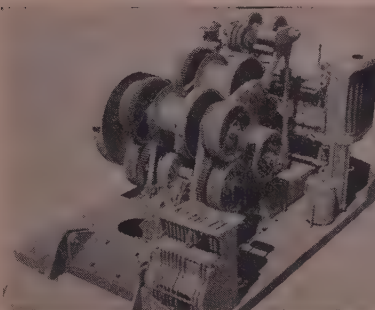
Increasing cycles per shift

Standard on every Link-Belt Speeder, Speed-o-Matic power hydraulic controls minimize operator fatigue. Response is fast, positive, precise

Exclusive with a Link-Belt Speeder, this true power hydraulic control system allows the operator to put his machine through its paces at the flick of the wrist. He's not subject to costly end-of-the-shift letdown... stays fresh, pushes his machine to its high limit throughout the shift.

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MORE USABLE HORSEPOWER than other machines using the same make and model engine. Yet a Link-Belt Speeder remains well within the engine manufacturers' recommended operating speeds. It's possible because a Link-Belt Speeder is an extra-strength machine, designed and built to take full advantage of an engine's available power. This extra strength is evident in the size and quality of shafts, gears, clutches and structural members.



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It's time to compare . . . with

LINK-BELT SPEEDER

Builders of a complete line of shovel-cranes . . . with exclusive Speed-o-Matic power hydraulic controls

lations, 800 wellpoints, two 10-in. headers, and four 6-in. vacuum pumps were used.

Site and borrow area stripping

According to the contract, all site stripping was to be placed in the future parking areas and compacted to 90% of optimum dry density. After three days it was realized that the use of one type of scrapers and push-tractors could not succeed due to the excessive moisture content of the material, which ranged as high as 57%, and made tractability for this type of equipment impossible. The contractor then replaced this equipment with two 1201 Lima draglines and 10-yd. dump trucks. This operation proved successful.

The next problem to be solved concerned the compaction of this material to the required 90% of optimum dry density. Because of the high moisture, neither the sheeps-

foot nor the pneumatic tired rollers were of any use. Discing the material could not succeed because of the limited time allowed for drying. It was soon realized that the solution lay not in changing the method of handling the strippings, but in the acquisition of additional area in which this material could be stored so that the site excavation could continue. Edison Company representatives acquired some adjacent property, and with this acquisition, the site excavation was satisfactorily concluded. In this operation 250,000 cu. yd. of stripping were excavated.

Borrow area stripping was done with a Lima 1201 and a Northwest 80 loading end-dump trucks with a total excavation of 290,000 cu. yd.

Fill placement on site

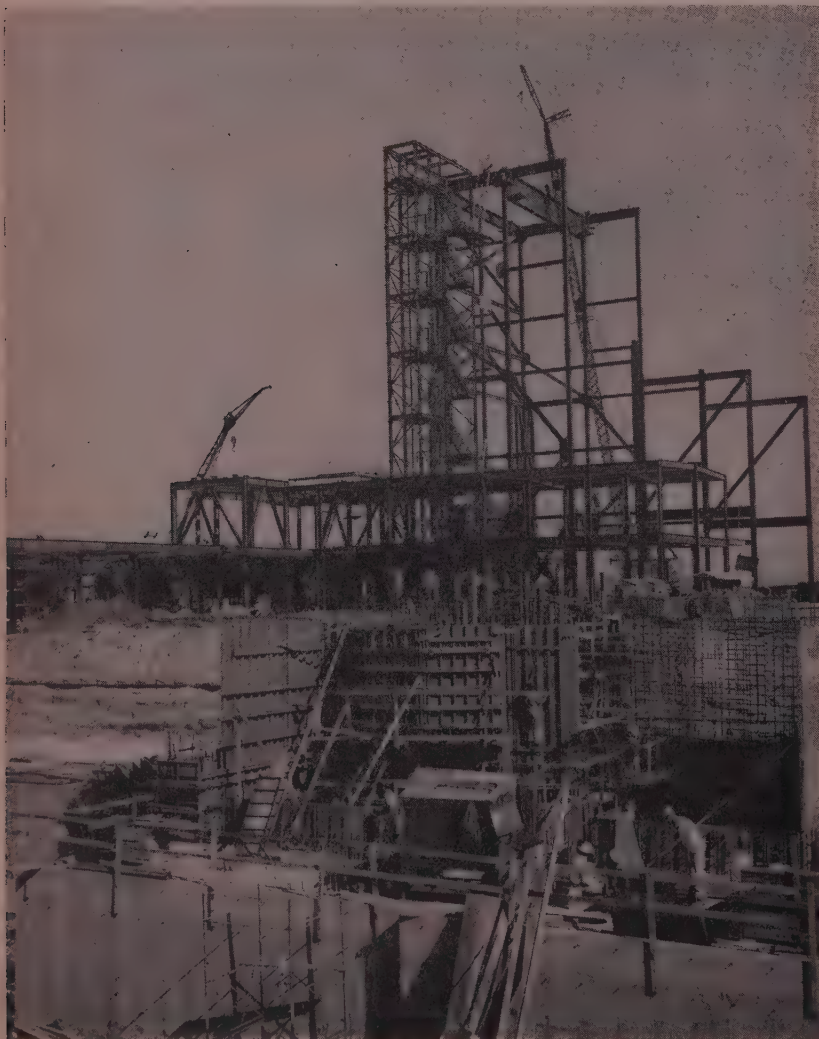
Backfilling with random material was completed with 290,000 cu. yd.

in place. In the areas excavated to underlying coarse sand strata, the fill was placed in 8-in. lifts and compacted with 50-ton pneumatic tired rollers to 95% of optimum dry density, but in the switchyard and the tank farm areas this procedure could not be followed. In these two areas, the excavation had not gone to sand but to a predetermined depth, where a blue silt intermixed with sea shells was encountered. This material was deemed to be sufficiently sound for the structures to be placed thereon, although it was not trafficable to rubber-tired equipment due to its plasticity and high moisture content. The designers solved the problem by increasing the thickness of the lifts to 4 ft. with the qualification that compaction tests were to be taken at a depth of one-half of the lift thickness placed. This procedure was adopted and proved successful. To test for compaction, a lift would be placed and compacted, a tractor would then excavate a trench to the depth specified by the inspector and a test would be taken. Tests revealed an average compaction of 95%.

The backfilling of the area directly under the main power building structures required 178,000 cu. yd. of select fill in place. In this area the excavation had been to coarse sand. This coarse sand stratum, which revealed a natural in-place density of 97% of optimum, was first compacted to the required 100% before any backfill was allowed. After the required compaction was obtained, the select material was placed in 6-in. lifts and compacted with 50-ton pneumatic tired rollers. All areas which tested below 98% compaction were recompacted and retested to insure that the entire fill would be compacted to the specified minimum of 98% for a single test and a 100% overall average.

The contract work was brought to a successful conclusion last fall with a total excavation of 1,003,000 cu. yd. and a backfill of 949,600 cu. yd. The work was carried out under the direct supervision of the author. Overall supervision of the project was under R. W. Spencer, manager of the engineering department, assisted by O. N. Kulberg, chief construction engineer, and T. M. Leps, chief civil engineer. Site investigation and design were carried out by B. R. Lavesty, senior civil engineer.

Power from the \$60,000,000 plant is expected to go on the line in the summer of 1958. The first of 2,000 tons of structural steel was erected in February.



BY MARCH about 20,000 cu. yd. of concrete had been placed and 1,000 tons of structural steel had been erected. Other work under way includes construction of two 14-ft. diameter pipes extending 2,000 ft. under ocean floor to bring cooling water to the plant.

National defense — Key to the highway program

Federal financing had its origin in the basic needs of our military establishment; these requirements and their impact on plans, designs and construction must not be forgotten. They are discussed by an authority.

IN THE RUSH of getting the highway program into the construction stage the aspects of national defense and military considerations have slipped into the background. At least at state and local levels it is seldom that the importance of defense gets into the discussions of location, by-passing, and route selection.

It is proper that this element of the program, which is the prime reason for 90% of federal financing, should be remembered. Needs of the military have played a large part in the present highway program. Well qualified to review this situation and point out some of the defense aspects is the executive vice president of the American Road Builders' Association, Maj. Gen. Louis W. Prentiss (USA, ret.) His recent statement on the subject follows:

When we think of the national defense aspects of the highway systems of the United States we are prone to take the narrow or limited view of military requirements and think only in terms of movement of troops, weapons and military supplies. We are apt to think also in terms of civil defense and the possibility of mass evacuation of population from key industrial cities.

A broader approach to the subject not only recognizes these uses of our highways in times of emergency but, more importantly, appreciates the tremendous contribution of the highway systems to the insurance of a sound and continuing economy which is the foundation of our Nation's defense.

Harmonious relations

There has been a gratifyingly close and cordial working relationship between the military staff of the Department of Defense and the civilian staffs of the federal and state highway agencies in working out criteria for our highway systems that will permit them to serve the dual needs of our nation—highways for peace and highways for war. Certainly no country can afford to build two sets of highways—one for the military only and one for civilian use. There may be times when

important military movements will necessitate exclusive use of certain sections of a highway system for a limited period but no other priority apparently is anticipated by the Defense Department.

Report submitted 1941 and 1949

The Congress of the United States, ever alert to the importance of our highway systems to the needs of national defense, directed the Bureau of Public Roads to prepare a report on the subject: "Highways for the National Defense." This report, completed and submitted in February 1941, led to the designation of the National System of Interstate Highways by the Congress in the Federal Aid Highway Act of 1944. It in turn was followed by a second study titled "Highway Needs of the National Defense." The second report was forwarded in June 1949, to the Congress with a letter of transmittal from the President of the United States which read in part:

"The report was prepared at the request of the Congress by the Commissioner of Public Roads in cooperation with the several State highway departments. In compliance with the request, the Secretary of Defense and the National Security Resources Board were invited to cooperate and have responded with suggestion of the indicated or potential needs for improved highways for the national defense."

The then Commissioner of Public Roads, Thos. H. MacDonald, had this to say when he transmitted this report to the President through the Administrator, Federal Works Agency:

"The State highway departments have all joined in a remarkably detailed examination of the mile-by-mile physical condition of the interstate highway system, thus affording for the first time an accurate evaluation of the roads upon which is concentrated the interstate flow of traffic on a nation-wide scale.

"In much the same manner as our great rivers gather to themselves the flow from innumerable other streams and their tributaries, the interstate system receives and must carry about 20% of the total vehicle mileage generated by the more than

41 million motor vehicles. The system of interstate highways comprises only 1-plus per cent of the total of public roads and streets. The high percentage of total traffic reflects its peacetime use. This same limited system of major roads is clearly indicated to constitute the routes essential to defense needs.

"Any complacency we may have as to the present adequacy of these major roads to serve in peace or in war is shattered by the evidence presented."

This report brings out the fact that serious deficiencies exist in "sight distances and in the width of its pavements, shoulders, and bridges. The sight distance deficiencies are the result of defective alignment and vertical curvature." Maj. Gen. Paul F. Yount, Chief of Transportation, Department of the Army, in testifying before the Committee on Public Works, House of Representatives, in April 1955, stated that only 15% of the designated National System of Interstate Highways meets prescribed standards for military needs and lists the deficiencies as existing in "bridge and slab design and construction, and also as to access."

Needs of the military

So we find ourselves today with a primary and secondary system of roads forming the tributaries or feeders to a designated 41,000-mi. interstate system which from the Army's point of view is 85% deficient to meet the needs of national defense. In studying the problem of developing these needs the Army was quick to recognize and adopt several basic concepts. These are as follows:

a. Military highway needs and civilian highway needs cannot be economically separated.

b. Military needs must therefore be integrated into the civilian needs of the country.

c. A relatively small, uniformly designed and efficient system of connected highways interstate in character is as essential to national defense as it is to our peacetime economy.

d. Having once agreed to criteria for the major systems of highways, future weapons and vehicles developed by the Army should conform.

e. Having once agreed to the location of the interstate system including the control points between major cities on the system, it is necessary to

(Continued on page 46)



Stones and rocks made digging tough.

Compact rugged Cleveland's smooth crawler mounting real public relations asset in 70,000' tough digging

The light weight, hi-tensile alloy steel construction and smooth crawler mounting of this Cleveland 92 "Baby Digger" enabled Rich & Co., Bradford, Pa. to cut 70,000 feet of trench in stony tough digging without causing damage to the sidewalks and fine old lawns in and around Groton, N. Y. The compact design and quick-and-easy maneuverability of the 92 were other big helps in digging these 4-inch pipe gas mains and laterals for New York State Electric and Gas Co., Ithaca, N. Y. The rugged 92 weighs only 10,000 pounds, is only 4½ feet wide over its crawlers, yet digs 10 to 20 inch trench widths and down to full 5 feet deep—in *all* soils.

The 10,000 lb. 92 treads lightly on lawn and sidewalks.



Compact 92 can put trench within 20" of side obstructions.



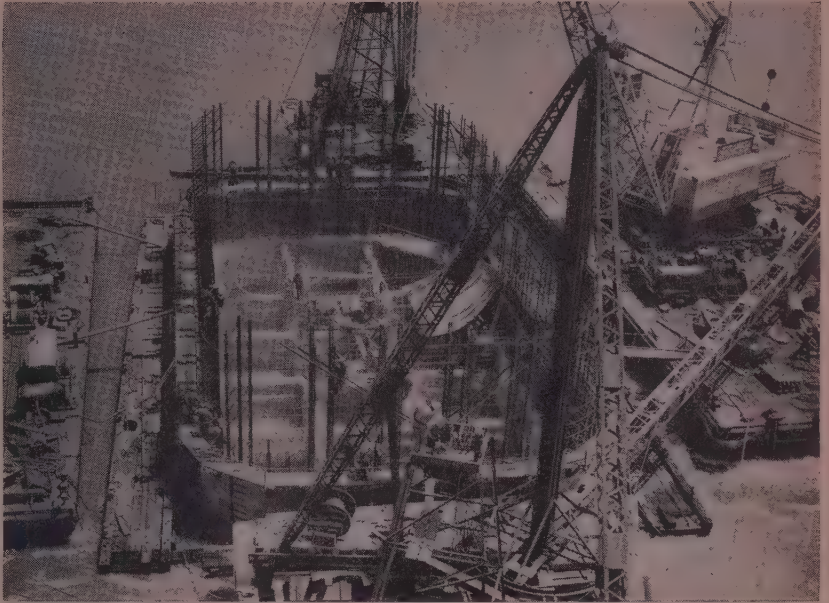
THE CLEVELAND TRENCHER COMPANY

20100 St. Clair Avenue

Cleveland 17, Ohio

Air lift pumps aid caisson sinking

The first of three caissons has been completed in Carquinez Straits in the largest operation of its kind since the San Francisco Bay Bridge. Improvements in construction methods included jets and air lift pumps instead of clamshells to remove sandy material, and shaped charges to blast bedrock.



ONE DOWN, TWO TO GO—The first caisson for the Carquinez Bridge is shown surrounded by barges and working platforms. It has been lowered 135 ft. to a solid footing on bedrock.

CAISSON ARNOLD, 53 ft. wide, 102 ft. long and 138 ft. high, has been successfully sunk to a firm foundation on bedrock within 0.9 ft. of its designed position. The caisson is named after Arnold Hanger, president of Mason & Hanger-Silas Mason Company, Inc., and F. S. Rolandi, Jr., Inc., holders of the \$5,455,000 substructure contract for the \$23,000,000 Carquinez Bridge, 30 mi. north-east of San Francisco.

The steel cutting edge of Caisson Arnold, the first of three, was fabricated at Bethlehem Pacific Coast Steel in San Francisco. Resembling a huge ice cube tray, the structure was floated to the job-site in July of 1956 and secured in place with 16 concrete anchors weighing 25 tons each. Pile-supported working platforms were constructed adjacent to the caisson location, a 125-cu. yd. per hr. Noble batch plant was set up on the shore, unusual re-usable collapsible forms were set in place and concrete began going into the walls of the caisson, forcing the cutting edge down toward the bottom. Concrete was placed with a specially-built revolving distributor consisting of a hopper feeding onto an extendable horizontal conveyor belt. The exterior walls are 3 ft. thick, the interior walls 2½ ft. thick and were built up in 10-ft. lifts. Each lift sunk the caisson about 9 ft. This work was carried on in the treacherous tidal conditions of the Carquinez Straits, and was described in detail in the September 1956 issue of WESTERN CONSTRUCTION.

To keep water out of the caisson as it was lowered into the water, each of the 18 cells was fitted with a laminated wood plug at the bottom with a 30-in. diameter capped pipe in the center. The wood plugs were caulked to minimize leakage. To remove the water which did seep in a bilge pumping system was engineered by the contractor, consisting of 6 electric Berkeley pumps and 8 air pumps. Using both electricity and air guarded against the possibility of a power failure. It was necessary to operate the pumps several hours each day, moving the water through 2½-in. diam-

eter fire hose made by Pacific Pump Co. On the second caisson, which is now being sunk, floats have been devised to make the operation of the pumps fully automatic and keep the water in every cell at any preset level.

The caisson descended at the rate of about 5 ft. a week, and the mud line was reached on the 7th of December. The mud consists mostly of fine sand and gravel and lies over the bedrock in a layer about 35 ft. deep. At this point the cells of the caisson were filled with water to give the structure maximum weight. The

(Continued on page 44)



WOODEN FALSE bottoms in each cell kept water out. Jetting and pumping were done through a 30-in. pipe leading to top of caisson. Bottoms were knocked out when clamshells were needed.

GREAT NEW IDEA in

52 hp

WORK BULL Model 404 with $\frac{5}{8}$ -yd, low-pivoted loader. Like all **WORK BULLS**, 404 has specially designed industrial front axle and heavy-duty clutch. (Diesel engine is optional.)



42 hp

WORK BULL Model 303 with angle dozer and backhoe. Gasoline engine, standard, offers high torque at low speed for better lugging. (Diesel optional.)



34 hp

WORK BULL Model 202 with hydraulic-controlled hoe. Most of the **WORK BULL** attachments can be switched in 5 to 15 minutes in the field — without special gear.



42 hp

Davis PIT BULL with $\frac{7}{8}$ yd er features torque converting clutches and 5 speeds for 5 reverse. In many cases it out high-priced, single-purpose rigs

tractors and attachments —



M-H-F

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As primary equipment, **WORK BULLS** put former hand work on a power basis . . . efficiently handle scattered, work-and-run assignments.

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BACKHOES—12, 16, 20,
24 or 36" buckets

MOWERS—Reel, rotary or
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FORK LIFTS — 2000 and
4000 lb. capacities

BLADES—Bull dozer, an-
gle dozer or grader

BROOM OR SWEEPERS
POST HOLE DIGGERS

ROTARY TRENCHERS
PIPE AND CABLE LAYERS
SNOW PLOWS
UTILITY BOOMS
SCARIFIERS
HAULING HITCHES



**FORK
LIFT**

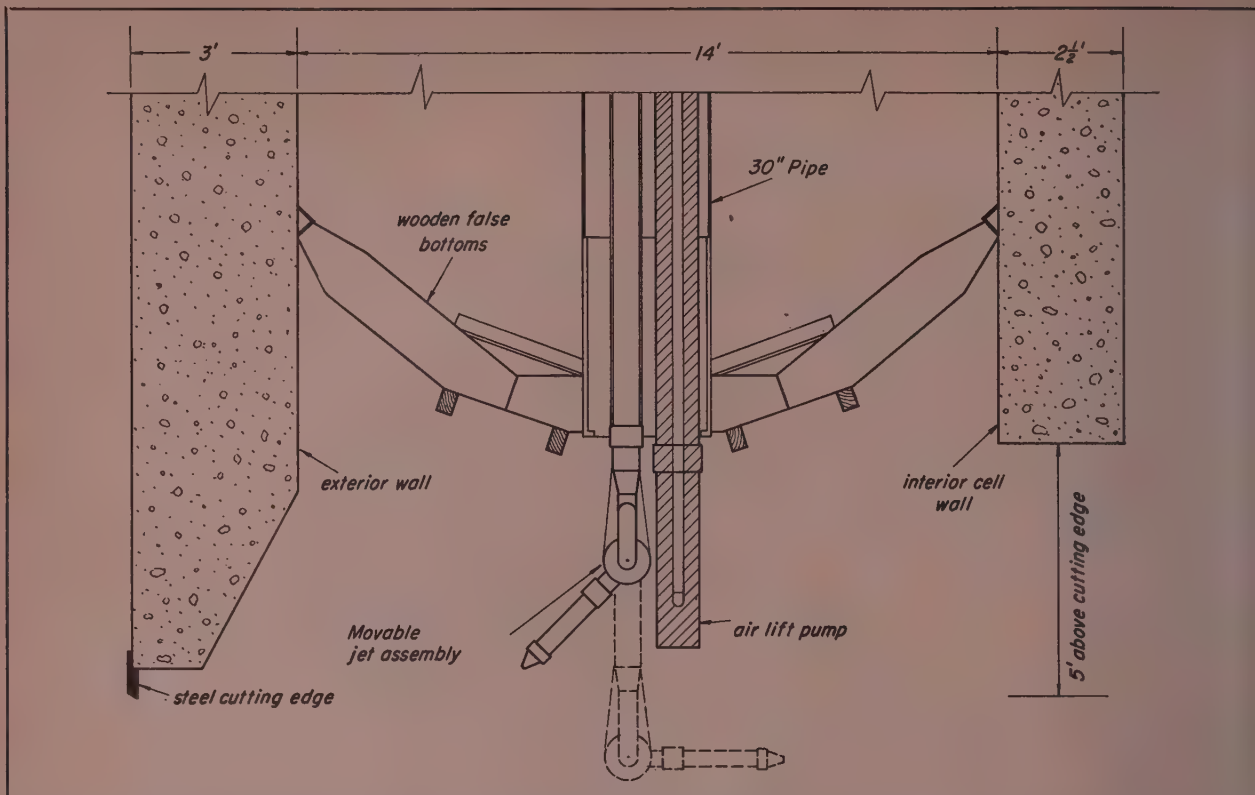
Fork Lift Model 202 has lifting capacity of 1500 lbs at full height, 4000 lbs at half height. Optional mast gives lift heights to 21 ft. Works on or off hard surface.

M-H-F WORK BULLS

Division of Massey-Harris-Ferguson, Inc.

27-E Quality Avenue

Racine, Wisconsin



JETTING AND PUMPING assembly is shown in this schematic cross-section at the bottom of one of the 14-ft. square cells. The Intelligent jet

can be moved up and down, rotated, and directed at any angle. Five foot clearance under interior walls gave divers room to maneuver.

(Continued from page 41)

usual procedure in work of this type is to remove the false bottoms and excavate the material by underwater clamshell buckets. The granular nature of the material on this job led the contractors to devise a system of jetting and pumping. Clamshell excavation would have been difficult because much of the sand would have washed out of the buckets as they were withdrawn.

The 30-in. diameter dredgewell pipes in the center of each false bottom in each cell were fitted with 30-in. diameter pipes reaching to the top of the caisson. The pipes housed Intelligent jet assemblies made by Chicksan, assembled in such a way as to permit movement up and down under the caisson and also rotation in every direction. The jets were fitted with 1 1/2-in. and 2-in. nozzles through which streams of water were forced at 225 to 275 psi. There were four jets, located in the interior cells only. Raising and lowering the jets was done with the work derrick. Rotation was done manually with a lever, and movement of the nozzle in a vertical plane was done manually by cables leading to the surface. The jets churned up the material, and loosened it, permitting it to be re-



CUT-AWAY MODEL shows wooden false bottoms but without the dredging pipes leading to the top. Although each false bottom was fitted with a 30-in. dredge well opening, jetting and pumping was done only from the four interior cells to minimize sloughing of material from outside the caisson. The rotating concrete distributor has an extendable horizontal conveyor, was designed by contractor, built by Noble Co.

moved through 10-in. air lift pumps. The jets were supplied by Peerless 370-psi. deep well pumps. Ingersoll-Rand model 35 sump pumps removed the bilge water. The head under which the bilge pumps operated was 150 ft.

It is usual in work of this type to find that the material excavated is about three times the amount the caisson actually displaces because additional material continually sloughs in from the side. On this job, however, there was very little additional excavation because material was removed from the four center cells only, thus reducing to a minimum the amount of material sloughing in from outside the caisson. Jetting and pumping were done in exterior cells only when it was necessary to correct the vertical alignment of the caisson.

Underwater blasting

The cutting edge at the bottom of the caisson struck bedrock in the last week of January 1957. The rock stratum was 3 ft. higher on the north side of the caisson than on the south, necessitating underwater blasting. First, the remaining sand and gravel was removed by air-lift pumping; then the wooden false bottoms were knocked out with a headache ball and

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FRONT AXLES



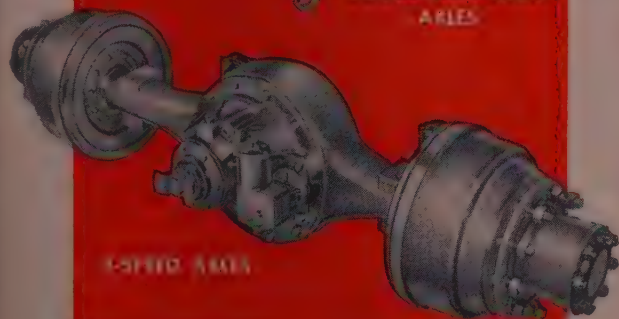
TANDEM DRIVE AXLES



SINGLE REDUCTION AXLES



DOUBLE REDUCTION
AXLES



2-SPEED AXLES



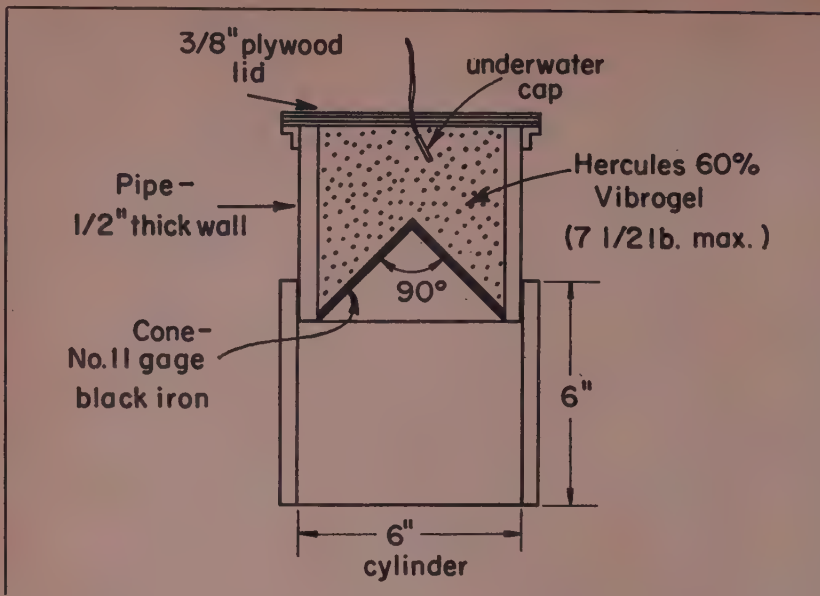
This rugged housing, used in famous Eaton 2-Speeds, is also used for Eaton single-reduction and double-reduction axles. The three types of heads are interchangeable.

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SHAPED CHARGE FOR UNDERWATER BLASTING was found to be better than drilling and shooting. Divers could place about six on each trip to the bottom, staying down 45 min.

the rocks and small boulders overlying the bedrock were removed with clamshell buckets.

Since divers can stay under water only 45 min. at this depth, drilling and shooting was discarded in favor of shaped charges. A diver can place about six of these in one trip to the bottom. The bottom of the cell walls are 5 ft. higher than the bottom of the cutting edge, giving the divers room to move around under the caisson.

The main problem during this phase of the work was to make sure that the blasting did not damage the walls of the caisson. The contractor's engineers prepared a table show-

ing the maximum safe charge plotted against the distance away from the caisson wall. In preparing this table the contractor found that there is very little published information on blasting damage. The best source was found to be a recently published book entitled "The Effects of Atomic Weapons." The formulas developed therein were found to be adaptable to small powder charges.

The shaped charges are shown in the drawing which accompanies this article. The average crater created by each charge was about 4 ft. in diameter and 2 ft. deep. It has required about 10 lb. of powder per cu. yd. of rock so far with about 40 cu.

yd. excavated. In order to scrape the loosened material into piles suitable for excavation by clamshells the divers use a horizontal I-beam dragged across the bottom by a system of cables and snatchblocks attached to the exterior wall of the caisson.

Removal of the 3-ft. ledge of rock from under the north side of the caisson was done so carefully that at no time did the caisson become more than 3 ft. out of plumb. The last blast took place in the first week of February and brought the caisson to within 0.9 of its designed position, well within the permissible tolerance. The contractor is now pouring a 25-ft. deep seal of concrete—class A concrete with 10% extra cement, or 6.6 sacks per cu. yd.

As the final work is being completed on the first caisson, the second caisson has been lowered through the water to within 25 ft. of bedrock as its concrete walls are built up. One 10-ft. wall lift is made about every 5.5 calendar days. This is almost twice the rate made on the first caisson, and is the result of experience. The third and last caisson is expected to be in place in July 1957.

Personnel

Russell Cone is project manager for Mason & Hanger. L. L. Snedden is chief engineer and Ed Bowman is general superintendent. F. S. Rolandi, Jr., is assistant manager. For the State of California, L. C. Hollister is project engineer. Oscar A. Johnson is resident engineer, assisted by Reid B. Neff and Wallace Ames.

DEFENSE HIGHWAYS

(Continued from page 39)

give full consideration to this system in the location of future defense installations whether they be military or industrial in nature.

f. Without controlled access large-volume priority movements, frequently essential in time of war, are almost an impossibility and certainly not at the speed possible where access is controlled.

Military questions to be considered

The military planner, asked to concur in a plan for design of modern interstate highways and their location, must seek the best answers possible to certain questions before giving his concurrence. Some of these questions might be:

1. What is the life expectancy of this highway?
2. Will its design protect its capacity throughout its life.
3. What will the nature of war be like during the life span of this highway and how will it fit into the picture of such a war?
4. Does it adequately serve existing military installations?
5. Does it contain vulnerable structures such as tunnels or bridges whose destruction would be easily accomplished and close the road? Is there an available alternate route without such structures?
6. Does it enter large cities where rubble and debris from the destruction of tall buildings would completely block it? Is there a bypass or circumferential?
7. Will critical structures require antiaircraft or NIKE protection?

8. Is there a parallel route which is strategically better and yet serves the same general area?

9. Can the road be quickly and easily cleared of traffic or closed to traffic to permit rapid emergency movements of troops or materials?

10. Does the road serve the nerve centers of railroad, waterway and air travel so as to properly complement or substitute for these means of transportation?

11. Does the road adequately serve important industrial installations producing war materials?

12. Will its possible use for civil defense evacuation negate its value as a military supply route?

13. In event of destruction of a section of this road by enemy air attack, can satisfactory detours be quickly established?

(Continued on page 66)



Strong candidate for **'MOST USEFUL MACHINE'**

John L. Bellinger, President of K.E.B. Constr. Co., Inc., North Syracuse, N. Y., sizes up the CAT* D4 Tractor-No. 40 Scraper Unit as follows:

"This is one of the most useful pieces of machinery we own, for we can do so many jobs with it. We clear land, build roads, carry fill and dig cellars, all with this one unit. It has proven its value in our work."

The job pictured here is on a residential housing development near DeWitt, N. Y. The sturdy D4 Tractor has plenty of power to self-load the scraper in clay and hardpan, averaging a heaped 4.5 cu. yd. per load. For land clearing and rough grading the scraper is quickly detached and the No. 4A Bulldozer takes over.

The D4 fills an important place in practically any spread. It's a handy size, small enough to be moved easily from job to job; big enough to give you real production. Teamed up with the No. 40 Scraper on short hauls, its performance often rivals that of larger machines.

The Caterpillar Engine delivers 50 drawbar HP and gives the tractor 10,700 lb. maximum drawbar pull. It's economical on fuel, using No. 2 furnace oil without fouling. The optional oil clutch adds easy shifting, long life and simplified maintenance.

Designed to match the D4 for top efficiency, the No. 40 Scraper loads fast, has quick, positive ejection and is ruggedly built to stay on the job. Your Caterpillar Dealer can show you how these units can make money for you. Ask him for a demonstration on your own job. He backs the long productive life of the machines he sells with reliable service and Caterpillar parts.

Caterpillar Tractor Co., San Francisco, Calif.; Peoria, Ill., U. S. A.

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**WANTED—
THE HARD WORK**



Record timber-dome roof for Montana sports arena

By M. L. HAMBLIN

School of Architecture
Montana State College
Bozeman, Montana

WITH A DIAMETER of 300 ft. the largest timber domed structure on record has been erected at Montana State College, Bozeman, Mont. Haggerty-Messmer Co. of Bozeman carried out the general contract for the structure which will be the Health and Physical Education Center for the college. Designs were prepared by Oswald Berg, Jr., and the late Fred F. Willson, architects of Bozeman.

Use of a system of timber arch ribs to support the 300-ft. dome was based on studies indicating definite savings compared to other designs. The availability of the material was another factor in reaching the decision.

The dome rests on a circular skeleton wall of reinforced concrete with column spacing of 26 ft. Construction of this circular concrete wall, with the columns to support the ribs, followed standard procedure in

forming and pouring of concrete.

Thrust of the ribs at the top of this frame is restrained by a tension ring made up of steel plates which is anchored to the top of the concrete columns. Top and bottom members of this tension ring are $\frac{5}{8}$ -in. plate

welded to the side pieces having a similar thickness of steel. This ring was fabricated in sections of approximately 26 ft. to correspond to the column spacing.

Design, fabrication and handling of the timber ribs represents the unusual element in the building of this college structure.

The laminated timber ribs have a cross section of $7 \times 16\frac{1}{4}$ in. and an overall length of 154 ft. from top of the column to the steel ring at the center of the dome. This total rib



A RING of concrete columns 39 ft. high provides support for the ribs of the dome. The steel tension ring (not yet in place) connects the bearing shoes at the top of the columns.

THREE LIFTS were made for each pair of 154-ft. ribs. The last lift connected with the center ring 90 ft. above the ground (top). Temporary supports consisted of spliced timber poles which swung into vertical position as the ribs were raised. Finished dome throws a pattern of shadows as roofing starts (bottom).

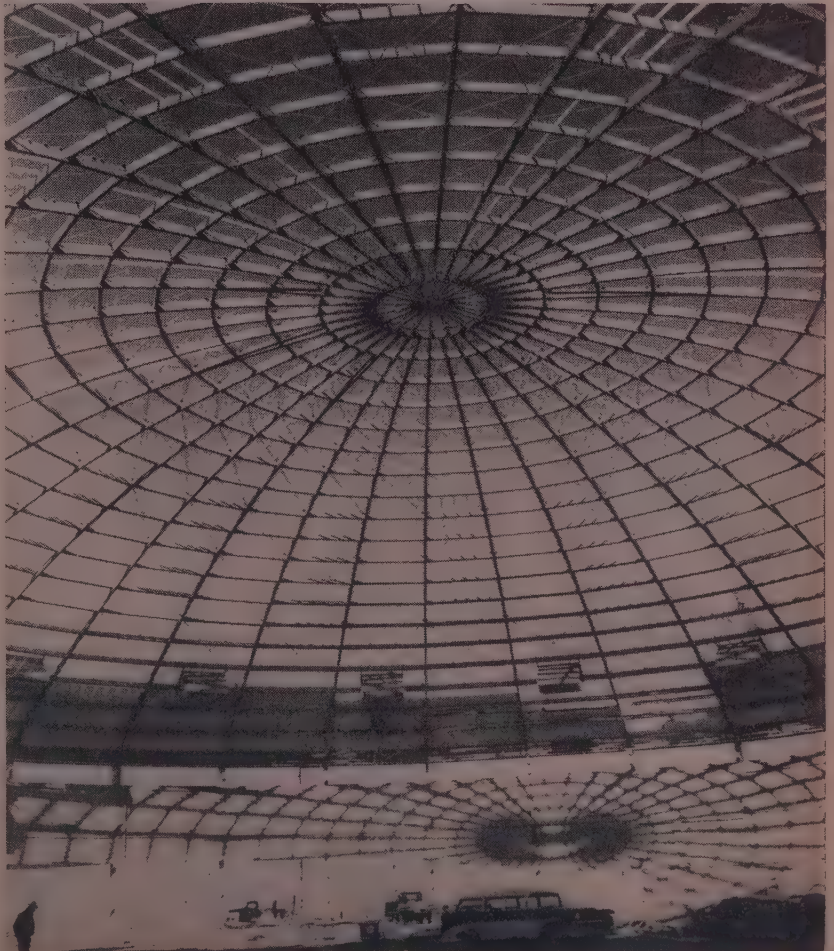
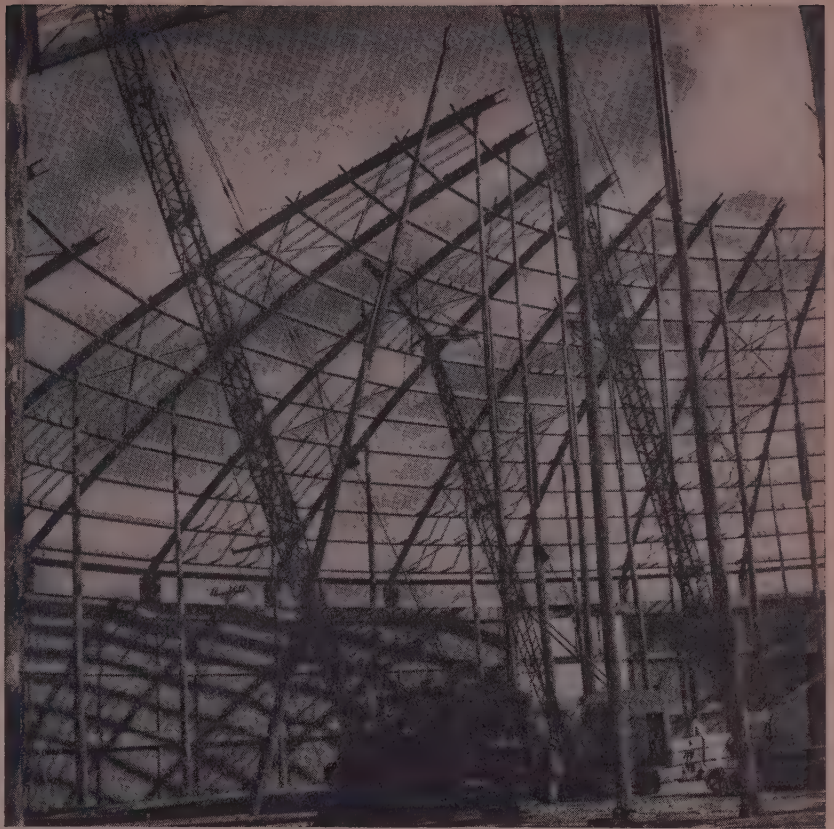
length is divided into three sections for convenience in transportation and erection. Design of the dome was prepared by Ben. F. Hurlbut, structural engineer, Billings, Mont. The timber units were fabricated at Portland, Ore., and shipped by rail to Bozeman, where they were handled by truck to the site.

Prepared for erection each of the individual rib sections consisted of the two ribs and the laminated timber purlins which are flush with the top surface of the rib. (see illustration). With purlins attached and ready for erection some of these lower sections weighed $7\frac{1}{2}$ tons.

The construction problem which required special planning was the provision for temporary supports under the the upper ends of the sections until the connection was made to the center ring and the rib became self supporting. The contractor solved this problem by using round timber poles, some requiring splicing, which were fastened directly to the upper end of the rib sections and allowed to swing into vertical position as the section was raised and placed by two crawler cranes. With the lower end of the ribs anchored to the wall columns and the upper end supported by the temporary timbers, the cranes moved forward to set the next rib section of the initial ring. When the intermediate purlins had been placed to complete the first section of the dome the second lift was started and handled in the same manner. Longer timber supports were required; these were anchored to the upper end of the rib sections in a similar manner for this second lift. Lower ends of the second lift were anchored to the first rib sections and this second circle completed.

In the meantime a tower consisting of four timber poles with necessary bracing was erected at the exact center of the dome. This tower supported a steel compression ring.

Erection of the 36 ribs and the 684 purlins represented the handling of 185 tons of laminated timbers. These timbers were assembled at the site and placed in 53 days. Lifting equipment was a Bucyrus Erie crane with a 105-ft. boom and an LS-75 Speeder crawler crane with a 98-ft. boom. The contracting firm of Haggerty-Messmer was aided by L. L. Winkelman, timber erection supervisor.





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available in its field! They have exclusive new cab mountings for quieter, more level ride. New brakes, new steering, new frames—and many other new features.

The result is a new line of trucks that—more than ever before—are built to cost *least* to own!

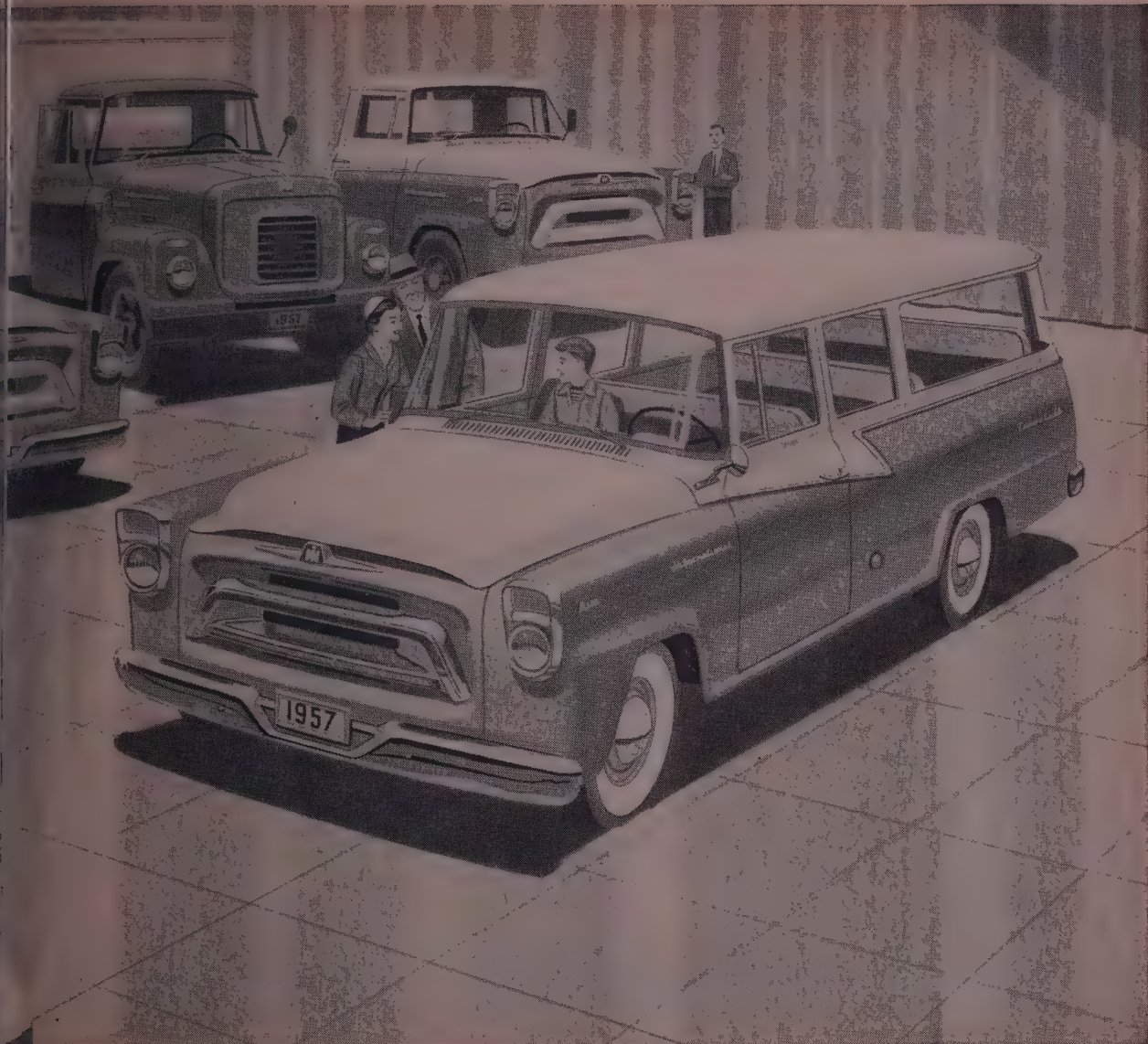
See and drive these newest INTERNATIONALS *today!* International Harvester Company, Chicago.

Trucks Unlimited...Powered for Modern Traffic...Plus Modern Comfort

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Biggest windshield—1,181 sq. in.—and *widest* cab in their class! New "Silent-Vent" door wings. New, wider front and rear springs. Exclusive level-riding 5-point cab mounting. Bigger brakes with more lining area, larger cylinders and boosters for quicker, easier stops.



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NEW Golden Anniversary INTERNATIONALS

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Motor Trucks • Crawler Tractors • Construction Equipment
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THREE TEST STRIPS are shown during construction on the side slopes of newly-excavated North reservoir. Bigge Drayage Co. winch trucks

pulled the paver and rollers up the slope. The machine in the center foreground is an Essick vibratory roller.

New reservoir lining being tested

The East Bay Municipal Utility District is testing a new type of reservoir lining designed to lessen construction difficulties, minimize leakage, and reduce costs. The lining features a very porous "open-graded" asphalt mix.

THE EAST BAY Municipal Utility District, of Alameda and Contra Costa counties in California, has tests under way which may alter the design of future reservoir linings. Eight test strips have been placed in EBMUD's newly-excavated 80,000,000 gal. North reservoir, which is scheduled to be lined this summer. If the tests are successful, and early results look promising, the cost of lining the new North and Maloney reservoirs may be reduced as much as \$100,000.

The tests are designed to find out if the bottom two layers of the District's standard design, a gravel blanket under a layer of dense-graded plant-mix, could be replaced by one layer of a new highly porous mix.

The development of a low-cost, leak-proof reservoir lining is essential to EBMUD's expansion plans which include the construction of 250,000,000 gal. of filtered water storage in

the next 15 yr. Since most of the reservoirs must be located in populated areas leakage must be prevented to avoid property damage and loss of valuable water.

Consolidated clay or sound bed-rock is seldom encountered at a reservoir site in the San Francisco Bay area so imperviousness must be built into the lining. The lining the District has developed and used on its last seven reservoirs consists of an underdrain, a flexible base, a continuous impervious membrane, and a wearing or protective surface.

The intended or assumed function of each layer of the standard lining is as follows:

(1) The concrete wearing surface withstands equipment loads imposed when the reservoir is cleaned and provides a protective cover for the impervious membrane. The severest loads occur during the erection of the precast concrete roof elements.

Since no special footings are provided for the columns the concrete layer acts as a spread footing in transmitting column loads to the base course.

(2) The asphaltic membrane provides the watertightness and is plastic enough to withstand minor deformations without rupture.

(3) The dense-graded asphalt stabilized base course serves as a semi-flexible base to support the impervious membrane and reduce the possibility of rupturing the membrane when surface loads are imposed.

(4) The drain rock blanket serves as a collecting system for leakage through the lining or for seepage from the subgrade.

The District has found that this type of lining costs about \$0.85 per sq. ft. Of the total lining costs about 50% is spent for the concrete surface and about 15% on the impervious membrane. The total lining cost for a typical excavated, lined, and roofed reservoir amounts to about 25% of the total cost of such a structure.

(Continued on page 56)

A worth-while story about
Shell men, techniques and



**SHELL
RIMULA
OIL**

Oil foils sneak thief...

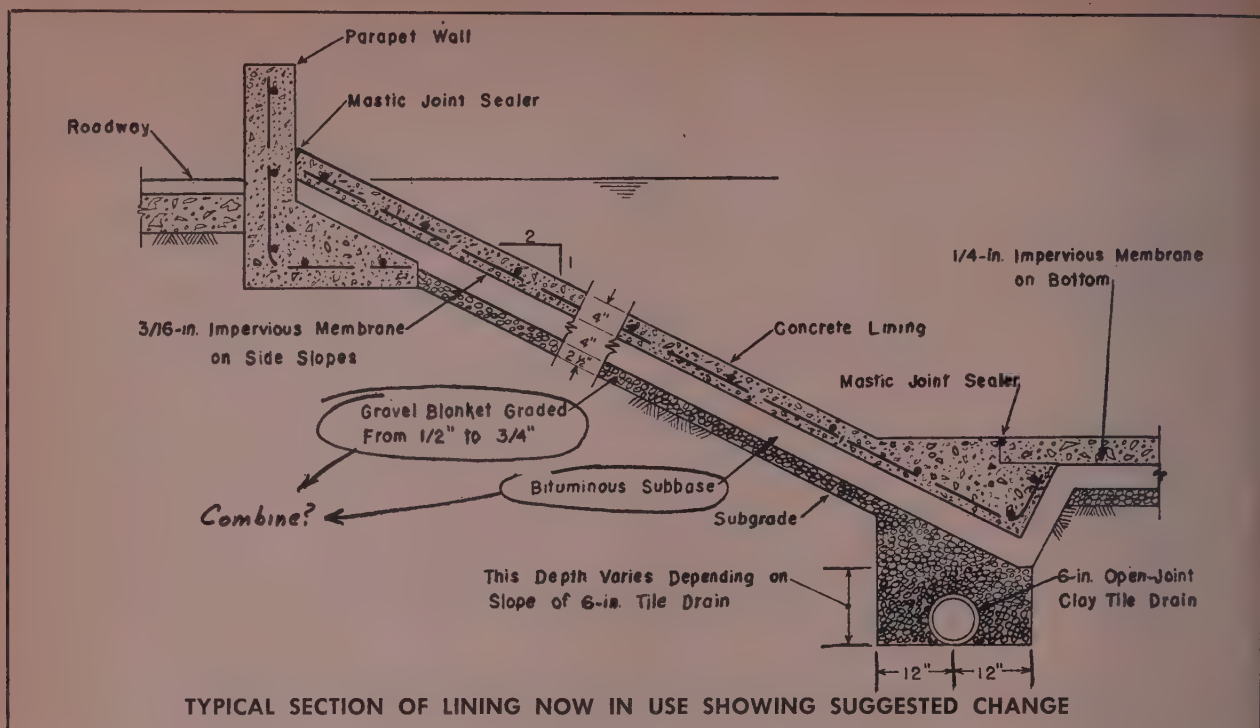


SILENT THIEF of engine life is "Acid Action"—result of harmful acids formed during a diesel engine's combustion cycle. A bigger wear factor than friction, acid action attacks piston rings and cylinder walls.

To catch the thief *before* he does his damage, Shell scientists developed an oil which effectively *neutralizes* these harmful acids—SHELL RIMULA OIL. Protected by Shell Rimula, engines stay trouble-free longer, have extra years of service ahead of them.

Rimula is the standard of quality in its field, the only oil of its type which fully meets — year after year — the requirements for America's leading diesel engines.

Chances are Shell Rimula or another Shell product is the right answer to your lubrication problems. These fine products are developed by Shell Research — a 1500-man team strong on lubricant experience. Why not put that experience to work this week?



Although this lining is adequate the District feels that there is plenty of room for improvement. Most of the disadvantages are difficulties encountered during construction. In the first place it is difficult to keep the drain rock in place on a $2\frac{1}{2}$ to 1 slope. This is especially troublesome if the gravel has rounded particles which reduce the natural angle of repose. Another difficulty is placing the plant-mix layer on the gravel without disturbing the gravel. This problem has usually made it necessary to place the stabilized base material in two courses by skidding spreader boxes up and down the slopes on wood forms. In this way intermixing of the gravel with the asphaltic layer is generally confined to the lower part of the asphaltic layer. Another trouble is that the impervious membrane is often torn when placing the slab reinforcing steel.

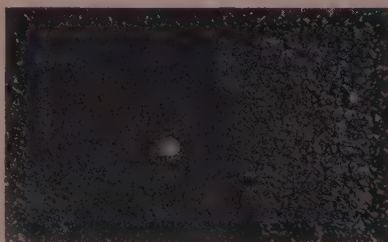
Early in 1956 research was begun to see if the gravel and plant-mix courses could be combined. If the result was both porous and stable the problems of placing the gravel on a slope and placing the asphalt on the gravel would be eliminated. It was also hoped that the sprayed impervious membrane would penetrate the surface of the porous mix to a controlled depth and thus be less likely to rupture during subsequent construction activities.

The laboratory work was assigned to the Los Angeles foundation engi-

neering firm of Maurseth & Howe. Some of the questions they were asked were: What is the permeability of present open-graded mixes? Can this be increased? How would increasing the permeability affect stability and cohesion? Could this material be made with local aggregates? Could it be placed with usual construction methods? What would be the best thickness? Would it cost less?

Favorable lab report

The laboratory report, submitted in August of 1956, was favorable enough to prompt the District to conduct further tests in the field. Eight 10 x 80-ft. test sections were constructed in North reservoir—7 on the $2\frac{1}{2}$ to 1 slope and one on the flat floor. A piping system was installed at the top of the strips and water was introduced in measured quantities to simulate leakage and ground water sources. The water



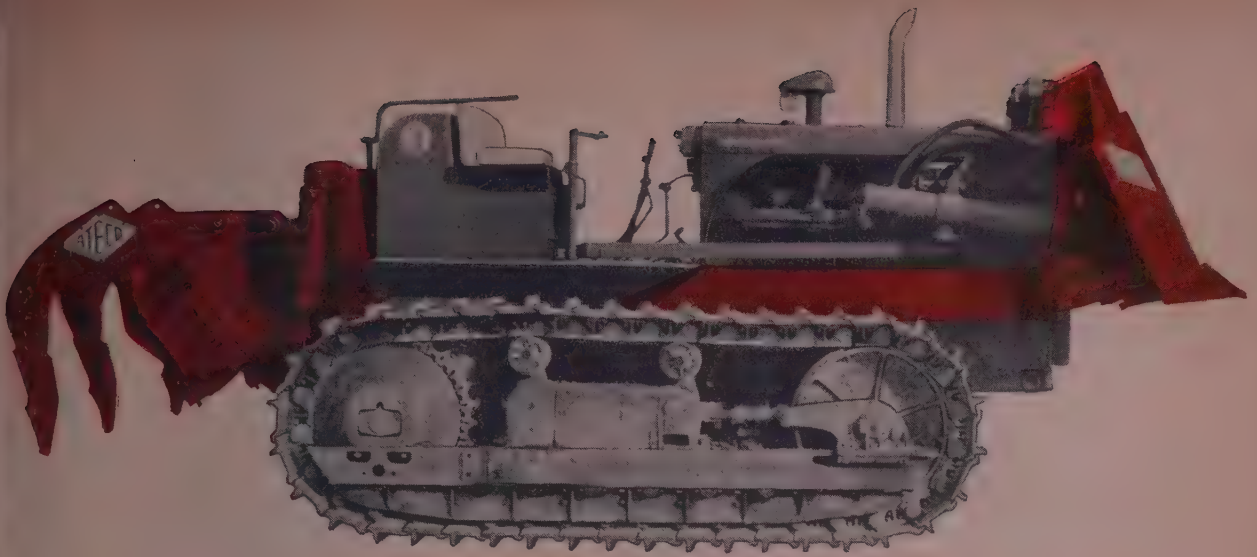
A QUARTER is used to show the difference in the texture of the new "open-graded" mix (left) and conventional plant-mix (right). New mix has good qualities of cohesion, porosity.

was caught and measured in a French drain.

The strips were laid in 2, 4, and 6-in. thicknesses using materials from three local aggregate sources. One strip was topped with slurry seal, one was topped with 1 in. of dense-graded ($\frac{1}{2}$ in. maximum) plant-mix and one was covered with prefabricated asphalt panels. Compaction was carried out with an 8-ton steel drum roller and an Essick vibratory roller.

At this writing (early April) the tests are not complete, but District engineers are seriously considering specifying a lining which would consist of 3 in. of porous plant-mix, 1 in. of dense-graded plant-mix ($\frac{1}{2}$ in. maximum), $\frac{1}{4}$ or $\frac{3}{16}$ in. of cat-blown asphalt and 4 in. of reinforced concrete. It is hoped that the remaining tests will also favor the new design and that enough data can be gathered and evaluated to justify a decision one way or another in time for inclusion in the specifications. The 400,000-sq. ft. lining contract is expected to be awarded in July of 1957.

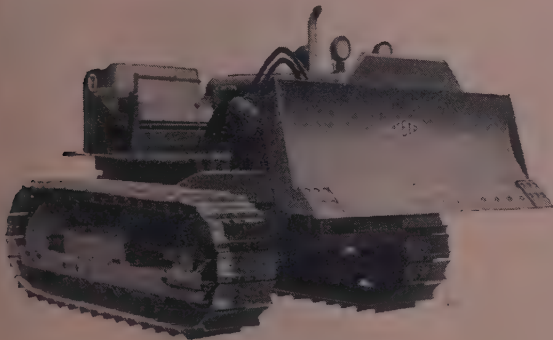
R. C. Kennedy is chief engineer of the East Bay Municipal District. Supervising civil engineer in the technical engineering section is J. W. Trahern. S. Koretsky is senior engineer in the structural design unit. The lining research project is under the direction of D. J. Dayton, associate civil engineer in the foundation design unit.



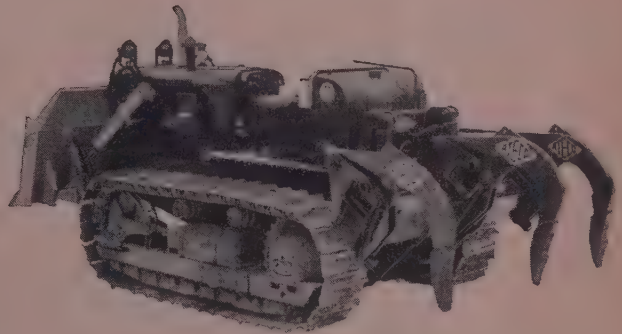
MATCHED GREENVILLE EQUIPMENT FOR INTERNATIONAL TD-14 AND TD-18

Matched Greenville attachments make an IH TD-14 or TD-18 one of the contractor's most versatile tools. With an inside-mounted 'dozer in front and a ripper

in back, operators rip one pass and 'doze their way back. Weight is evenly distributed . . . increases traction . . . more bite . . . puts full tractor power to use.



Greenville ATECO rock rippers for IH TD-14, TD-18, or TD-24. TD-18 and TD-24 rip as deep as 24", TD-14 to 18"; tractor-mounted; completely hydraulic.



7' 11 1/4" blade tilts in either direction; no nose diving; dual plate design bowl; extra-heavy push arms; no highway permit required.

INSIDE-MOUNTED 'DOZERS—These 7' 11 1/4" blades take full advantage of the added horsepower in International Harvester's powerful TD-14 and TD-18 crawler tractors. Push arms, mounted between the tracks, use IH's modern hydraulic system and cylinders to provide trouble-free hydraulic power. Center of draft is always between the tracks. Nose diving is eliminated. You dig and roll big loads with less clutch fighting. Wear and stress on track rails, rollers, and idlers is reduced.

POWERFUL, NEW ROCK RIPPERS—The big Greenville Rock Rippers, mounted on TD-14s or TD-18s, go wherever the tractor goes—always there to tackle hard spots. Points bite in to depths of 24" . . . rip out earth and rock with ease for 'dozing or fast scraper loading. Shanks swivel 15° in either direction. The double-acting hydraulic system puts full tractor weight on the points for fast, deep penetration. For complete data on rippers for TD-14, TD-18, or TD-24, request Greenville Bulletin IH 157.



GREENVILLE

STEEL CAR COMPANY

ATECO DIVISION
Greenville, Pennsylvania

How to tilt up 30-ton wall panels

The new engineering building of Aerojet-General Corporation points up the necessity of careful planning in tilt-up construction. Wall panels were 20 ft. wide and up to 34½ ft. high. A six-point pickup system was used.

TILT-UP wall construction employing precast concrete panels of unusual height and weight presents some erection problems requiring good engineering judgment in the selection of methods and details and good workmanship in the execution.

A good example is the new Engineering Building for Aerojet-General Corporation at Azusa, California. A two-story structure, having an area of 40,000 sq. ft per floor, its exterior walls are full-height tilt-up panels, 7½ in. thick, 20 ft. wide, and up to 34½ ft. high. The slab weights exceed 30 tons with maximum of about 33 tons.

In this building, as frequently occurs in tilt-up construction, the ground floor was not available as a casting bed, because the installation of floor ducts was in progress. The panels were formed and cast in stacks, 5 units deep, outside the building area. The design called for the erection and bracing of the wall sections, joining them by wall columns cast-in-place and also providing seats for the interior structural steel framing of the second floor and roof.

The erection of precast panels of such height and weight is an operation which, though not essentially

difficult, requires attention in both design and construction stages, to insure that loads are evenly distributed in the lifting process and that overstressing which might cause cracking does not occur.

The general requirements for satisfactory heavy-panel erection may be stated briefly thus: Select a layout of pickup points calculated to balance moments and to keep erection stresses within allowable limits; select inserts to provide satisfactory anchorage and cable attachment; select and assemble the lifting equipment, such as cranes, equalizer, spreader bar, blocks, sheaves and cables, so that lifting forces are evenly and smoothly distributed to the pickup points and thence to the panel.

Location of pickup points

For this job, six-point pickup was chosen. On each side of a panel, the upper point was located at a distance from the top edge equal to .14 times the height. The intermediate point was at a distance of .27 times the height below the upper; the lower point was at the same interval below the intermediate, or at a distance of .32 times the height above the bottom edge. Each of the vertical rows of points described was located at a distance of .205 times the width from the panel edge. This layout is considered typical of six-point pickup in pairs at three heights and has been developed by analysis for critical conditions of erection.

Erection of the precast panels was performed by two 35-ton P & H cranes, working in unison. Each crane lifted on one end of a heavy "equalizer" bar, which carried a spreader bar swiveled from its center. Connection between each end of the spreader bar and a side of the panel was made by continuous cable lines.

The pickup points made use of Burke double lift points, cataloged as double spider inserts, to which were fitted double angle lifting plates for attachment of Skookum blocks. Two Skookum blocks were also attached at each end of the spreader. The cable was tied at the spreader, then ran alternately through the sheaves at panel and spreader, to a final tie at the spreader bar.

This procedure provides for a fixed length of connecting cable, with automatic adjustment as the slab rotates during tilting. A proper fixed



WORKMEN on rolling scaffold remove steel angles from the pickup points. Slabs were cast in stacks 5 units deep. Slab weights ran as high as 33 tons.



This 125 cfm Gyro-Flo Compressor and PB-8 Paving Breaker combination is making short work of a heavy pavement job in a large Eastern city.

On any pavement job, you can
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SELECTION of pickup points must arrive at a layout that will keep erection stresses within allowable limits. Next, inserts must be designed to provide satisfactory anchorage and to allow easy cable attachments to the panel (see diagram at right).

length of these cables can be best determined by a layout made in the horizontal before erection. Placing the spreader bar outside and parallel to the top edge of the panel, the cable is tied to the spreader bar. It is then strung through the five Skookum blocks, brought up taut and even, and the final spreader tie is made.

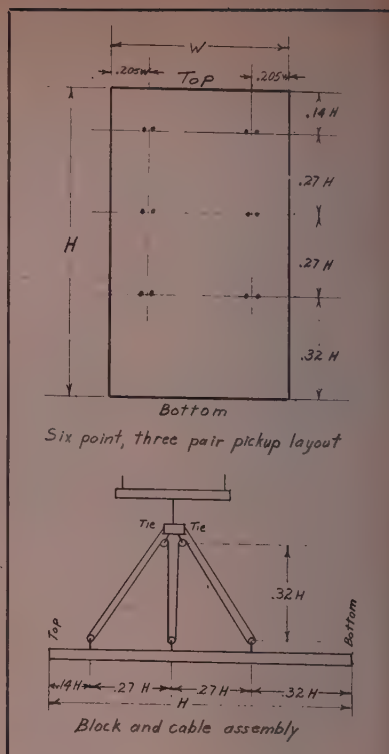
The designer's criterion for a correct lifting assembly, for this layout called for a cable length such that, when the spreader bar was centered over the middle lift point of the horizontal panel, with cables taut, the vertical distance between spreader bar blocks and lift point blocks would be approximately .32 times the panel height.

Since the interior steel frame was supported on the cast-in-place wall columns it was necessary to erect the walls and construct the columns in advance of placing structural steel. The only means of entrance or exit was through the lobby area; hence the schedule and sequence of steel deliveries was important to permit placement of the last section of steel before the removal of the crane.

This article has not discussed the

details of pickup design, but has merely outlined the solution for a given case.

It should be emphasized that tilt-up construction, particularly when high or heavy panels are involved, deserves engineering in the layout stage, to insure that the anticipated economies may be obtained and that



LOCATION of pickup points is shown in relation to the dimension of the panel to be raised. Lifting equipment must function smoothly to distribute forces evenly.

panels need not be injured in the erection process.

Credits

The Engineering Building was designed by the Architect-Engineer Division of Aerojet-General Corporation. Vinnell Company was the general contractor. Erection of the wall panels was performed by Heisler & Woods, contractors. Design and detailing of the pickup point system was prepared by J. L. Peterson, structural engineer.

New book on highway design by BPR

THE BUREAU OF PUBLIC ROADS, U. S. Department of Commerce, has just published, through the Government Printing Office, a 363-page book entitled "Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects." The book is intended primarily for use in the construction of Federal road and bridge projects under the direct supervision of the Bureau. Such projects include work for which Public Roads receives direct appropriations, as for major highways through national forests, and work performed by Public Roads for other Federal agencies on highways both within and outside of the

domain of the Federal Government.

The new book contains up-to-date specifications for those items of work and materials and construction methods that are generally applicable to direct Federal highway contracts. They are considered to be good specifications, which will result in highway work of high quality.

"Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects" (FP-57) is available for purchase from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. at \$2.00 a copy. Please do not send orders to the Bureau of Public Roads.



A review of the construction problems on the \$12,000,000— **Eastland shopping center project**

Close coordination between contractors keeps diversified job on schedule.

By PAUL TICHENOR
Assistant Superintendent
T-S Construction Engineers, Inc.
Los Angeles, Calif.

THE EASTLAND SHOPPING CENTER is located on a sloping 55-ac. site in West Covina, California. The construction work at the Center includes rough grading, all site utilities, paving, yard work, a large market, a service shops building which will house ten small shops, a specialty shops building which will contain thirty-six separate stores, and a May Department Store building. The total floor area under roof will exceed 750,000 sq. ft. Total cost of the construction work at the Center will be more than \$12,000,000.

Construction work began in July 1955 with the construction of a 12 x 16-ft. inside measurement covered drainage culvert of reinforced concrete. Among the problems encountered was the removal of the Los Angeles County Flood Control District fences which lined the wash. Pipe fence posts imbedded several feet in the ground had rusted during

the years. The posts were lifted up by a chain, hooked to the blade of a D-8 Cat.

A lesson in economy

The concrete work on the tunnel provided a good lesson in economy. Pouring of the 3,600 cu. yd. of concrete in the tunnel was begun by using power concrete buggies and a runway system. After the first pour it was seen that this was an expensive process. So an El Monte crane rental company was contacted, and a 20-ton crane sent out. By using two 1-yd. pouring buckets, one dumping concrete in the forms while the other was being loaded directly from the transit-mix truck, the pouring rate ran about 30 cu. yd. per hr. This cost was less by a considerable amount than the cost of using power buggies and runways for this type of job.

During the winter of 1955-56, the rough grading on the site was done. As the general contractors, T-S Construction Engineers, Inc., did all the survey work and subcontracted

the dirt work to the Bert C. Altfilisch Construction Co. The high-points of the earth-moving operation were the use of two twin engine Euclid scrapers along with the other movers, and the use of two Allis-Chalmers HD-21 crawlers to simultaneously aid in loading a single scraper. The dirt moving operation was a high-speed well-planned operation. Of the 266,000 cu. yd. of dirt excavated, about 226,000 cu. yd. were replaced as compacted fill on other parts of the site.

During the spring of 1956, all water, sewer, storm drain, electrical and telephone lines and manholes were put into the site. By doing this utility work at that time, disruption of the building construction operations has been cut to almost nothing.

In May 1956 the work began on the footings and basement of the May Department Store. Since May of last year 19,000 cu. yd. of concrete have been poured, just about topping-out the building structurally. The structure is reinforced concrete with a pan-joint floor system. The exterior filler walls are masonry—with specially specified and manufactured yellow brick.

The Specialty Shops building started last June. This is a 340,000-

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WESTERN CONSTRUCTION—May 1957

"CLEAN LIVING" GIVES A CHEVY ENGINE LONGER LIFE!

... more evidence that Chevrolet Task-Force trucks are engineered better and built better for bigger savings!

This drawing shows, roughly, one of the ways in which Chevrolet truck engines minimize a major cause of wear—dirt! Now consider this additional evidence that Chevy heavy-duty V8's and 6's "live clean" and bring you fleet, dependable power that costs less to use!

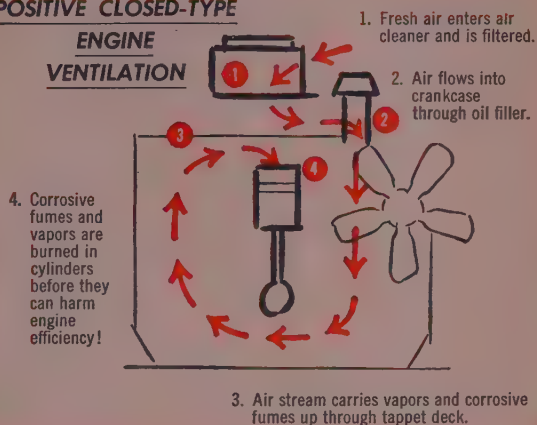
Extra filters give extra-clean fuel—Only clean fuel reaches the engine—that's one reason you can depend on a Chevrolet truck! All fuel is filtered twice (once in the fuel tank and again in the carburetor) to keep dirt and water from hampering efficient operation. Chevrolet truck V8's provide a *third* filter, at the carburetor, for triple protection!

Oil stays clean longer, too—Chevrolet truck V8's and 261-cu.-in. 6's come equipped with modern high-capacity oil filters (V8 filters are of the Full-Flow type). These engines keep *clean* oil flowing to moving parts; parts wear less and last longer because of it!

Even the air is cleaner—Dust and foreign matter in the

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ENGINE VENTILATION



air an engine "breathes" can reduce engine life by years. Chevrolet minimizes this wear-producing factor by providing big oil-bath air cleaners as *standard equipment* on all truck engines.

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CHEVROLET TASK-FORCE 57 TRUCKS

sq. ft. floor space structure of two stories. Combined together are poured-in-place concrete and prestressed double "T" floor decking and beams on the first floor. The roof is entirely prestressed decking with the exception of shear panels at the ends and sides of the roofs.

Coordination and erection problems

Many and varied problems were encountered in the construction of this building, all of which have been resolved by close cooperation between Rockwin Prestressed Concrete Corp. and T-S Construction Engineers, Inc. The first problem was how to erect the prestressed beams, some weighing 30 tons, and roof decking over areas where the first floor was of poured-in-place concrete. The poured floor was not designed to support the heavy equipment required for the erection. Leaving holes in various parts of the building was discussed, as was the use of cranes, gin poles, and skylines.

The final solution was to leave por-

tions of the poured-in-place concrete out, thereby allowing Rockwin to go in with cranes and gin pole to erect girders and double "T" decking.

Another problem was the required close coordination of operations between Rockwin and T-S since concrete columns and beams had to be poured and cured to at least 2,500-psi. strength before prestressed beams and double "T" decking could be erected. After prestress erection, filler strips and topping-out of walls had to be done by T-S. To work these operations with a minimum delay, a schedule was set up for both the completion of poured-in-place concrete and erection of prestressed concrete. The two firms were able to plan their work accordingly, affording each many advantages.

The market building was begun in June and is just now being completed. It is masonry with some concrete, and tapered steel girders. Floor space totals 57,000 sq. ft. Structure is under the general foremanship of Jim Prash.

The service shops building will soon be under construction. Just getting under way is the yard work.

The grand opening of the Shopping Center is scheduled for next September. The parking lot provides parking for 5,500 automobiles. The opening of the May Co. Store, the 36 specialty shops, and the 10 service shops all at the same time could conceivably create new construction problems—those of providing adequate roads to the Center, at least that's what the builders and the owners hope.

Personnel

Albert C. Martin and Associates of Los Angeles is the architect-engineer. For T-S Construction Engineers Joe Collins is project superintendent, assisted by Paul Tichenor. Otis F. Holt is building superintendent on the May Department Store. E. J. "Skip" Smith is superintendent on the specialty shops. Wade Taylor is general superintendent of Rockwin Prestressed Concrete Corp.

DEFENSE HIGHWAYS

(Continued from page 46)

14. Is it an all-weather road? Will it be closed frequently or for prolonged periods by fog, snow, or ice?

15. Is it designed for full load all year around or are loads to be limited in the spring thaw months?

16. Does the proposed road net permit rapid concentration of reinforcements to logical points of possible air or sea invasion?

17. Does the proposed capacity appear adequate in the light of future classified proposed defense installations?

18. Does the road cross or come unnecessarily close to a weapon or guided missile range?

19. If the proposed interstate highway does not serve a defense installation directly does it come close enough to insure reasonable service via a primary feeder road?

20. Does the answer to any of these questions dictate a different solution than the one proposed for concurrence? If so, is the alternate solution more expensive? Does the benefit to national defense from the alternate solution justify the extra cost?

There are probably many other questions that would come to mind in any specific instance. From a study of the foregoing questions it can be seen that the location of the Interstate System can have a very

profound impact on our defense effort in any section of our country. I am sure that items such as these will be considered before concurrence is obtained in the final location of any additions to the already approved Interstate System.

Overall approach to routes

From a national defense point of view there is a very serious subject which I feel has been overlooked. That is overall control over the priority of construction on the Interstate System. So far as I have been able to find out there is no requirement at this time that any one through route be built as the initial coordination effort of all the states involved. It is certainly desirable that we not proceed with the construction of this nationwide system in a checkerboard fashion with a little piece in this county and a little piece in that. Not only must there be continuing progress on a high priority route in each state but there also must be coordination of route selection and timing of construction between adjacent states.

In order to accomplish this orderly approach to construction it may be necessary for Congress to assign priority to a limited number of transcontinental routes as well as three or four north-south ones. This would insure that the taxpayers would be given an opportunity to collect some dividends from their tremendous in-

vestment long before the whole system is completed. It would also insure the defense establishment of early availability of a transcontinental highway for logistical support which might well mean the difference between success or failure in the early stages of an emergency.

The great importance of the Interstate System to national defense was weighed carefully by the Congress when it departed from the policy of the past and established the 90-10 ratio for federal support of the system. Due to rapid developments in weapons of war and in the changing methods of waging war, it is admittedly most difficult to project the highway needs of national defense throughout the expected life-span of the new highways. It is impossible to predict the force or extent of an enemy attack or the exact demands that will be placed upon highway transportation in order to cope with it. However, sound guide lines have been established which, if adhered to as the highway program develops, will take care of most of the foreseeable needs of national defense.

I am sure the state highway officials will continue to discharge their responsibility with the high degree of efficiency that has marked their work in the past, but the fullest cooperation and coordination of the states and the Bureau of Public Roads under the leadership of the able, new Federal Highway Administrator, Bert Tallamy, is essential.



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PLATE GIRDER weighing 34 tons is being raised into place by derrick poised on end of temporary cantilever. When girder is in place and the

field splice is made, the connection over the pier is changed to a simple support. Method eliminated falsework in late stages of erection.

Erection method beats flood threat

The threat of spring floods made the use of falsework very risky, so 10-ft. deep plate girders were erected by means of temporary cantilevers which eliminated falsework entirely.

BRIDGING a mountain gorge can be a tough assignment during the rainy season when any moment a flash flood could quickly obliterate the falsework necessary to support bridgework while it is under construction between piers.

Bethlehem Pacific Coast Steel Corporation faced this problem during the 1956 winter season when it was awarded the fabricating and erecting contract for the Pope Creek and Putah Creek highway bridges in Northern California.

These bridges are located in the Napa Hills where a new perimeter road is being constructed at a higher elevation around what will eventually be a reservoir. This road will replace county and state roads which the Bureau of Reclamation expects will be under water in the next two or three years when the Berryessa Reservoir is filled with waters from the Putah Creek watershed.

This Bureau of Reclamation proj-

ect, part of the Central Valley Project in California, will eventually serve Solano County as a multi-purpose reservoir.

Both the Pope Creek and Putah Creek bridges are some 150 ft. above the canyon floor at mid span. The Pope Bridge is 573 ft. long and the Putah Bridge 814 ft. in length. The spans in each bridge are identical, being 166 ft. The Pope Bridge is composed of three such spans with a 75-ft. span on the west end. The Putah Creek Bridge has four 166-ft. spans with a 75-ft. span at each approach.

The remoteness of the area and winding roads presented another problem. The 75-ft. long girders were the maximum length that could feasibly be moved by truck and trailer around turns of the mountain road.

Each of the 166-ft. spans was fabricated in three pieces. Two 58-ft. girders with one 50-ft. girder in the center comprised a span. Each girder

web was 9 ft. 10 in. deep by 7/16 in. thick, reinforced by welded 1/2-in. thick stiffeners spaced approximately every five feet. Stiffeners at the ends of each girder were 3/8 in. thick and 12 in. wide. The 30-in. flanges on the 58-ft. girders tapered from 1 1/4 in. to 2 in. in thickness. The flanges of the 50-ft. center section were 2 1/4 in. thick. Each span weighed approximately 50 tons. Stiffeners were used only on one side of the girders. The 38 girders were transported singly by truck and trailer to the two bridge sites. A derrick and 50-ton American crawler crane were used in the erection.

Because the steel erection coincided with the rainy season in this area, Bethlehem Pacific engineers were apprehensive of using falsework in the floor of the canyon. There would always be a constant threat of heavy rainfall and rapid flood such as the floods which occurred in the 1955-56 season.

Cantilever instead of falsework

Falsework was only employed in the early stages of erection at higher elevations along the canyon wall. As the erection proceeded over the



JEHLHEM PACIFIC steelworkers prepare to bolt a splice as girder is swung into position. Derrick platform extends to each side of cantilever

to permit efficient guying of vertical derrick member. General contractor on the project was John C. Gist Co. of Sacramento, Calif.

eeper walls of the canyon, a cantilever principle was employed to install the middle spans of both bridges. The cantilever method was used five times in the two bridges.

In the erection of the Pope Creek Bridge, the girders for the first two-thirds of the first span were set by derrick from the abutment to a temporary falsework tower and connected at the abutment. The 50-ton crawler then worked from abutment line and passed the girder for the final 1/3 of the first span to the derrick which had moved on the girders over the falsework. The derrick swung the sections into position, completing the span from the falsework tower to the first pier.

When these sections were connected, the derrick then moved out over pier No. 2 and picked up the girders to be cantilevered. The cantilever, 58-ft. girders, were temporarily spliced to the first span at the pier. This splice consisted of a welded compression flange and a bolted tension flange and web, and gave continuity to the bridge for the next stage of erection.

In each case the cantilevered sections were fabricated four inches longer than their designed length in order to make the connection at the pier.

At this stage the cantilevers are poised 58 ft. out from the pier, leaving a gap of 108 ft. to be bridged to pier 3. The next step was to splice together on the canyon floor, 150 ft. below the derrick, a 50-ft. and a 58-ft. section. The derrick then raised the 34-ton, 108-ft. spliced girder into position on the cantilever section where they were bolted together. The other girder span was erected in the same manner.

The flanges of the connected girders were fastened with splice plates connected by 1 1/8-in. diameter, 7 1/2-in. long high tensile bolts. One inch diameter high tensile bolts were used in the web connections.

Changing to simple supports

At this point, the spans were actually continuous, extending over pier 2 clear back to abutment one. The next step would be to convert this long span into two shorter simple spans linking the abutment and pier 2 and between pier 2 and pier 3. To relieve the stress at the temporary splice over pier 2, two 50-ton Norton jacks were set under the ends of the girders at pier 3. By using the jacks to elevate the ends of the girders some 16 in., the stress at the temporary splices could be relieved, the bolts removed and the extra four

inches trimmed from the oversize girders by torch. When seated in the anchor shoes of the piers, each of the girder sections then became a simple span linking the two piers and the pier and abutment.

On the Putah Creek Bridge, the first 75-ft. span between abutment No. 1 and pier No. 2 was erected by crawler crane. The derrick was set up on first span and erected the first one-third of second span landing the girders on pier 2 and a falsework tower. The derrick moved out on this portion of the span and erected the remaining two-thirds of the span to pier 3. The balance of the bridge was erected using the same cantilever method used on the Pope Creek. The piers for both bridges were constructed of reinforced concrete.

As opposite girders were seated on the pier shoes, lateral trusses of tees and channels were used to tie them together. The lateral trusses were connected to stiffeners and the girder web by high tensile bolts; each of the lateral trusses was fabricated in the shop by riveting. There was no field riveting. All members were spliced by welding and by high tensile bolts.

The two bridges were designed by the Bridge Department of the California State Division of Highways for the County of Napa.



It looks like a dry year—

Runoff forecast for Western States

HOMER J. STOCKWELL

Fort Collins, Colorado
and

NORMAN S. HALL

Reno, Nevada
Snow Survey Supervisors
Soil Conservation Service

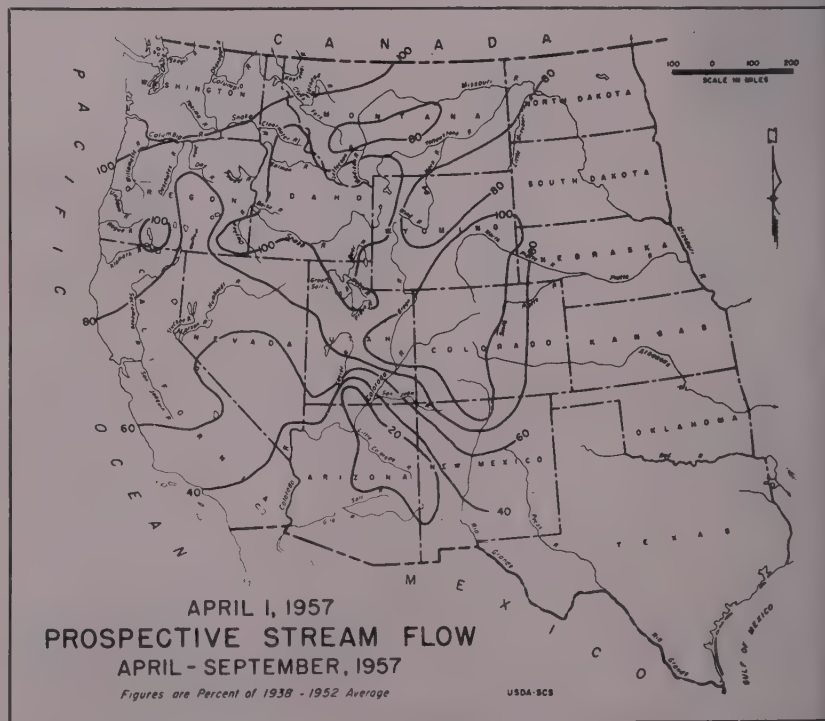
NO EXTREMELY HEAVY snow packs were measured near the end of the snow season in 1957. Streamflow will exceed normal in only a few locations of the Pacific Northwest. Forecasts of streamflow by the Soil Conservation Service does not exceed 115% of normal. No extremely heavy flow is expected on any streams during the snowmelt season. This is in sharp contrast to a year ago when heavy flows occurred in the Columbia River and its tributaries and in other streams adjacent to this major watershed. In the extreme drouth areas of the Southwest there generally has been some improvement over a year ago, but the shortage of water is definitely serious. Prospective supplies for parts of Colorado, Utah, and California will be deficient. Severe shortages, comparable to the past two

years or more, are in prospect for New Mexico and Arizona. Streamflow will be below average for most areas in California. Late season shortages may be expected where carry-over storage is not adequate.

Forecasts of 1957 irrigation water supplies in the West are based on April 1 measurements by the U. S.

Department of Agriculture, Soil Conservation Service and many other organizations on about 1,300 snow courses. Water content of the snow, soil mixture conditions under the snow as well as in irrigated areas, and the amount of carryover storage in nearly 200 reservoirs, are considered in appraising the supply outlook.

1. The Soil Conservation Service coordinates snow surveys conducted by its staff and many cooperators, including the Bureau of Reclamation, Forest Service, Geological Survey, other Federal bureaus, various departments of the several states, irrigation districts, power companies, and others. The California State Department of Water Resources, which conducts snow surveys in that state, contributed the California figures appearing in this article. The Water Rights Branch, British Columbia Department of Lands and Forests, has charge of the snow surveys in that province and likewise contributed the information here for British Columbia.



Although runoff will be about average in the Pacific Northwest, only isolated areas will experience water shortages. Water supplies will exceed the usual demands along the main streams in Montana, Idaho, Washington, and Oregon. As usual, some shortages are expected on smaller tributaries without adequate storage. Because of heavy streamflow last year, and the resulting carryover, storage in irrigation reservoirs is above normal. Mountain soils are wet and soils in irrigated areas are in fair to good condition as far as moisture is concerned. This favorable outlook extends from the Northwest to northern and central Utah and the Colorado River drainage of Western Wyoming and Colorado.

Mild water shortages may occur on Wyoming and Colorado streams, east of the Continental Divide. Winter snow pack has been much above normal, but years of drouth have reduced the amount of water to be expected from a generous snow pack. Unless summer rainfall is above normal, rather severe shortages of water will be experienced on the lower reaches of the South Platte in Colorado and the Arkansas in Colorado and Kansas. Soil moisture conditions, particularly near the mountains, were improved by major early April storms on the plains.

The outlook for the Rio Grande in New Mexico is substantially improved over 1956 but continued water shortages will be experienced, especially in New Mexico. In Arizona, the water supply is again critical, similar to the past several years. Water demands far outstrip surface supply. Less reservoir storage is available than for any recent year. No surface water is available from San Carlos reservoir on the Gila River. It's dry! Extensive use of groundwater to supplement surface water for irrigation will be needed in New Mexico and Arizona. The prospective lack of streamflow extends to southern parts of Utah and Nevada.

Streamflow in California and Nevada will be below normal. In California's Central Valley surface water may become critically short in late season on streams which do not have carryover storage. Shortage may also be expected for coastal areas and Southern California. Considerable dependence will be placed on importations. In Nevada, irrigation season water supplies will be normal in Paradise Valley, north of Winnemucca, and fair to poor in other areas depending on storage rights.

The table lists the forecasts of flow for some typical streams of the West.

Western Runoff Forecasts for 1957

	Runoff 1,000 ac. ft.	April-Sept., incl. per cent of normal
RIO GRANDE		
South Fork at South Fork, Colo.	140	106
Rio Grande at Del Norte, Colo.	565	100
Conejos at Mogote, Colo.	240	109
Inflow to El Vado Reservoir	285	108
Rio Grande at Otowi Bridge, N. Mex.	700	82
Pecos River at Pecos, N. Mex.	35	56
PLATTE RIVER BASIN		
Poudre at Canon, Colo.	240	109
Clear Creek at Golden, Colo.	140	94
No. Platte at Saratoga, Wyo.	700	107
ARKANSAS RIVER BASIN		
Arkansas at Pueblo, Colo.	400	100
MISSOURI		
Yellowstone at Corwin Springs, Mont.	1,885	101
Wind River below Boysen Reserv., Wyo.	675	72
Madison nr. West Yellowstone, Mont.	210	106
Jefferson at Sappington, Mont.	879	83
Missouri at Fort Benton	2,037	80
Clark Fork at Chance, Mont.	583	101
COLUMBIA BASIN		
Columbia at Birchbank, B. C.	42,760	107
Clark Fork nr. Plains, Mont.	10,435	97
Clark Fork at Cabinet Gorge, Mont.	11,746	97
Pend Oreille blw. Z Canyon, Mont.	14,247	97
Flathead nr. Polson, Mont.	6,618	102
So. Fork Flathead nr. Columbia Falls, Mont.	2,046	99
Columbia at The Dalles, Ore.	103,890	107
Umatilla at Pendleton, Ore.	155	92
Powder at Salisbury, Ore.	64	101
Owyhee Res., net inflow, Ore.	400	87
Deschutes at Benham Falls, Ore.	485	95
McKenzie nr. Vida, Ore.	1,080	90
Willamette at Salem, Ore.	4,300	99
COLORADO BASIN		
Salt at Intake, Ariz.	50*	293
Gila at Virden, Ariz.	3.5*	16
Green at Linwood, Ariz.	1,175	90
Colorado at Glenwood Springs, Colo.	1,700	110
Roaring Fork at Glenwood Springs, Colo.	900	116
San Juan at Rosa, N. Mex.	750	106
Animas at Durango, Colo.	550	105
Dolores at Dolores, Colo.	250	80
Colorado at Grand Canyon, Ariz.	10,100	100
Duchesne nr. Tabiona, Utah	123	101
GREAT BASIN		
E. Walker, nr. Bridgeport, Calif.	37**	51
W. Walker nr. Coleville, Calif.	111***	69
Carson nr. Carson City, Nev.	145***	76
Humboldt at Palisade, Nev.	187***	75
Truckee at Farad, Calif.	202***	72
Bear at Harer, Idaho	270	96
Weber nr. Oakley, Utah	131	102
Provo at Vivian Park, Utah	156	94
OREGON AND CALIFORNIA COASTAL		
Upper Klamath Lake, net infl., Ore.	640	122
Rogue above Prospect, Ore.	280	88
No. Umpqua blw. Lake Creek, Ore.	146	89
Sacramento (Shasta Res. infl.) Calif.	1,650***	89
Feather nr. Oroville, Calif.	1,450***	71
Yuba nr. Smartville, Calif.	860***	74
American at Fair Oaks, Calif.	1,050***	73
Mokelumne nr. Mokelumne Hill, Calif.	355***	70
Stanislaus blw. Melones Power House, Calif.	510***	66
Tuolumne abv. La Grange Dam, Calif.	820***	65
Merced at Exchequer, Calif.	390***	60
San Joaquin blw. Friant, Calif.	750***	59
Kings River at Piedra, Calif.	730***	59
Kaweah River nr. Three Rivers, Calif.	160***	57
Tule River nr. Porterville, Calif.	16***	33
Kern River nr. Bakersfield, Calif.	210***	44

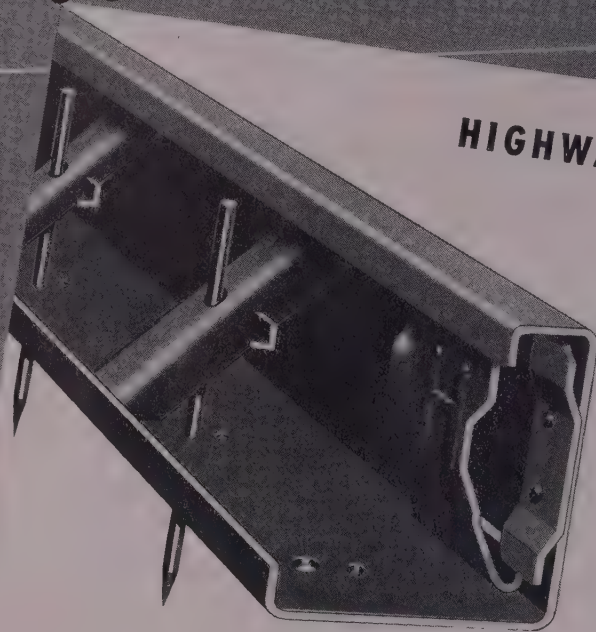
* Jan.-May

** April-August

*** April-July

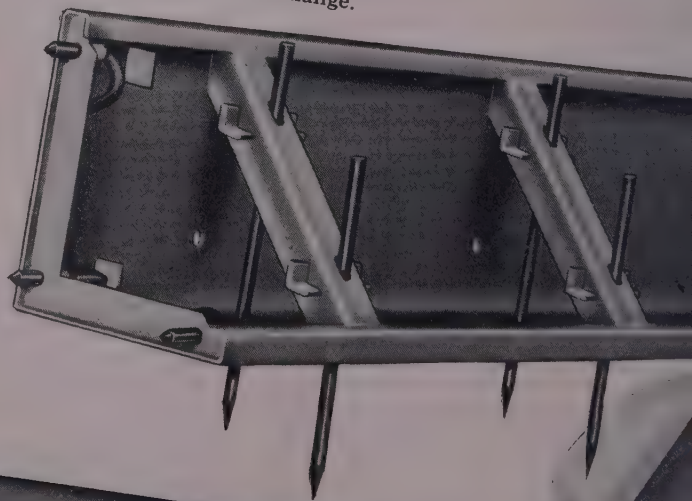
Here's the greatest Steelever offered!!

HIGHWAY AND AIRPORT FORMS



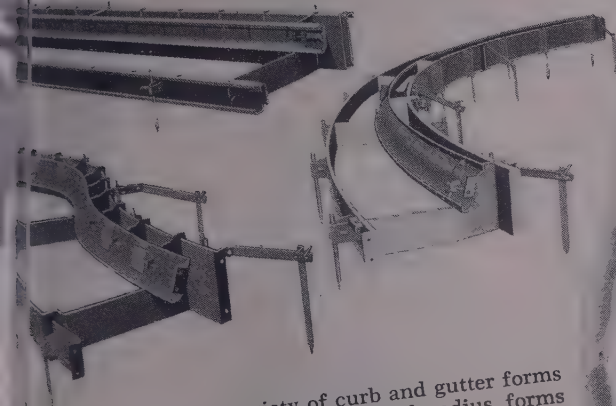
Redesigned Road Forms engineered by America's foremost form builder, are stronger, easier to align, faster setting than ever before. Built to contractors specifications, these new forms will take plenty of punishment and give years of service. They are now available with or without upturned base flange.

Heltzel's husky Dual Duty Forms have long been the favorites of contractors who build airport runways and ramps. These forms come in a number of double faces to enable contractors to pour two slab thicknesses with the same form.



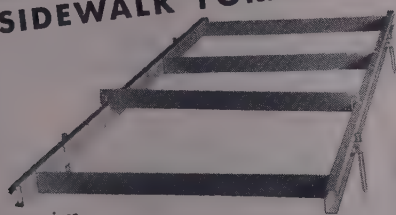
Form Value

CURB AND GUTTER FORMS



Heltzel builds the widest variety of curb and gutter forms in the industry. Straight, flexible or rigid radius forms in many face and style. You'll want to know about the joined curb and gutter forms with the interchangeable sections that permit many styles from the same basic design... a real cost saver!

SIDEWALK FORMS



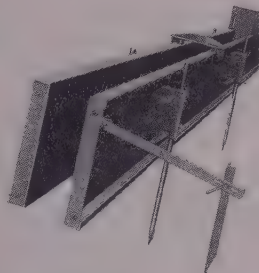
Here's an improved design sidewalk form with built-in Heltzel quality that assures lifetime performance. Division plate slots are spaced in one foot increments for better pouring practice.

HELTZEL STEEL FORMS

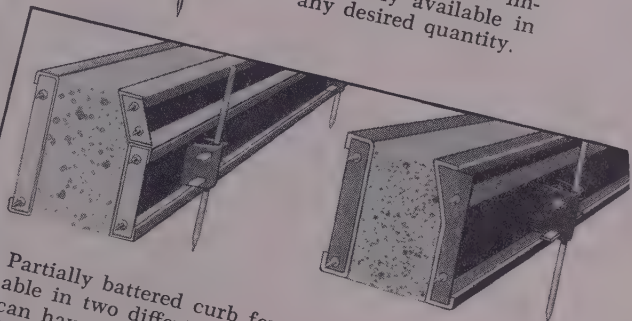


CURB FORMS

Heltzel Curb Forms now have full length stake pockets that add to form rigidity—make staking faster, more positive. Forms are made of prime steels

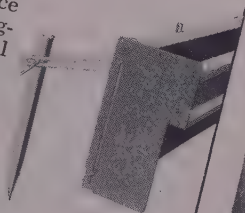


that have rerolled rail stakes. Battered or straight face in straight, fixed or flexible radius styles immediately available in any desired quantity.



Partially battered curb forms are available in two different types. Contractors can have either the single or two piece form. Both have the strength and ruggedness that is typical of Heltzel Steel Forms.

Adjacent forms for adding curbing to slabs already in are available in the widest variety of combinations.



SPECIAL FORMS

Whatever your forming needs it pays to specify Heltzel Forms. Heltzel will build forms to meet any specifications — for islands, foundations, driveways, piling, etc. Literature available on all form types and styles.



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THE HELTZEL STEEL FORM AND IRON CO., 407 THOMAS RD., WARREN, OHIO

The accelerated highway program

In a talk before the contractors of the American Road Builders Association, A. C. Clark, assistant commissioner, Bureau of Public Roads, presented a concise and forward looking analysis of the National Highway Program, as it enters the first active construction season. This discussion is so helpful in understanding the present status of the multi-billion dollar job, and the problems yet to be solved, that it is presented in full to the readers of WESTERN CONSTRUCTION.

Editor

WHAT IS MEANT BY, "the accelerated highway program?" A few facts will clarify this phrase as it applies to the present and to the immediate future.

One hour after the President signed the Federal-Aid Highway Act of 1956 into law on June 29, the Secretary of Commerce signed the Certificate of Apportionment for the first year's authorization of \$1,125,000,000. Furthermore, in order to accelerate the program as rapidly as possible, he made an additional apportionment to the states on Aug. 1, 1956, of \$2,550,000,000 for the fiscal year 1958.

These funds have not been lying around. In 1954, Federal-aid contracts advertised and funds obligated amounted to approximately \$650,000,000; in 1955, this amount rose to about \$850,000,000; in 1956, it was over \$1,500,000,000.

What about the future? When the 1959 apportionment is made, probably on July 1, 1957, \$6,500,000,000 will have been apportioned to the states in one year. This is more than had been apportioned in any previous 14-yr. period in history. More Federal-aid highway funds will be available to the states in the first four years of the new program than in the previous 40 yr. of Federal-aid combined.

We have made considerable progress. A year ago the discussions emphasized facts about the need for a continuing Federal-aid highway program. The Congress has now authorized such a long range construction program. For the first time in highway history we are taking a long look into the future. We are designing and constructing a national system to han-

dle the traffic volume of 20 yr. from now.

We now have a target date of 13 to 15 yr. in the future to complete the job. Contractors and roadbuilders have their first genuine opportunity to do effective long range planning. They can order new equipment confident that these machines will be kept busy not for six months or a year, but during the life of the program. They can recruit and train necessary additions to their working force. From now on piecemeal programs based upon season-to-season estimates of available highway funds should be a thing of the past. Material and equipment production and contract lettings can be engineered and scheduled to complete the National System of Interstate and Defense Highways as date lined.

Contractors still below capacity

The large number of bids being received on highway contracts disclose that contractors are still working at levels considerably below their capacity. Engineering is being accelerated to absorb that capacity.

Progress has been made in synchronizing engineering to the needs of the accelerated highway program. Less than three weeks after passage of the Federal-Aid Highway Act of 1956, the Bureau of Public Roads on July 17, 1956, approved geometric design standards for the Interstate system that had been adopted by the American Association of State Highway Officials.

The next engineering requirement was the preparation of detailed estimates of the cost to complete the Interstate system to these standards. In order to have a uniform basis for these estimates, the Bureau of Public Roads prepared, field tested in three states and then distributed last October an instruction manual for the preparation and submission of this information.

Cost estimating under way

In addition, a guide for estimating 1975 traffic by route sections was developed and distributed to the states. The preparation of the cost estimates is now well under way. Personnel of the Washington staff have visited all regional offices to insure that these estimates are consistent and realistic. The schedule calls for completion of

the field work by the end of fiscal year 1957 and we expect that schedule will be met.

Congress, in the 1956 Act, authorized the use of photogrammetry wherever practicable, to expedite engineering. To assist the states in taking advantage of this authorization to conserve engineering time, the Bureau of Public Roads with the cooperation of the American Society of Photogrammetry and the American Congress on Surveying and Mapping has published a Reference Guide Outline. This publication contains specifications for aerial surveys and mapping by photogrammetric methods for highways. This guide has also been distributed to the state highway departments.

Besides encouraging the highway departments toward wider use of these photogrammetric techniques, we have been working closely with them in developing additional applications of electronic computers in further expediting highway engineering. Meetings have been held in Atlanta, Albany, Chicago, and in Los Angeles to acquaint highway officials with the application of both photogrammetry and the high-speed computers. That interest in these subjects is high was demonstrated by the fact that busy highway officials took time to attend these meetings.

17 states have computers

The meetings have already borne fruit. There are now 17 states that have electronic computers installed or on order. Most of the others are investigating the use of these machines in their operations. Many of these will soon install machines or utilize the computer service now available on a rental basis in 114 cities, in 39 states and the District of Columbia.

This is certain from the increasing number of applications which have been developed and are now in everyday use by highway departments. There include computations involved in bridge design, traffic analysis, surveys, hydraulic design and many others.

These preliminary activities will directly affect the contractors who will put this work in place. For example, the cost estimates now being prepared for the Interstate system

(Continued on page 104)

ANOTHER

NEW "Euc"

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...25 yards heaped



300 HORSEPOWER • TORQMATIC DRIVE

...high speed production over the long hauls

Consider this new Euclid for your earthmoving requirements. Designed for increased production on the long haul scraper jobs, the SS-18 combines power, speed and 18-yard struck capacity.

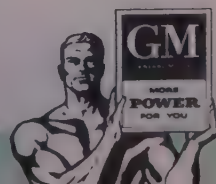
Six-wheel design provides good weight distribution and the stability needed for high speed, long hauls. A 300 h.p. diesel supplies the power through Torqmatic Drive. There's no clutch — change from any one of the three speed ranges to another is made under full power. Both drive and scraper tires are 24.00 x 25, with 29.5 x 25 optional for jobs requiring maximum traction and flotation.

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FOR MOVING EARTH, ROCK, COAL AND ORE



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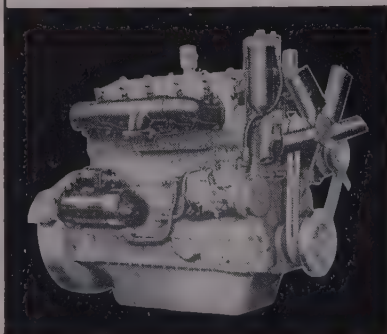
2¼ yard MICHIGAN gets fast maneuverability with WAUKESHA

Diesel

● Looks too tough for a rubber-tired tractor shovel. But, Waukesha-powered with a 135-DKB Diesel, this 2¼ yard Michigan 175-A is excavating granite overburden in development work at the Crystal fluorspar mine, near Darby, Montana, at 6900 ft. elevation. 500 tons per 7-hr. day! Good going, but it takes power and lots of it—the smooth, speedy, flexible power of a Waukesha Diesel. This same 175-A Michigan loads fluorspar ore, too, “hopping” from one 12-ft. bench to another... to blend the grade of ore which varies at different bench levels. 400 blended tons per 7-hr. day takes speed and mobility.

339

135-DKB Diesel—4¼-in. bore x 5-in. stroke; 426 cu. in. displacement, with counter-balanced crankshaft. **Get Bulletin 1573.**



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LOS ANGELES

Structural Design Chart—X



By
THOMAS HARAN
Civil Engineer

IN LAST MONTH's issue of WESTERN CONSTRUCTION, Chart No. 9 was presented as an illustrated condensation of the structural design requirements for walls taken from “The ACI Building Code” (ACI 318-51). The middle section of Chart No. 9 set forth various stipulations for walls with minimum percentages of steel reinforcement. Chart No. 10, which appears on the opposite page, is an extension of Chart No. 9.

It gives under “As/1 needed” the cross-sectional areas of steel that are required to satisfy the minimum steel ratios of .0025 bt = .0216 t for welded wire fabric. In adjacent columns it gives sizes and spacings of bars and the stock sizes of welded wire fabrics with the actual steel areas they supply indicated under “As/1.”

The Chart covers walls of 5 to 14 in. in thickness. Walls of more than 10-in. thickness are given with two curtains of steel, as required by the Code. Walls of 10 in. and less are shown with a single curtain of steel which is permitted by the Code; although the designer may, at his option, use a double curtain of reinforcing.

Should he desire, for example, to use two curtains of reinforcing in a 10-in. thick wall, he could use No. 4 bars spaced at 8 in. on centers placed as indicated by the dimension “s” shown in the cross-section of 2-curtain steel wall on the lower right side of the Chart. This actually results then in one curtain of No. 4 @ 16 in. for each face of wall. If welded wire fabric were preferred a curtain of 6x6-2/2 could be used at each face.

Next month, WESTERN CONSTRUCTION will publish Chart No. 1—“Structural Analysis and Design of Isolated Footings.”

A. C. I. MINIMUM WALL STEEL

†	BARS				W W F			POSITION
	A_s/l NEEDED	#	S	A_s/l	A_s/l NEEDED	SIZE	A_s/l	
5"	.15 ^{"2}	3	9"	.15 ^{"2}	.108 ^{"2}	6 x 6 - 2/2	.108 ^{"2}	
		4	16	.15				
6	.18	3	7 1/2	.18	.130	6 x 6 - 1/1	.126	
		4	13	.18				
7	.21	3	6	.22	.151	6 x 6 - 0/0	.148	
		4	11 1/2	.21				
		5	17 1/2	.21				
8	.24	3	5 1/2	.24	.173	2 - 6 x 6 - 3/3	.186	
		4	10	.24				
		5	15 1/2	.24				
9	.27	3	4 1/2	.29	.194	6 x 6 - 2/2 6 x 6 - 3/3	.108 .093 .201	
		4	9	.27				
		5	14	.27				
10	.30	4	8	.30	.216	2 - 6 x 6 - 2/2	.216	
		5	12 1/2	.30				
		6	17 1/2	.30				
11	.33	3	4	.33	.238	2 - 4 x 4 - 4/4	.240	
		4	7	.34				
		5	11	.34				
		6	16	.33				
12	.36	3	3 1/2	.38	.259	2 - 6 x 6 - 1/1	.252	
		4	6 1/2	.37				
		5	10	.37				
		6	14 1/2	.36				
13	.39	4	6	.40	.281	2 - 6 x 6 - 0/0	.296	
		5	9 1/2	.39				
		6	13 1/2	.39				
		7	18	.40				
14	.42	4	5 1/2	.44	.302	4 x 4 - 10/10 6 x 6 - 0/0 6 x 6 - 0/0	.043 .148 .191 .148 .339	
		5	8 1/2	.44				
		6	12 1/2	.42				
		7	17	.42				

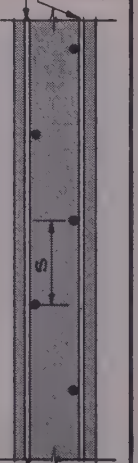
BARS

$\frac{1}{2} A_s/l$
 $\frac{1}{2} A_s/l$

W W F
 $\geq \frac{1}{2} A_s/l$
 $\geq \frac{2}{3} A_s/l$

T. HARAN

BARS
 $\frac{1}{2} A_s/l$
 $\frac{1}{2} A_s/l$



W W F
 $\frac{5}{8} A_s/l$
 $\frac{2}{3} A_s/l$

T. HARAN

Flood prevention funds for California

SENATOR Thomas H. Kuchel, California, has reported the way will be cleared for more than \$180,000,000 of additional Federally-financed California flood prevention projects, if the House concurs in a \$1,500,000,000 omnibus public works bill approved by the Senate. Important results of the bill overwhelmingly passed by the Senate would be assurance of continued Federal support over varying periods of years for comprehensive basin-wide flood control programs, Kuchel said. He explained the bill would authorize substantial additional appropriations in later years for work on the Sacramento River, San Joaquin River, Kaweah-Tule Rivers, Los Angeles Basin, and Santa Ana Basin development plans.

The feature relating to Oroville Dam provides for an outright Federal grant to the state equal to the cost of flood prevention benefits expected from this huge structure. The Public Works Committee estimated the United States contribution will be approximately \$50,000,000.

Language changes in the bill adopted at Kuchel's suggestion provided that the President must approve the finding by Army Engineers about flood control values from the project and allow the State four years—instead of two as authorized in the vetoed 1956 bill—to begin actual construction.

While the bulk of the authorizations

are extensions of previously-approved projects, the bill would make possible two large dams, Buchanan on the Chowchilla Reservoir and Hidden on the Fresno River, and one levee job on the Eel River never before authorized by Congress.

The new California flood-prevention work which Kuchel said enactment of the bill will make possible is:

Sacramento River (general program), \$17,000,000; Sacramento River (Chico Landing-Red Bluff), \$1,560,000; Eel River (Sandy Prairie project), \$707,000; San Joaquin River (general program), \$13,000,000; Buchanan Reservoir (Chowchilla River), \$10,900,000; Hidden Reservoir (Fresno River), \$12,500,000; Kaweah and Tule Basins (general plan), \$28,000,000; Los Angeles Basin, (general plan), \$44,000,000; and Santa Ana Basin (general plan), \$3,000,000.

News of Glen Canyon: Lands and low bids

AN ORDER has been signed granting the Bureau of Reclamation the use and occupancy of Navajo tribal lands needed for Glen Canyon Dam and Reservoir. The Navajo Tribal Council previously adopted a resolution endorsing this action by Secretary Seaton with provision that legislation be pushed in Congress

for an exchange of an equal acreage of land to be added to the Navajo reservation. The order clears the way for selection of the site of the government and construction town. This permitted opening of bids for the prime construction contract for Glen Canyon Dam on April 11, with Merritt-Chapman & Scott Corp., New York City, low at \$107,000,000. Next was joint venture headed by Guy F. Atkinson Co., with \$118,000,000. Morrison-Knudsen Co., Inc., was third with a bid of \$120,000,000. Engineer's estimate was \$135,000,000.

The town, which is expected to house a maximum of 12,000 people during the peak construction period, will be located on the southeast side of the river approximately one-half mile away from the dam site. It will be known as Page, Arizona, in honor of the late John C. Page, who was Commissioner of Reclamation from 1937 to 1943.

The Navajo Tribe has indicated that it wishes to obtain land adjacent to the reservation in Utah in exchange for the approximately 53,000 acres of land it is giving up for Glen Canyon Dam and Reservoir. Approximately three-fifths of the land it is giving up for the reservoir is in Utah. Although Glen Canyon Dam is to be constructed in Arizona, eight miles south of the Utah State line, it will back water up to the Colorado River 185 mi. and up the San Juan River 71 mi. Most of the inundated area will be in Utah.

Utah firm gets contract for work on US 40

AWARD of a \$4,976,000 contract to Gibbons & Reed of Salt Lake City by the California Divisions of Highways will modernize and bring up to interstate standards a 5.4-mi. section of U.S. 40 extending west from the Nevada state line. This is one of the many expensive sections of highway construction required to bring this major transcontinental route through the Sierra Nevada up to modern standards.

Work starts with the arrival of proper weather conditions and the project will be completed late in 1958. A construction problem will be the need to keep heavy traffic flowing on this highway route through the two working seasons. Delays up to two hours may be necessary on week days during summer months.

The project will be carried out under the direction of Alan S. Hart, district engineer with headquarters at Marysville.



GLEN CANYON LOW BID IS \$107,955,122

Officials meet with a representative of Merritt-Chapman & Scott Corp. of New York City, low bidder on Glen Canyon Project. L. to r., seated: William Denny, vice president, M-C & S Corp.; L. F. Wylie, project engineer on Glen Canyon Project. Standing, l. to r., Jim Fordham, project administrative officer and Howard Fink, B. of R. office engineer.



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Here are some of the exclusive Mack features—wide selection of Mack or stock diesels ranging from 170 to 400 hp, each delivering maximum torque at low r.p.m. . . . superior Mack transmissions with two-speed compound or torque converter . . . planetary gear reduction in rear-axle wheel hubs for smooth power transfer without excessively large gears in the carriers . . . the exclusive Mack Balanced Bogie with Power Divider, the four-wheel, rear-axle drive that delivers maximum power to the wheels with traction . . . many models available from stock, the units you want with the engines

and transmissions or converters you need supplied upon gratifyingly short notice.

Why not investigate the large-capacity economy afforded by the complete line of Mack off-highway dumpers? Invite your Mack representative to give you full details and specifications. Mack Trucks, Inc., Los Angeles, Denver, San Francisco, Seattle, Portland, Salt Lake City, Albuquerque.

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POWERHOUSE EXCAVATION UNDER WAY AT PRIEST RAPIDS DAM

EXCAVATION for the powerhouse foundation at Priest Rapids damsite goes on behind a solid wall of steel and rock. There are 23 cells for this first phase of powerhouse construction, each 54 ft. in diameter. The second stage cofferdam has been closed off. A low structure, it will be topped by high water during June and July. After the high water

recedes, the cofferdam will be pumped out and work will start on 11 bays of the concrete spillway. At present, 749 men are employed by Merritt-Chapman & Scott who are building the dam for the Grant County PUD. As many as 2,000 men will be working on the project this summer at peak of construction. (Photo by Bethlehem Pacific)

Oroville road work advertised

Railroad and highway relocation out for bids under \$25,000,000 appropriation.

BIDS FOR RELOCATING portions of the Western Pacific Railroad around Oroville Dam and reservoir site were advertised on March 29 by the California Department of Water Resources, according to Harvey O. Banks, director. Work included in this call for bids will be the first to be started under a \$25,-190,000 urgency appropriation by the legislature.

The following month bids will be called for a 13.2-mi. portion of U. S. Highway 40-Alternate relocation in the same general area. The new route in its entirety will be about 19.3 mi. in length and will replace 20.5 mi. of the existing route. Both projects are preparatory to construction of the dam, a key feature of the Feather River Project, Banks said. Preparation of documents for the bid call has been under way since the urgency appropriation was approved.

Included in the first contract will be construction of the two most northerly of five railroad tunnels necessary for relocation of the railroad. It will be necessary to replace 27 mi. of rail line

with 23 mi. of track to the west of the present alignment. The entire relocation job, including the major highway and railroad, a logging railroad, county road, canals and utilities, will cost about \$50,000,000, and will require two and one half years to complete.

One of the two railroad tunnels which are scheduled for construction will be about 4,400 ft. long and the second tunnel will be approximately 8,800 ft. long. Both are near Big Bend, about 14 mi. east of Oroville. Tunnels will be all concrete lined throughout and the finished inside dimensions will be 18 ft. in width, with the crown of each tunnel 24 ft. above top of rail.

Contract for construction of the first two tunnels (known as Tunnels 4 and 5) calls for 310,000 cu. yd. of excavation, 100,000 yd. of concrete tunnel lining, 5,000 tons of reinforcing steel and 5,000 tons of steel tunnel bracing.

Three other tunnels of similar size will be advertised for bids in May. One tunnel will be located in a loop of the railroad just south of the West Branch of the Feather River near Pentz. This curved tunnel will be 2,825 ft. long.

Tunnel 2, located directly north of the West Branch of the Feather River, where the proposed highway and railroad cross the river on a combination bridge, will be 2,970 ft. long, and Tun-

nel 3, directly north of Tunnel 2, will be 2,700 ft. in length.

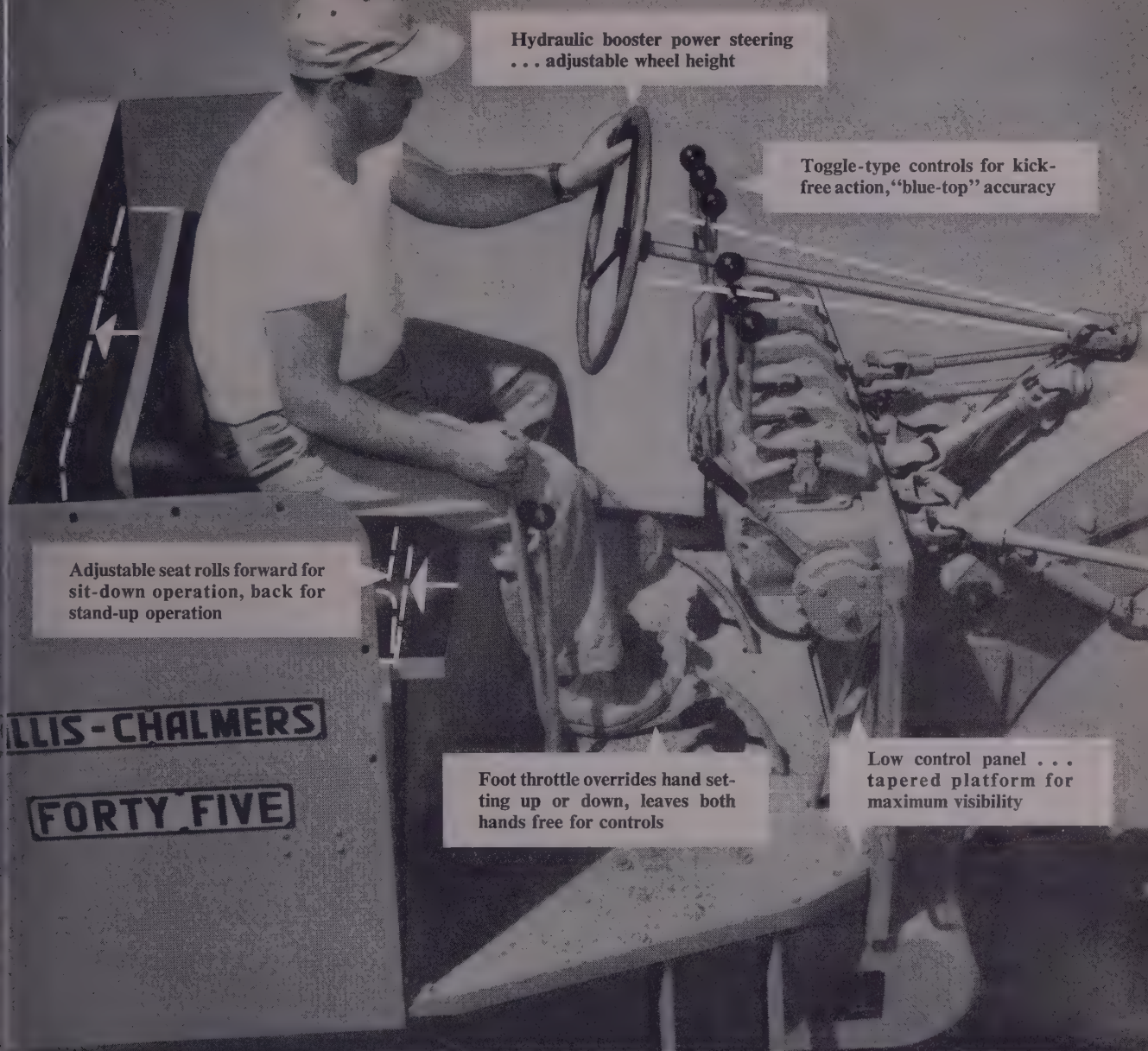
The Division of Highways, under plans and specifications already prepared by them under contract to the Department of Water Resources, will advertise for bids for construction of the proposed relocation of U. S. Highway 40-Alternate from Wicks Corner, located about 6 mi. northwest of Oroville, to Jarboe Gap, about 15 mi. north of Oroville, where the proposed highway will join the present route. This contract will exclude construction of the combination railroad and highway bridge across the West Branch of the Feather River.

Major item of the highway construction will be nearly 3,500,000 cu. yd. of roadway excavation.

In connection with the highway construction project, the Division of Highways will do 666,000 cu. yd. of railroad grading, including drainage facilities, where the proposed railroad will parallel the new highway at Vinton Gulch.

The Division of Highways contract will also include construction of a 1,285-ft. siphon, known as the Vinton Gulch Siphon, located in the Upper Miocene Canal belonging to Pacific Gas and Electric Co. The siphon will be of 42-in. welded steel pipe, to carry the canal under the new highway.

Included in the Department's budget plans for the 1957-58 fiscal year is construction of the combined railroad and highway bridge across the West Branch



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Toggle-type controls for kick-free action, "blue-top" accuracy

Adjustable seat rolls forward for sit-down operation, back for stand-up operation

Foot throttle overrides hand setting up or down, leaves both hands free for controls

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SOUTHERN CALIFORNIA

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San Joaquin Tractor Co.—Bakersfield
Show Sales & Service Co.—Los Angeles and San Diego

IDAHO

Southern Idaho Equipment Co.—Idaho Falls and Twin Falls
Southern Idaho Equipment Co. of Boise, Inc.—Boise

MONTANA

Mountain Tractor Company—Missoula and Kalispell
Richland Machinery Company—Sidney
Seltz Machinery Company, Inc.—
Billings and Great Falls

NEVADA

A D Machinery Company, Inc.—Elko and Las Vegas
Reno Equipment Sales Co.—Reno

OREGON

Hauptert Tractor Company—Medford and Klamath Falls
Wood Tractor Company—Portland
Timber Tractor Company—Springfield

UTAH

Cate Equipment Company—Salt Lake City

WASHINGTON

Pacific Hoist & Derrick Company—Seattle
American Machine Company—Spokane

WYOMING

Studer Tractor & Equipment Company—Casper

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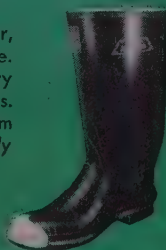
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"Hardboiled" Safety Hats in fibreglass or aluminum. Light weight and comfortable, yet providing greatest possible head protection. Exceed highest established requirements for strength, heat and moisture resistance, and dielectric tests.

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of the Feather River. The bridge will be a double-deck continuous steel truss, with the upper deck a four-lane highway and with a single track railroad on the lower deck. Overall length of the bridge will be 1,800 ft., including a center span of 576 ft., two side spans each 432 ft. long, and a 360-ft. approach span on the south side of the river. The bridge will be supported by three main piers, the tallest of which will be 240 ft. high above natural ground.

Proposed construction also includes two major railroad bridges in addition to the combination railroad-highway bridge described. One railroad bridge will cross the Feather River just above the proposed afterbay dam near Oroville. The other will cross the North Fork of the Feather River near the northerly intersection of the existing rail route with the new route.

Scheduled also for call for bids during the first half of the 1957-58 fiscal year will be the state highway between Oroville and Wicks Corner, and a program of five schedules which will complete grading for the new railroad and provide ballast, ties, rails, sub-base and telegraph lines and signal equipment.

Additional funds have been requested for expenditure in the same fiscal year for relocation of a county road and relocation of the Feather River Railway, including a bridge across the South Fork of the Feather River.

Prestressed concrete subject of conference

PLANS are well advanced for the World Conference on Prestressed Concrete to be held in San Francisco July 29 to August 2. Similar international congresses on the subject have been held previously in London and Amsterdam. This year's congress in San Francisco will be held



WHEN a flooding mountain stream near Bridalveil Falls in Yosemite National Park washed out an existing sewer, more than 12,000 ft. of welded steel pipe was rushed to the scene to serve as an emergency sewer. Here it is shown suspended over the stream from wire cables. (Armco Drainage & Metal Products, Inc.)

concurrently with meeting of the Prestressed Concrete Institute. Other technical societies cooperating in the meeting include The American Concrete Institute, American Society of Civil Engineers, American Association of State Highway Officials, American Railway Engineering Association, American Institute of Architects and the Portland Cement Association.

Professor T. Y. Lin of the University of California is general chairman for the conference. He is being assisted in the planning by Professors J. W. Kelly, Alexander C. Scordelis, and Kenneth L. Downes, Jr., all of the University of California. Others active in arrangements are Ben C. Gerwick, Jr., and Robert Singer of the Ben C. Gerwick organization, Harold A. Price and Jack Streblow of Basalt Rock Company, Inc.

Welded design contest for highway bridges

THE JAMES F. LINCOLN Arc Welding Foundation, Cleveland, Ohio, has announced a new bridge design competition offering a total of \$50,000 in awards for designs of welded highway bridges. Awards will be made to the best designs submitted for highway bridges that are or could become a part of the national system of interstate and defense highways. Any type of bridge either built or proposed can be submitted so long as it conforms to the general requirements of the interstate and defense highway system. A total of 16 awards will be made with a top award of \$10,000. Designs will be judged on quality of detail, economy in material and labor, cost savings and appearance.

The Foundation hopes, through entries in the competition, to make a significant contribution to the successful and economical construction of the nation's highways. It is the purpose of the competition to encourage the creation of bridge designs which will save steel and money and produce structures of beauty, safety and efficiency.

Surveys among states now using welded construction indicate a savings of 10 to 35% through the use of welded designs. Further, The U. S. Bureau of Public Roads has issued data substantiating that savings in welded structural steel average at least 25%.

The new competition, the fourth in a series sponsored by the Foundation, is open to all residents of the United States or its possessions. Information on the preparation of entries may be obtained from The James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio.

Engineers and contractors discuss mutual problems

A JOINT DINNER meeting of the San Jose Branch (S. F. Section) of ASCE and the Peninsula group of the Engineering and Grading Contractors Asso-

ciation was held to discuss mutual problems where these engineers and contractors could work cooperatively toward their solution.

One of the topics discussed at some length was the possibility of joint efforts to sponsor local legislation which would provide protection for both engineer and contractor under faithful performance bond relating to sub-divisions in counties and cities. Another subject discussed was the matter of force account operations by local political units. The contractors also reminded engineers that licenses were issued to contractors to cover special fields of activity and that engineers should require contractors to work within the classifications for which they are qualified. Permitting contractors to carry out work outside of the fields for which he is licensed would appear to be

inconsistent with the best interests of engineer, contractor and the public.

The possibilities of establishing a joint committee between the two groups to continue the study of mutual problems were discussed at the meeting.

Headquarters for the Northern California Division of the Engineering and Grading Contractors Association has recently been moved and established at 530-G El Camino Real, San Carlos. Warren R. Mendell is Northern California manager with headquarters at this address. The Association has four Chapters in the Northern California area, with headquarters of the Central Valley Chapter at Fresno, the Peninsula Chapter embracing the area south of San Francisco, the North Bay Chapter, and a newly established chapter in the East Bay.

Cooperation between AGC and B. of R.

Commissioner Dexheimer speaks on vital subject

COOPERATION between the Bureau of Reclamation and the Associated General Contractors was reviewed by W. A. Dexheimer, Commissioner of Reclamation, at the annual convention of AGC in Washington, D. C., March 11-14. His remarks on this subject follow:

On several occasions there has been close cooperative association between task groups of AGC and the Bureau of Reclamation. The most recent meeting between representatives of the Bureau and the AGC task unit on Reclamation specifications was held during the latter part of January. As a result of these periodic conferences many specification provisions and contracting procedures have been worked out resulting in mutual benefits to the contractors and the Government.

Reducing unknown hazards

Among the problems on which the Bureau has sought the advice of contractors' groups have been methods of reducing the unknown hazards of construction and the allowance for contingencies. We have simplified and clarified contract terms and developed uniform specification requirements. We have sought to standardize our own procedures so that the contractors may expect uniformity in inspection.

Careful attention is given to the possibility of reducing cost on each specification. We have provided for payments for firm quantities, and, in some cases for early payment to contractors for capital outlay and plant equipment, and escalation for sharing increased costs due to major wage increases. On long-term jobs, we have allowed the most economical performance time consistent with physical site conditions. In order to reduce the risk confronting contractors concerning foundation conditions we are now furnishing much more subsurface information.

As a result of recommendations of the AGC, the Bureau developed a specifica-

tion clause to provide reimbursement to contractors for extra costs caused by interruptions, delays, or suspension of work which are no fault of the contractor. However, the clause as approved by the Comptroller General is not all that the industry believes is desirable. We are not permitted to include payment of added costs for delays in delivery of Government-furnished material or equipment. This matter is of such interest that the Federal Government, the various bar associations and your association now plan to study such a provision further.

Another innovation from AGC and Bureau task force work is the inclusion of a lump-sum in the specifications to cover mechanical and electrical work. To date this optional bidding method has been used in four specifications. Of 32 bidders on the four jobs, only seven did not use this option. If this method continues to receive favorable response in meeting the needs of the contractors, it will be used more extensively in future specifications.

As a means of reducing the financing costs which contractors would have to carry on such large jobs as the Glen Canyon Dam, we have revised the specifications for that job to provide for the cement and pozzolan to be furnished under a separate contract. This change will lower the initial bids and reduce the amount of bonding capacity needed.

As you know, it is our policy to carry out our construction work by contract. We are doing 99% of our work by contract at the present time. We encourage wide competition. We seek competition by circulating copies of our Advance Construction Bulletin, containing information on work forthcoming within the next 60 to 90 days to all those who have indicated an interest in the type of work proposed.

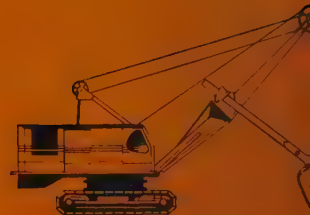
We also make wide distribution of bid announcements and specifications for bid purposes for which we make no charge to bona fide bidders. In order that the Bureau's bid openings will not conflict with those of other agencies, we try



American



Bay City



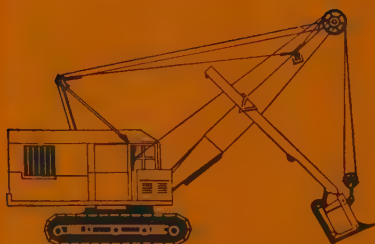
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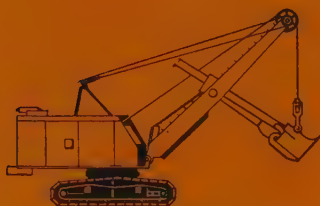
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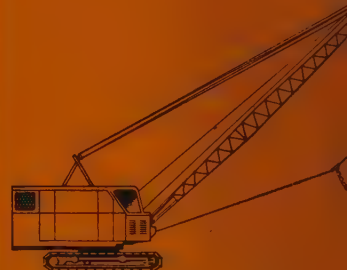
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For more information, consult your nearest equipment representative or Cummins Distributor.

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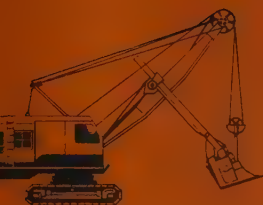
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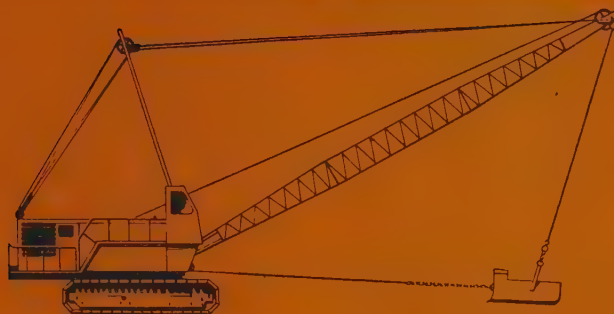
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to coordinate the time and place of bid openings to best suit the needs of the contractors.

In the interest of assisting subcontractors and small businesses in participating in our contract work, we recently started to publish the lists of those bidders requesting plans and specifications. We are now providing plan-holder lists without charge to interested parties.

There is still much to be done to improve bidding. Mistakes in bids and bidders taking exception to specification provisions have become an increasing problem in recent years. The rising incidence of arithmetical and other mistakes in bids indicate that a number of bidders are not checking their bids. These errors cause the Government a great deal of trouble, expense and delay in making award of contracts.

Bids containing mistakes are often protested by other bidders. Bidders themselves are misled by erroneous bid totals indicated at bid openings. Such irregularities and misunderstandings in bidding not only result in delaying award of contract, but cast reflections on the integrity of the bidders. Such errors often seriously delay getting a water or power supply to a critical area.

Rising spiral of costs

The inflationary tendencies in construction costs are a matter of deep concern to the Government as I am sure they are to you. Construction costs for Bureau of Reclamation work have increased about 10% during the last two years. This rising spiral of costs has accelerated during the last six months.

We appreciate that there are many factors which have pushed costs up. Wage rates on Bureau works are about 4.5% higher than a year ago. These rates will continue to rise over the next two years as a result of labor contracts recently negotiated in most of our Western states. These contracts provide for automatic increases amounting to about 8% during this period.

Cost of materials has also shot upward from the combined pressures of increased labor costs and demand for available supplies. The particular pinch is in steel which affects not only construction materials cost but also the cost of the heavy construction equipment. The average price for excavating and earth-moving equipment has increased nearly 8% during the last year. Further advances of 4 to 10% are in prospect due to increase in steel prices, labor and equipment demand. Cement costs are also rising. Cement companies have announced an increase as of the first of the year.

Present high interest rates increase the cost contractors must bear to finance their operations. Higher freight rates also add to the cost.

We recognize all these factors and are sympathetic to your problems. On the other hand there is the very distinct possibility that construction may be pricing itself out of the market. It is essential that the current pressures on inflationary

wages, fringe-benefits, materials, equipment and profit must be halted if we are to continue to maintain a progressive construction program. If inflation trends are not quickly curbed, there is little doubt in my mind that you will find all but the most essential work curtailed, delayed or stopped.

Certainly we can expect tighter Federal budgets and a drastic curtailment of the Federal public works program if construction costs get out of hand. The General Services Administration recently curtailed its lease-purchase building program until "present inflation pressures in the construction industry recede." This has resulted in suspension of lease-purchase negotiations on nearly 150 new Federal building projects. It is entirely possible that the Bureau may delay award of some contracts or the slowing down of construction to stay within our available funds.

As I have mentioned, we are sympathetic to your problems and recognize that there are many factors that are beyond your control. But there are other areas where you have exercised positive leadership and where you should continue your good work.

One is the more efficient use of available manpower. This, of course, has definite limitations due to the human capacity of the workmen and regulations imposed by contracts and Federal statutes. Another, and more lucrative field for lowering costs is the development of machines and methods which can perform more work and do it more efficiently.

In some recent construction contracts extending over several years we have included an escalation provision to share increased labor costs. However, we have placed a limitation on the amount of wages, which will be, subject to escalation. This limitation is generally 85%. We feel that the contractors should not be relieved of responsibility to exercise diligence in holding increases to the minimum and to conduct their labor management in the most efficient manner.

We try to include in our specifications provisions for better or more efficient methods. We are constantly on the alert to encourage new construction techniques. Imagination and ingenuity can play a prominent and often profitable role. We are open to suggestions where modification in our designs will permit your utilization of more modern and efficient construction techniques.

The contracting industry can assist in preventing runaway wage increases by cooperative efforts among those operating in adjacent areas and the avoidance of pirating of labor. Adjoining state AGC chapters should be alert to the need for coordination in negotiating labor agreements for work located near state boundaries.

Bidding which includes unreasonably high contingencies or margin of profit because work is plentiful must be avoided. I urge you to sharpen your pencils and figure your bids as tight and close as possible. Otherwise, you may kill the goose that lays the golden eggs.

THE NEW LORAIN HEADQUARTERS

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**SOUTHERN IDAHO
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TRACTOR & EQUIPMENT CO.
Sidney, Miles City and Glasgow, Mont.

**WORTHAM MACHINERY
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Seattle, Wash., Fairbanks and Anchorage, Alaska

T-WC-2

★ **SALES** ★ **PARTS**
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Phoenix freeway study approved, under way

THE ARIZONA State Highway Department has authorized the firm of Johannessen and Girand and Earle V. Miller, consulting engineers of Phoenix and Tucson, to accomplish the design and plans for the Durango Interchange structures for the Phoenix freeway section of the new Arizona interstate highway system now under construction.

Subsequent approval of the contract by the United States Bureau of Public Roads has been obtained and preliminary work is now under way.

The three level structure to be located near the present intersection of Durango and 23rd Avenue (Phoenix) will provide traffic interchange from three converging interstate highway routes entering the Phoenix area from the California, Flagstaff and Tucson directions.

The design project is under the supervision of Earle V. Miller, former Idaho State Highway Engineer and now head of the highway design department of Johannessen and Girand and Earle V. Miller. He estimated the construction cost of the structures to be approximately \$1,000,000.

Redwood Highway job let to Guy F. Atkinson

GUY F. ATKINSON CO., has been awarded a contract of \$6,345,594 for construction of the first unit of the Redwood Highway bypassing redwood state parks on U. S. 101 in Humboldt County. The project is between Dyerville and Englewood and involves construction of 4.4 mi. of freeways together with connections and ramps and four bridges. The California Highway Commission voted an additional \$1,121,361 of additional funds to finance the project.

A cut at the beginning of the project involves 1,400,000 cu. yd. of difficult

excavation. No haul roads can be developed on state park property outside the highway right-of-way. This cut requires construction of a detour in the stream-bed for traffic on the Redwood Highway, and as traffic must be taken off the detour before high water, the contract requires completion of this large cut by Oct. 15, 1957. If the cut is not completed by October 15, any remaining excavation must be deferred until the second construction season and the contractor will be required to restore the detour in the river at his own expense. The grading operations involved are complicated and expensive, are subject to a very tight schedule requiring exact planning, and are subject to a wide variance of opinion in estimating, according to the Division of Highways.

Brig. Gen. Hans Kramer dies, well known in West

BRIG. GEN. HANS KRAMER, Corps of Engineers, retired, well known to the construction industry of the West, died in San Francisco Feb. 16. He will be remembered as the officer in charge of construction on the Conchas Dam in New Mexico. He had also served as ROTC instructor at the California Institute of Technology shortly after his graduation from West Point in 1918.

Part of his service was in engineering work along the Mississippi River and on other dam projects carried out by the U. S. Engineers.

Retiring in 1946 because of physical disability, General Kramer established an office as consulting engineer in San Francisco and has recently served on several consulting boards including those studying the enlargement of the Panama Canal and a barrier to halt encroachment of salt water in upper San Francisco Bay. He was a member of the American Society of Civil Engineers.

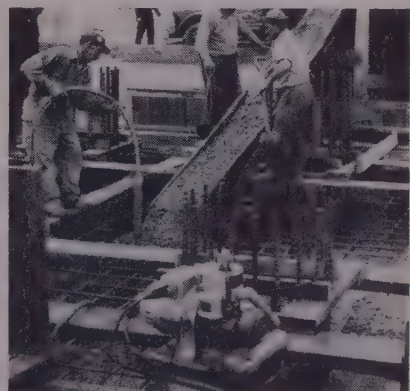
Full Line of Carryable Construction Equipment Now Offered by Homelite



Carryable Diaphragm Pump . . . This self-priming, 120 pound diaphragm pump will handle water in the thickest sand, muck, or mud. Capacity: 5,000 g.p.h. Size: 3". Complete line of centrifugal pumps are also available in sizes from 1½" to 3".



Chain Saws For Every Job . . . Now you can choose from a full line of lightweight, powerful Homelite chain saws. From 3½ to 7 horsepower . . . 19 to 29 pounds. Brush cutting and clearing attachments are available to handle all your cutting jobs.



One-Man Electric Vibrator . . . It takes only one man to place concrete with powerful, Homelite high-cycle or universal electric concrete vibrators. Carryable Homelite generator provides power for high-cycle vibrators and 110 volt DC for all universal vibrators, tools and floodlights.

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FIRST REINFORCING steel can be seen above ground on the Santa Monica Auditorium being erected at Pico Blvd. and Main St. in Santa Monica, Calif. The \$2,500,000, 2,750-person capacity general purpose auditorium is due for completion in June 1958. Architects and engineers are Welton Becket and Associates; general contractors are the C. L. Peck and the Millie and Severson construction companies.



High altitudes, narrow benches severely test this Michigan, yet every day it loads

400 tons of rock weighing 5,400 lb per cubic yard

Up in the scenic Sapphire Mountains of southwestern Montana, Cummings-Roberts Company has one of the toughest rock-loading jobs you could find anywhere.

Part of the time, they blast and load coarse mountain-top granite . . . summer and early fall, they load fluorspar. No one needs to detail what a severe test the heavy, rough granite overburden gives to *any* loader. Fluorspar, however, is even worse. A heavy rock mineral, it weighs 5,400 pounds per cubic yard—over 850 lbs more per yard than in-bank granite (and 2,200 lbs more than pit-run gravel).

Proved by demonstration

Over the years, Cummings-Roberts has tried just about every kind of loader made. Last year to increase

efficiency, their Michigan distributor, Miller Machinery Co., Missoula, suggested a Model 175A Michigan Tractor Shovel. "Frankly," Cummings-Roberts officials told them, "we don't believe *any* rubber-tire unit can load the stuff, much less do the work day in and day out. But we'll give it a try."

Result? John Taber, General Superintendent, wouldn't let them take the Michigan off the job.

Heaped loading assures proper blending

Today, the 133 hp 2¾ yard Michigan handles *all* loading of the super-heavy fluorspar. Production, with trucks on 600 ft one-way hauls to crushing mill, averages 400 tons per 7-hour day. The fluorspar, incidentally, varies considerably in grade from place to place through-



out the mine. It must be blended to give the grade desired for shipment . . . and this assignment goes to the Michigan, too. Its 27 mph mobility is a vital asset on this scattered loading; trucks never wait more than a few minutes for loading service.

Strips granite overburden — 500 tons per day!

In late autumn and sometimes in spring, the Michigan strips the granite overburden. Output averages 500 tons per 7-hour day.

Downtime negligible

With all this rugged loading of super-heavy material, plus repeated back-and-forth maneuvering on narrow benches, plus continuous work at high 6,800 to 7,000 ft altitudes, the torque converter equipped Michigan has posted an excellent mechanical record. *To date, it has had only one minor breakdown!*

Also tows compressors, speeds other odd jobs

Operator Don Lindblom likes Michigan's power-shift transmission, says its bucket action is the best he's

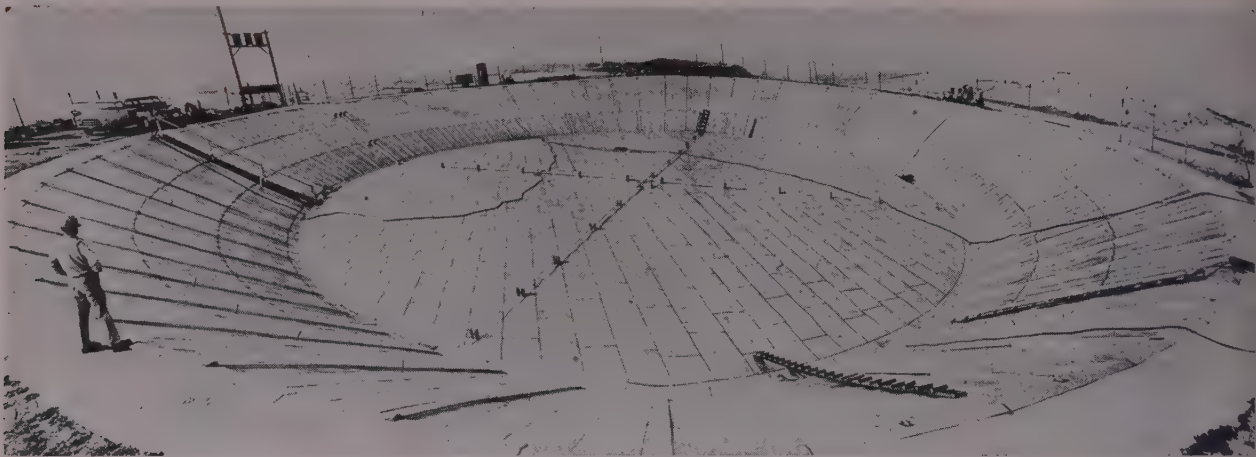
ever worked with. "You can tip it back and fill it easily," he says. "I like the fact also that it takes only half-an-hour per day to refuel and lubricate." Foreman Waino Lindblom adds, "The Michigan has done a nice job for us! We particularly like its truck-like speed in moving from bench to bench." This mobility gives the Michigan some "spare time" to handle maintenance jobs scattered along 15 mi of mountain roads—cleaning rock rubble off benches so trucks and wagon drills can get through . . . hauling air compressors . . . digging culverts . . . even plowing snow.

Got a tougher job than this?

There *may* be a tougher materials-handling job than loading granite and fluorspar . . . but we're willing to bet a Michigan Tractor Shovel can do it faster, better, at lower cost than any other machine. To prove it, your Michigan Distributor will be glad to arrange a demonstration at *your* convenience. *You pick the jobs.*



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EVER THINK OF LINING YOUR RESERVOIR WITH STAINLESS STEEL?

If you have been thinking about it you must have a lot of ammonium nitrate lying around. That's what the Hercules Powder Co. is going to store in the reservoir shown above. It's 200 ft. in diameter and has a volume of 2,000,000 gal. Stainless steel was specified for the lining

because it is highly resistant to the corrosive action of ammonium nitrate. The steel was furnished, fabricated, and welded by U. S. Steel's Consolidated Western Steel Division. More than 18,000 ft. of welded seams were needed, and 3½ mi. of electrode welding done.

Tacoma sewer program would cost \$20,000,000

WITH an estimated total construction cost of about \$30,000,000 a sewerage and storm drain improvement program for Tacoma, Wash., has been outlined in a report by Brown & Caldwell, consulting engineers of San Francisco. It is a long range plan and is intended to provide adequate drainage for the existing city, its future growth as well as cleaning up the adjacent waters to improve land values.

The sanitary sewer program recommended by the report represents an overall cost of about \$20,000,000 and this would be financed by revenue bonds with a rental charge. The charge would represent an increase of almost three times the present rate. The storm drain system, which represents the remaining \$10,000,000 in the program, would be financed by general obligation bonds.

The report is intended to provide adequate facilities until 1975 and recognizes a probable population growth for Tacoma from 170,000 in 1960 to about 240,000 in 1975. Part of the program includes enlargement of the present sewage disposal plant, from a present capacity of 13 mgd. to 40 mgd. by 1965, and an ultimate of 80-mgd. capacity by the end of the program.

Fish hatchery planned at Lewiston Dam site

A FISH HATCHERY will be included as a facility of the Trinity River division of the Central Valley Project in order to assure conservation of existing fish runs in the Trinity River. Costing approximately \$1,350,000, the hatchery was recommended by the Fish and Wildlife Service and the California Depart-

ment of Fish and Game for maintenance of the fishery resources in the river.

One of the principal features of the Trinity River development will be the Lewiston Dam now under construction. This structure will block migration of fish at the dam site. There are runs of king and silver salmon and steelhead trout which pass upstream beyond Lewiston dam site in their spawning migrations. At the present time, the Bureau of Reclamation is proceeding with arrangements for fish preservation during construction of Lewiston Dam by the construction of a barrier trap and the transporting of the fish in special trucks around the dam site to permit them to continue their upstream spawning migration. Fingerlings coming downstream can go through the diversion tunnels at the dam site without harm.

The hatchery will include facilities capable of attracting and trapping all fish ascending the Trinity River to the vicinity of Lewiston Dam, holding ponds for adult salmon and a hatchery and rearing establishment with a capacity of 41,000,000 eggs annually.

John Day Dam plans ok

A BOARD of consulting engineers has approved the design plans for the John Day Dam on the Columbia River. Plans were prepared by the Walla Walla District office of the Corps of Engineers. The structure will be a multi-purpose dam containing the same general elements of the earlier downstream dams such as The Dalles and Bonneville. John Day Dam will be about 5,700 ft. long and will include a navigation lock, powerhouse, spillway and passages for fish on both shores of the river. The power plant which will have an ultimate capacity of 2,000,000 kw. will occupy a position more than 2,000 ft. long in the overall plan.

According to the schedule recom-

mended by the consulting board, construction is to proceed without interrupting navigation or barge traffic on the Columbia. Construction funds will have to be appropriated by Congress before bids can be called, although active construction could be under way by the next fiscal year.

Members of the consulting board who are identified with the West include Julian Hinds, consulting engineer and formerly chief engineer of the Metropolitan Water District of Southern California and C. E. Blee, long identified with the Tennessee Valley Authority, although previously associated with Western engineering work.

Shilshole Bay bids 20% over estimate

BIDS RECEIVED for the construction of a breakwater in Shilshole Bay at Seattle ran considerably over the estimate according to the Seattle District, Corps of Engineers. Low bid of practically \$2,000,000 was about 20% above the government estimate and was submitted by General Construction Co. of Seattle.

This harbor improvement designed to provide a shelter for small boats was described briefly in *Western Construction* October 1956, page 32. The location is immediately north of the ship channel which extends from the Sound into Lake Washington. The breakwater will be about 4,200 ft. long extending 20 ft. above low-water level and would involve a dredged fill of gravel with rock slopes for protection.

The Shilshole Bay small boat basin project was considered a good example of a Federal river and harbor undertaking which consisted of a sound plan with ample justification and included the co-operation of local interests with the Federal Government in accordance with respective benefits.

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CATERPILLAR TRACTOR CO.

ENGINE POWER CERTIFICATION

This is to certify that the Diesel Engine herein described has been engineered, manufactured and tested in accordance with rigid Caterpillar Standards. The materials and workmanship incorporated into this engine give it the inherent capacity for satisfactory performance when applied in accordance with the power ratings established and recommended by this company. The MAXIMUM OUTPUT capacity of this standard production engine is 200 H.P. @ 2000 R.P.M. equipped with: air cleaner, water pump, lubricating oil pump, fuel pump, and standard intake and exhaust manifolds.

I certify that B. L. Henson, Supervisor of Diesel Engine Test, Caterpillar Tractor Co., Peoria, Illinois, has tested and certified this engine on February 11, 1957.

B. L. Henson
Supervisor Diesel Engine Test
Caterpillar Tractor Co.
Peoria, Illinois

Caterpillar Model D326 Industrial was manufactured and shipped as follows: Engine Serial No. 39B1018 Shipping Date February 11, 1957

Power Setting 152 H.P. @ 1600 R.P.M. Intermittent Power Rating

Radiator & Fan	Tachometer Drive
Ether Starting Aid	Muffler
32V Charging Generator	Heater Connections
Governor Control	Remote Shut-off

POWER RATINGS

MAXIMUM OUTPUT is the horsepower capacity of the engine, a measure of the maximum power, $\pm 5\%$, that can be developed for five minutes without drop in speed.

INTERMITTENT HORSEPOWER is a rating for use in variable load applications such as excavators, hoists, and standby power units, where the duration of sustained full power output is one hour or less, with the average output not over 80% of Intermittent Horsepower.

RATED HORSEPOWER is a rating for use in applications such as planing mills, hammer mills, and rock crushers where the duration of sustained full power output is 12 hours or less.

CONTINUOUS HORSEPOWER is a rating for use in applications such as work-boats and pumps where the duration of sustained full power output is 24 hours per day, day in—day out.

Horsepower figures are established in accordance with rigid Caterpillar standards. All ratings, corrected to sea level barometric pressure (29.92 in. Hg.) and standard temperature (60°F), apply to a production engine including air cleaner, water pump, lubricating oil pump, fuel pump and standard intake and exhaust manifolds. The above ratings are based on British and American BHP.

FORM NO. 513-32553

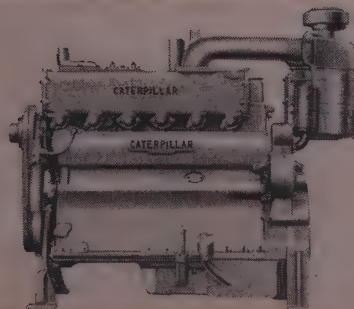
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In a quarter century of diesel leadership Caterpillar Engines have achieved a reputation for *honestly rated power*. Owners have found that they can depend on a Cat Diesel to deliver the power promised.

Now, to back this reputation, Caterpillar becomes the *first* manufacturer to issue a certificate showing the horsepower capabilities of the engine. This certificate is signed by Caterpillar Tractor Co. and certified by a notary public.

You have a right to demand *certified power* when you invest in an engine. You get it when you buy from your Caterpillar Dealer. Let him show you the certified power plant that fits your needs.

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CATERPILLAR*

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Highway Program

(Continued from page 82)

must be completed by July 1, 1957. Furthermore, they must be signed by state highway department officials and the respective district engineers of the Bureau of Public Roads.

This requirement will crystallize at an early date decisions by state and Federal officials as to character and location of the Interstate routes. As soon as these decisions are made, machinery will be set in motion to further accelerate the highway program. Acquisition of right-of-way can be stepped up, aided by the availability of Federal funds now for this purpose. The necessary land can be obtained as much as five years in advance of construction. This permits the orderly removal of buildings, utilities and other obstructions well ahead of the time contractors will move onto the project.

More time for planning

The design engineer, with the aid of photogrammetry and electronic computers, will have the data he needs sooner than ever before. Under the present streamlined procedures, including the use of high-speed computers, standard plans, photographic reproduction techniques and the policy of letting larger projects to contract, the engineer can turn out plans, specifications and estimates at a much faster rate and farther ahead of construction than ever before. These plans, specifications and estimates will be made available to contractors earlier than in the past so that there will be more time to look over these projects and select ones best suited to equipment and organization.

Engineering during the construction stage also has been streamlined to expedite progress. The Bureau of Public Roads has taken far-reaching steps in delegating to our field offices authority to approve nearly all of the details in advancing the project through all of its stages to completion. Our district engineers are available, in emergencies, for many of these decisions by telephone and soon, in many instances, by radio.

The recent revisions in specifications should also be helpful. In instances where practical to do so, results rather than methods have been specified to give a better opportunity to take advantage of new developments in equipment and techniques which will speed construction, lower costs or improve the roads.

We have cited some of the actions that have been taken that are designed to accelerate the rate of improvement on the Federal-aid highway system. For Congress has declared that such an accelerated rate is in the National interest. Roadbuilders have a big stake in seeing that this accelerated rate of construction is achieved.

The responsibilities involved

If everyone in the highway industry discharges his responsibilities in this highway program, a year from now we should be able to look back upon the achievement of our common objective: an accelerated rate of highway improvements by contract in 1957. We can look forward to even greater volumes ahead. But each of us has responsibilities.

Contractors have many. The roads they build are to be adequate for use by traffic many years from now. The rate of construction must be accelerated but not at a sacrifice in quality. There will be no lowering of standards, else we fail in our purpose. These is a responsibility to see that this tremendous task is performed as economically as possible. Ingenuity in seeking new methods and equipment is an American tradition. More than ever before in the years ahead this tradition must be upheld.

There is also a responsibility to undertake vigorous and continuing programs to reduce the number and severity of accidents that happen on highway and street construction. Let's just add up the cost of accidents that will happen at the present rate during the construction of the Interstate system unless you do something about it. Right now Congress has authorized \$24,800,000,000 and the states will add an estimated \$2,600,000,000 for construction of this system. Deducting about 20% from this \$27,400,000,000 total leaves around \$22,000,000,000 which will be expended for work performed by contract. Of this contract amount, 26% or \$5,700,000,000 will be contractors' payroll. On the average workmen's compensation insurance costs \$.35 per hundred dollars of payroll, which totals close to \$200,000,000 in insurance premiums.

But that is not all. The direct cost of accidents, i.e., compensation, doctor bills, and hospitalization, that is paid by the insurer takes 60% or \$120,000,000 of these premiums. Studies have shown that the indirect costs are four times the direct cost which in this case would be \$480,000,000. Add to this the \$200,000,000

in premiums and there is a total of \$680,000,000. We cannot afford the loss of skilled workmen, equipment, material, production time and all the other losses that total to such a big bill. Accidents can be prevented and these costs reduced. But a vigorous program, supported by top management is necessary.

There is also a responsibility in the field of public relations. This highway program cannot go forward without public support. Public support comes from understanding by farmers, businessmen and, in fact, all the citizens of our communities what the completion of this road program will mean to them. Contractors can perform a valuable service as a link between these citizens and highway officials. The businessmen along the Interstate system may not support a highway to which direct access for them and their customers is denied. They must be told how completion of the new road will widen the area from which customers will come, that costs of goods to them should be less because of lower operating costs, lower accident costs, lower insurance rates and less time required for the trucks that deliver their goods.

By removing through traffic from the central business district, as many of the new roads will do, communities, too, will benefit. The area from which customers will come will be increased because the business center will be easily reached over the new roads and removal of congestion will make parking space available.

Public hearings will be held as prescribed by Congress. Contractors are well equipped to participate in these discussions. Their experience would be very beneficial to the citizens of their communities and would help secure the public support.

Difficult questions remain

The new program is both an opportunity and a challenge to all in the highway industry. Much has already been accomplished. There are also many difficult questions to be answered. Shall we, for example, in planning construction schedules, decide, as some toll authorities did, to block traffic entirely from long sections until construction is completed? Or shall we open short sections as completed and maintain traffic along side construction projects that are under way? Which would engender better public relations and foster greater public support for the new highway program?

These and other questions will require careful consideration.

talk about production!

42"



50'x42" KOLMAN 101 Portable Conveyor with 9'x54" SB-90 Screen and Dozer Trap.



KING-SIZE Kolman 42" Model 101 Loads 20-Ton Trucks in Less than a Minute

A giant producer is this 50'x42" KOLMAN 101 'Conveyor-Screen Plant. On the application pictured it loaded 20-ton trucks in less than a minute, while scalping out a large proportion of oversize rock in the production of sub-base material.

From three to four crawler tractors with dozer blades were kept busy in the pit feeding this hungry monster. It is equipped with dozer trap designed to facilitate dozer feeding. A complete line of other loading accessories is also available, including the feeder-trap combination, open type hopper and attached feeder, all fully portable.

The KOLMAN single-deck vibrating screen used on this plant is 9' long by 54" wide. Its design eliminates excess weight, making it possible

to suspend this screening surface of over 40 square feet on the portable conveyor without extra supports. This plant can also be equipped with a double or triple-deck screen to produce various sizes of material in one operation, ideal for the simultaneous loading and screening of sand, gravel, ore, crushed rock, coal, limestone and similar materials. Spray bars can be added to provide an efficient, low cost portable washing plant.

Other features such as operator's platform, head pulley clutch, back-stop, extended engine controls and rugged design of the entirely portable plant make it the most complete and practical unit of its kind now available. These outstanding features are also available on smaller Model 101 KOLMAN plants of the same design.



Single-deck vibrating screen folds under end of conveyor for transporting. No disassembly of the driving mechanism is required.



Available as integral part of tail assembly is the feeder-trap combination with reciprocating plate feeder built into trap, with full adjustments for length of stroke and angle of operation.

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Hawaii Report

By SYD LOVE
Honolulu, Hawaii

HOMESITES—William M. Wachter, Territorial public works superintendent, has asked real estate brokers to place more homesites on the market and thereby encourage other landowners to more readily sell their property to the Territory for new highway routes. To secure lands for an \$80,000,000 six-year highway program, the Territorial Highway Department is stepping up its real estate activities to a record-breaking level. Wachter wants to avoid difficulties in land acquisition that might cause major delays in the program.

NEW HIGHWAY—A road around Kaena Point, Oahu's rugged northwest tip, is planned by the Territory for 1961 completion. It will enable residents to circle the island by a 117-mi. route almost entirely along the coast. Cost for the right-of-way for the 10-mi. two-lane road is expected to be \$500,000.

LOW BIDDER—Honolulu Builders Ltd. has submitted the low bid, \$215,458, to construct seven-tenths of a mile of the Kohala Mountain Road on the island of Hawaii. It will be two lanes wide with a 22-ft. paved strip. New concrete structures will replace two old bridges.

SEARS IS STARTED—Ground has been broken in Honolulu for the newest and second largest store in the Sears, Roebuck and Company chain. Cost will be \$5,000,000. The builder: Hawaiian Dredging and Construction Company. The store will anchor a \$13,000,000 shopping center on a 50-ac. tract halfway between Waikiki and downtown Honolulu within a stone's throw of the beach. Completion of the Sears store is scheduled for the fall of 1958.

TUNNEL OPENING—Governor Samuel Wilder King was scheduled to drive the first car through the Nuuanu Pali tunnels May 4. Rains have delayed the opening more than two months. The project includes bores of 1,000 and 500 ft., both for one-way traffic, to eliminate a climbing, winding road over the Koolau Mountain Range between Honolulu and Windward Oahu communities. J. M. Tanaka, Honolulu contractor, had two contracts for the project totaling nearly \$3,000,000.

WILSON TUNNEL—The Honolulu Board of Supervisors has passed an ordinance appropriating \$700,000 from bond loan funds to help pay for Wilson Tunnel projects and sewer construction. Honolulu Contractor E. E. Black is building the first bore, which is 2,700 ft. long in a \$6,500,000 project. The job calls for a second bore. Black says he could save the city \$1,000,000 if he gets the job—because of know-how acquired on the first bore.

DEVELOPMENT—Three Mainland developers—Paul W. Trousdale, Clint Murchison, Jr., and his brother, John Murchison—have negotiated an agreement with Harold K. L. Castle giving them exclusive rights to develop 10,000 ac. of Windward Oahu over the next 15 years. Extensive housing developments are believed to be planned. Oahu's population—most of it jammed on the leeward side which includes Honolulu and Waikiki—now totals about 400,557 residents.

HIGHWAY PLAN—The Territorial Public Works Department is considering a plan that calls for a six-lane freeway across Kewalo Basin—on the Waikiki side of Honolulu—across the Kewalo industrial area, under the mouth of Honolulu Harbor and over Sand Island. It would join Kamehameha Highway on the Honolulu Airport side of Keehi La-

goon. Donald H. Wolbrink, resident planner for Bartholomew Associates, which evolved the idea for Bishop Estate, claims the plan would "help solve, for a very long time in the future, the traffic circulation problem in and by the harbor area." The artery would stretch for seven miles. Wolbrink did not estimate the cost.

MISCELLANY—J. M. Tanaka is low bidder at \$142,291 to replace eight termite-eaten two-lane bridges on Kauai. The new ones will consist of four reinforced concrete bridges and four corrugated metal pipe culverts. . . . Authorities figure \$144,000,000 worth of construction will take place in the Islands this year. And the engineering firm of Daniel, Mann, Johnson and Mendenhall has opened a Honolulu office to get its share. . . . The Territorial Senate has asked various Kauai groups to investigate the possibility of constructing an aluminum dome auditorium as a war memorial at Lihue. The Legislature has appropriated \$200,000 for it. Industrialist Henry J. Kaiser put one on his Hawaiian Village Hotel grounds in 36 hr. for what he said was \$100,000. It seats 2,000.

Low bids and contract awards

CALIFORNIA

Ukropina, Polich, Kral of San Gabriel received a \$1,030,381 contract for grading, surfacing, concrete pump house and retaining walls to be constructed in the city and county of Los Angeles. **J. C. Compton Co.**, McMinnville, Oregon, received a \$520,886 contract for 38 mi. of surfacing between Alturas and Oregon State Line, Modoc County. **Gibbons & Reed Co.** of Salt Lake City, Utah, received a \$4,976,184 contract for 5.4 mi. of grading, paving and construction of a concrete slab bridge east of Floriston and Nevada state line, Nevada and Sierra counties. A \$221,927 contract was received by **C. B. Tuttle** of Los Alamitos for construction of a girder overcrossing and grading and surfacing approaches in Ventura County. **Lee J. Immel** of San Pablo submitted a low bid of \$416,023 for 2.3 mi. of grading and surfacing in and near Napa, Napa County. **Brown-Ely Company** of Corte Madera received a \$221,715 contract for 4.5 mi. of surfacing portions of a two-lane highway and drainage facilities to be installed near Boonville in Mendocino County. **Osborn Co.**, Pasadena, submitted a low bid of \$635,215 for 1.1 mi. of grading, surfacing and construction of one bridge on Paramount Boulevard in Los Angeles. **Matich Constructors** of Colton received a \$227,266 contract for plant-mixed surfacing at various locations in San Bernardino and Riverside counties. **Matich Constructors** also submitted a low bid of \$302,857 for 1.4 mi. of grading and surfacing in San Bernardino County. **Granite Construction Co.** of Watsonville submitted

a low bid of \$1,039,020 for 5.6 mi. of grading and surfacing and construction of a concrete bridge in Monterey County.

COLORADO

C. L. Hubner Co., Denver, submitted a low bid of \$445,722 for 8.8 mi. of grading and surfacing, from Eads north on State Highway 59 in Kiowa County. A low bid of \$319,730 was submitted by **E. J. Rippey & Sons** of New Castle for 4.6 mi. of grading and surfacing between Ft. Lewis and Breen in La Plata County. **L. J. Hesser** of Greeley submitted a low bid of \$110,665 for grading, structures and surfacing east of Bellvue, Laramie County. A low bid of \$295,772 was submitted by **Shore-Bailey Construction Co.** of Littleton for underpass structures along railroad track in Pueblo. **Baah Construction Co.** of Greeley submitted a low bid of \$99,857 for grading and structures in Weld County. **Herren-Strong** of Platteville submitted a low bid of \$202,856 for structures between Adams City and Barr Lake in Adams County. A low bid of \$288,723 was submitted by **Read Construction Co.** of Cheyenne, Wyo., for grading, structure and surfacing between Rockport and Nunn in Weld County. **Leon K. Suhm Inc.**, Denver, submitted a low bid of \$121,228 for construction of First Avenue bridge over Cherry Creek, city and county of Denver. **H. & E. Lowdermill Inc.**, Englewood, submitted a low bid of \$181,963 for grading, structures and surfacing between Naturita and Nucia o. S. H. No. 97 in Montrose County.

Colorado contractor's KOMPACTOR WORKS CLOSE-UP



eliminates all hand tamping costs!

"We're more than satisfied with the close compaction of the K-45," says Domenic Leone, referring to the excellent work the self-propelled K-45 Kompactor is doing on his \$1,026,762.25 job on State Highway 1 in El Paso County, Colorado.

Domenic Leone Construction Company, Inc., Trinidad, Colorado, is compacting 1,722,000 cubic yards on 12.726 miles of highway south of Colorado Springs. Included are 6 concrete box culverts, 10' x 12', making close compaction a necessity.

Not only has the highly maneuverable K-45 eliminated hand tamping

on culverts . . . it also averages 1100 yards an hour on banked material. Faster speeds, up to 5 mph, and its "interrupted pressure" principle of operation that directs *all* compaction effort downward, enabled Domenic Leone to replace several other pieces of compaction equipment with *one* K-45 Kompactor.

*Write today for full information—
or see your nearest Buffalo-Springfield distributor.*



The Standard of Comparison

**BUFFALO-SPRINGFIELD
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Here's how close the flexible K-45 can work to culverts and abutments, and it's faster, better, more efficient in the "wide open spaces" too.





Next job is only minutes away

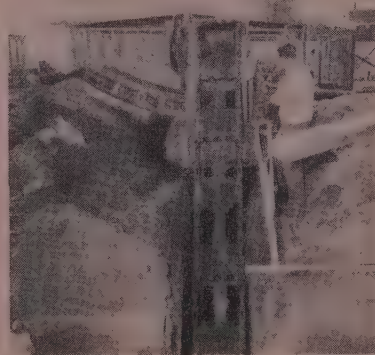
Mobility on rubber is the answer to widely-scattered trenching jobs around town. A job 6 miles away can be started in less than 30 minutes from "now" with Parsons Trenchmobile. It's as mobile as a truck — runs anywhere at a moment's notice — drives over highways, streets, through traffic at 12.6 m.p.h. It digs the trench at speeds up to 14½ feet per minute — drives on to next job without delay. No waiting for trailer, loading or unloading.

Digs 8 to 16 inches wide

Handy, economical on small, "work-and-run" jobs, Trenchmobile is big enough, too, for main-line extensions, underground lighting systems, building footings, etc. It digs 8 to 16 inches wide, at depths to 5 feet.

Positive, down-crowd boom starts cut fast, maintains accurate grade. It undercuts walks, curbs, cross-pipes — makes vertical set-ins. Self-sharpening "Tap-In" teeth assure top digging efficiency at any depth,

width, in all soils. Shiftable, reversible spoil conveyor discharges to either side. Backfill blade optional. For proof of what Trenchmobile can do for you, call nearest Parsons distributor.



If your work requires a small, utility-size trencher on crawlers, look into this Parsons 155. It's compact, low, narrow — yet, digs 16 to 26 in. wide, 10 feet deep. Big ladder or wheel-types also available — including "big-inch" and "middle-inch" Trenchliners®.

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COLORADO BUILDERS SUPPLY CO.....	Denver



PARSONS TRENCHMOBILE®
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IDAHO

Pickett & Nelson of Idaho Falls received a \$454,706 contract for constructing a railroad underpass, overpass and grading and surfacing approaches of U. S. Highway 191 in Idaho Falls, Bonneville County. **Interstate Electric Co., Inc.**, Salt Lake City, Utah, submitted the low bid of \$1,016,887 for constructing 30 mi. of 132-kv. transmission line and related substation work at the U. S. Atomic Energy Commission's National Reactor Testing Station.

MONTANA

Misco-West Coast of Seattle, Wash. submitted a low bid of \$1,056,283 for construction of Helena Valley Pumping Plant, Helena Valley Unit, Montana Helena-Great Falls Div., Missouri River Basin Project. **Holmes Construction Co.**, Heyburn, Idaho, submitted a low bid of \$445,689 for surfacing and paving 28.6 mi. of the Swan River Highway in Lake and Missoula counties. **Miles & Williams**, Kennewick, Wash., are low bidders at \$205,032 for schedule 1, construction of 8 mi. of the Helena Valley project. **Harris Construction Co.**, Aberdeen, South Dakota, submitted two low bids for grading and surfacing in Fallon, Richland, and Dawson counties \$432,527 for 10.2 mi. of surface treatment and draining the Baker-Wibaux road in Fallon County and \$630,079 for 10.6 mi. of grading and gravel surfacing the Circle-Sidney Road in Richland and Dawson counties. **Narancho & Konda** of Butte submitted a low bid of \$109,077 for 8.8 mi. of grading and surfacing the Galata-North Road in Toole County. A low bid of \$137,908 was submitted by **Hilde Construction Co., Inc.**, Great Falls, for 4.1 mi. of grading and surfacing the Ovando-Rogers Pass Road near Cadotte Creek in Lewis and Clark County.

NEVADA

Silver State Construction Co. of Fallon received a \$354,362 contract for 15.5 mi. of grading and surfacing north of Fallon in Churchill County. A \$581,125 contract was received by **Hooper Construction Co.**, Twin Falls, Idaho for construction of portions of state highway in Lander and Eureka counties. **Dodge Construction, Inc.**, of Fallon received a \$592,602 contract for 24.6 mi. of grading and surfacing State Rte. 1 in Lincoln County.

NEW MEXICO

Wayne A. Lowdermilk, Inc., of Española received a \$440,000 contract for 4 mi. of grading and surfacing the Jan Canyon Route in the Lincoln National Forest, Otero County.



TON OF STRENGTH *for every ton of payload capacity*

Koehring Dumptor stands up under heavy loading shocks because it's built for rock. Sides and ends of all-welded 6-yard body are heavily rib-reinforced. Double-plate bottom, lined with multiple steel beams, cushions shocks and impacts of shovel-loading $\frac{1}{2}$ to $2\frac{1}{2}$ yards at a single pass. Bolted or free-swinging kickout pan adds another $\frac{1}{2}$ -inch steel plate to Dumptor bottom for extra protection.

There's plenty of strength, too, in the heavily-trussed chassis to take constant pounding of heavy loading and rough, off-road hauling. Cast-alloy "I"-beam steering axle oscillates 21 inches, takes the twists and strains out of haul road travel. What's more,

Koehring Dumptor has no leaf springs — just one big snubber-type chassis spring on the steering axle — none on the drive axle. Big drive tires eliminate the need for more springs, absorb loading and hauling shocks — save spring maintenance.

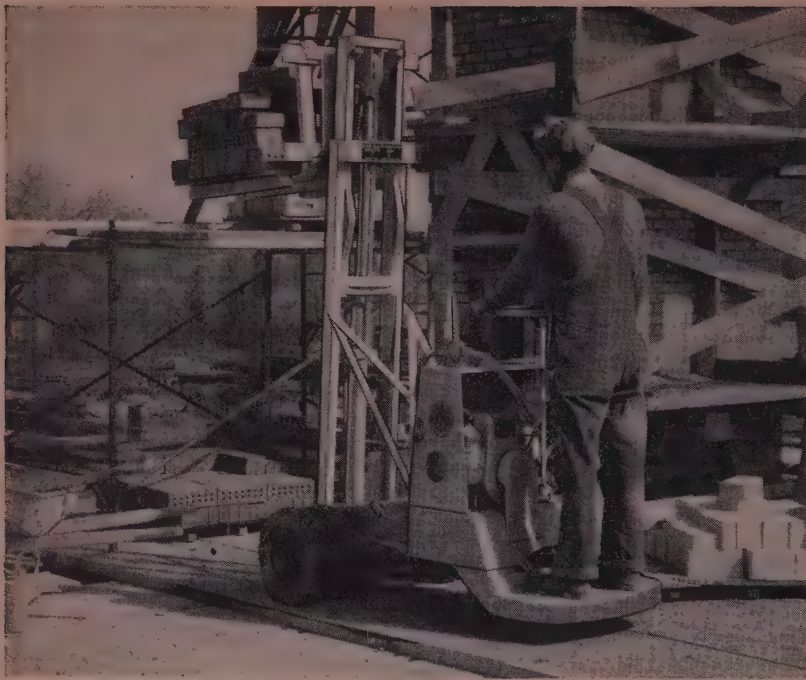
Even with all this heavy-duty strength, Koehring Dumptor still has more than 6 H.P. for every ton of loaded weight. It accelerates fast, pulls through soft ground with less shifting, climbs 24% grades fully loaded. If you have a tough hauling problem, better look into this heavy-duty 6-yard Dumptor®. You also get 1-second gravity-dump (no body-hoist maintenance), and same travel speeds forward and reverse for no-turn shuttle hauling.

K722R

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1/2-TON handyman on school annex

Building contractor on this new school annex used his Moto-Bug to good advantage as a *double-duty* fork lift and power wheelbarrow. With 1/2-ton (6-foot) fork lift attachment, the versatile S-10 unloaded palletized, banded bricks and stone from flatbed trailers, and stockpiled the materials. It also distributed materials from stockpile to work areas, hoisted brick onto masons' platforms.

Soon paid for itself

When need to haul and pour concrete, fork lift unit was removed from Moto-Bug chassis, and 10 cu. ft. hopper body attached. Hauling 150 to 200 feet from truck-mixers to forms, it unloaded 5-yd. transit-mix trucks in an average of 35 minutes. On this alternating, dual operation, contractor reports that Moto-Bug paid for itself in less than 3 months. You'll find, too, that a small investment in Moto-

Bug earns substantial savings in time and material-handling costs. Get all the facts on this *multiple-tool* S-10, with its interchangeable fork lift, 10 or 15 cu. ft. hopper, 3/4-ton platform. See your Kwik-Mix distributor today.



Here's another Moto-Bug that will interest you — the big R-15, with automatic power-flow transmission. No clutching, no shifting. Travels 12 m.p.h. forward and reverse, climbs 25% grades fully loaded. Has 1-ton platform, 15 or 18 cu. ft. hopper, 3/4-ton (7-foot) fork lift. Other Kwik-Mix products: concrete, plaster-mortar and bituminous mixers. KM739R

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LEACO CO.	Hobbs



KWIK-MIX MOTO-BUG
A DIVISION OF KOENIG COMPANY

OREGON

A joint venture by Hall-Atwater, Inc., of Seattle, Wash., and O. A. White Construction Co., Walla Walla, Wash., submitted a low bid of \$2,893,000 for construction of an aircraft control and warning facility for the 13th Naval District southeast of Klamath Falls. A \$360,628 contract was received by Quinn Bros. and Robbins, Inc., Boise, Idaho, for grading and oiling the Baker-Homestead highway in Baker County. West Coast Steel Works, Portland, received a \$236,420 contract for bridge construction on the Riddle county road in Douglas County. L. C. Daniel of Eugene submitted a low bid of \$175,795 for repair and construction of bank protection at various locations along both banks of the Long Tom River in Lane and Benton counties.

UTAH

Gibbons & Reed of Salt Lake City submitted two low bids for roadwork in Salt Lake County: \$80,256 for 1.3 mi. of grading and surfacing State road No. 152 and \$71,608 for 1.5 mi. of grading and surfacing No. 71.

WASHINGTON

An \$822,195 contract was received by General Construction Co. of Seattle for construction of City Waterway Bridge in Pierce County. Donald M. Drake Co., of Portland, Oregon, received a \$945,228 contract for 2 mi. of grading and surfacing Helena St. to Custer St. in city and county of Spokane. Scarsella Bros., Seattle, received a \$339,321 award for 1.4 mi. of grading, surfacing and structures in Thurston County. A \$291,427 contract was received by Troy T. Burnham Co., Seattle, for construction of the Lacey road overcrossing in Thurston County. Hannan Bros. Co., Portland, Oregon, received a \$227,521 contract for construction of overcrossings on the Stockford road and county road No. 4 in Clark County. Guy J. Norris of Seattle received a \$282,539 contract for 1.1 mi. of grading, surfacing and one bridge on the Cowlitz River Bridge in Cowlitz County. E. Selene & Sons of Bellingham received a \$210,228 contract for construction of the Meador Avenue overcrossing in Whatcom County. Nelson Construction Co., Tacoma, submitted a low bid of \$1,753,900 for construction of the Woodrow Wilson senior high school building in Tacoma. Manson Construction & Engineering Co., Seattle, received a \$501,850 contract for renewal of north and west aprons and other reconstruction work at Pier 48, Port of Seattle.

WYOMING

Riedesel-Lowe Construction Co., Cheyenne submitted a low bid of \$837,470 for construction of Service Club

and Airmen's Dormitory, F. E. Warren Air Force Base, Cheyenne. **Foley Brothers, Inc.**, of St. Paul, Minn., submitted a low bid of \$2,289,052 for Anchor Dam concrete access road, Owl Creek Unit, Big Horn Basin Project. **Lichty Construction Co.**, Casper, received a \$249,922 contract for grading and surfacing 3.3 mi. of the Thermopolis-Shoshoni road in Hot Springs County. A \$256,63 contract was received by **Schmitt Construction, Inc.**, of Arvada, Colo., for grading and surfacing 17.7 mi. of theinedale-Rock Springs road in Sublette County. **Woodward Construction Co.** of Rock Springs received a \$788,888 contract for grading, draining and surfacing 16.9 mi. of the Rock Springs-Miawatha road in Sweetwater County. **Winsley Moore Co.**, Douglas, received a \$473,185 contract for grading, draining, embankment and pipe-arch culverts on 0.7 mi. of the Medicine Bow-North road in Carbon County. **Colorado Construction Co., Inc.**, Riverton, received \$140,065 contract for 10.7 mi. of grading and surfacing the Lovell-Emblem road in Big Horn County. A \$184,582 contract was received by **Brasel & Whitehead** of Riverton for 9 mi. of grading and surfacing the Green River-Burnt Ford road in Sweetwater County.

ALASKA

Reed & Martin, Inc., of Fairbanks submitted a low bid of \$2,219,561 for construction of a security control building, storage magazine, utility systems, clearing and excavation, roads, parking areas and security fencing at Ladd and Elmendorf Air Force Bases, Military defense construction. **Chris Berg, Inc.**, of Seattle, Wash., received a contract of \$4,910,000 for construction of a DEW-Line station for the Air Force at Port Heiden in the Aleutians. **S. S. Mullin Co.** also of Seattle, received a \$4,010,000 contract for construction of the Port Moller DEW-Line station. Contracts for the last two of six DEW-Line stations being built for the U. S. Air Force along the Aleutian islands were received by **Patti-MacDonald Construction Co.** of St. Louis, Mo., and **Morrison-Knudsen Co.** as joint venturers, for \$4,915,052. **Baker & Ford Co.** of Bellingham, Wash., received a contract for \$4,643,647 for their bid for **Nikolski**. These last two DEW-Line wards bring the contracts for construction of the six Distant Early Warning stations on scattered islands along the 3,000-mile Aleutian chain, including 25 diesel generators, to a total of \$25,685,715. **Peter Kiewit Sons' Co.**, Seattle, is low bidder at \$1,414,469 on the two schedules for extension of a runway, construction of an access road and high intensity lighting at Galena Airport. **Patti-MacDonald Construction Co.** submitted a low bid of \$9,753,952 total for all schedules of a contract for construction of three Nike guided-missile installation in the vicinity of Elmendorf Air Force Base.



Unloads cement, weigh-batches into trucks

To simplify cement-handling on your jobs, check this flexible, low-cost Johnson Elevating Charger. At a rate of 275 bbls. per hour, it unloads bulk cement from box-cars or hopper-bottom cars, and transfers or weigh-batches cement into trucks. Standard Charger has a 1000-lb. batcher hung under a 33-bbl. overhead storage hopper. Or, as shown above, two 1000-lb. cement batchers can be used to load dual-batch trucks. Batchers can be manually-controlled, or fully automatic with graphic recording for high-production airport and highway paving.

For transfer-plant operation, all you do is remove batchers, cone, and bolt a 50-bbl. extension section to upper hopper. It's quickly set up anywhere, portable, easily moved by rail, trailer, or behind truck (wheels, towing-eye, electric brakes optional). Ask Johnson distributor for full details.



Also check Johnson bulk cement plants — capacities from 254 to 611 bbls. with single silo — up to 1321 bbls. with twin silos. Available with truck or car-receiving hoppers, screw conveyor, bucket elevator, one or two 1000-lb. batchers — manual, or full automatic with graphic recording. Johnson brings you everything from bins and buckets to complete plants for central, transit-mix or concrete products.

1740R

CONRAD CREIM COMPANY.....	Seattle
CRAMER MACHINERY CO.	Portland
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ENGINEERING SALES SERVICE, INC.	Boise
COOK BROS. CONST. MACH. CO.	Los Angeles
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ANDREWS EQUIPMENT SERVICE, INC.	Spokane
COOK BROS. EQUIPMENT SALES	Phoenix
WESTERN CONSTRUCTION EQUIP. CO.	Billings, Great Falls

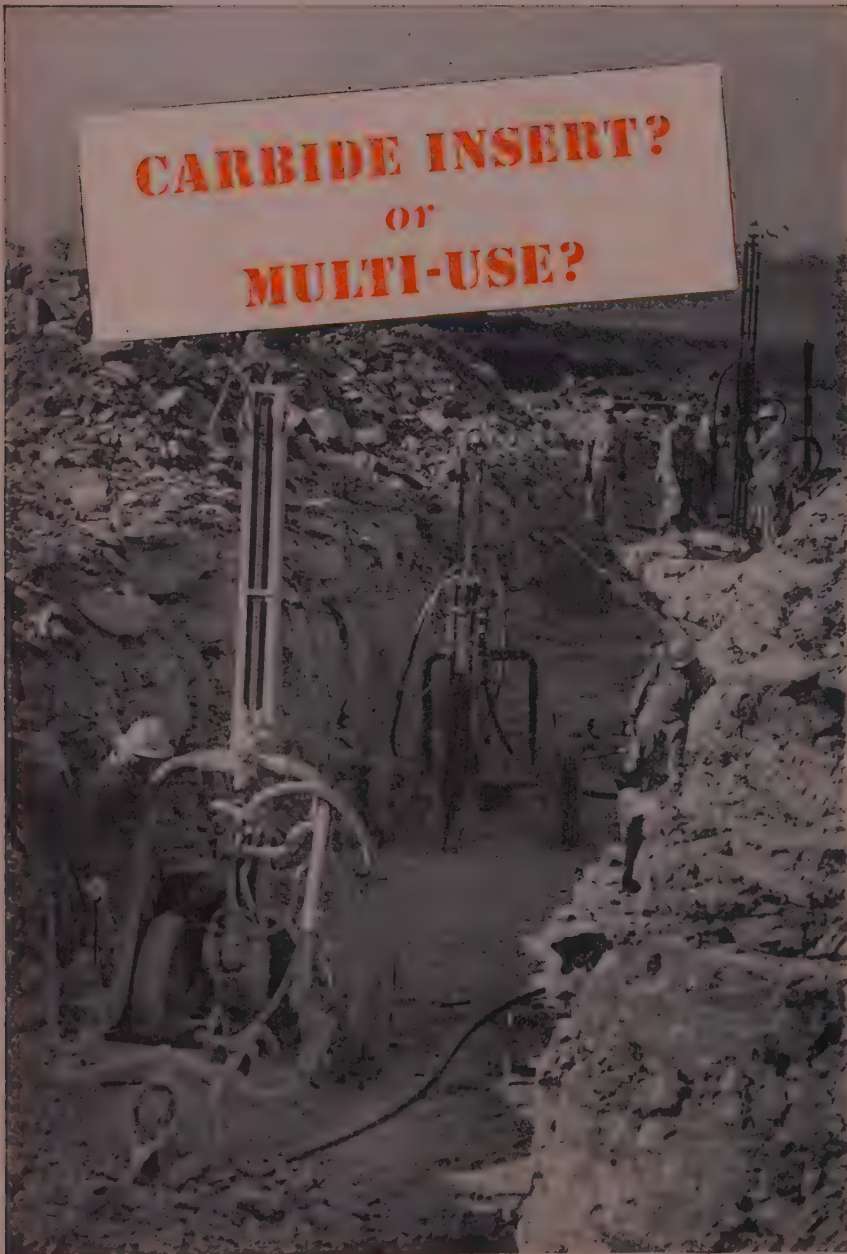


JOHNSON cement CHARGER

A SUBSIDIARY OF KOEHRING COMPANY

We get the lowest cost per foot-of-hole with TIMKEN® multi-use bits

... Reports McDowell and McDowell Construction Co.



LOCATION: Industrial plant site, Nashville, Tenn.

OPERATING CONDITIONS: Medium hard limestone.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

your best bet for the
best bit for every job

DRILLING through medium hard limestone on a 23-acre industrial plant site, McDowell and McDowell Construction Co. found they got the lowest cost per foot-of-hole with Timken® multi-use bits.

Under many drilling conditions you, too, can get the greatest saving with Timken multi-use bits. They will give you the lowest cost per foot-of-hole when full increments of steel can be drilled in ordinary ground.

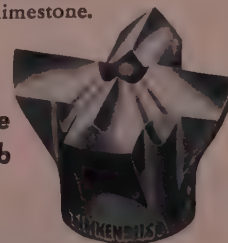
But multi-use bits may not always be your best bet.

In hard abrasive ground, for instance, Timken carbide insert bits will give you higher speeds and greater economy. And for extremely deep holes, constant-gauge holes, or small diameter blast holes, Timken carbide insert bits are again your best bet.

Your drillers will save time with Timken rock bits—multi-use or carbide insert—because they're interchangeable in the same thread series. Dozens of Timken rock bits fit the same drill steel. Change them as fast as the ground changes.

And you get these extra advantages with all Timken rock bits: 1) they're made from the Timken Company's own electric furnace fine alloy steel; 2) they have the special shoulder union developed by the Timken Company to protect threads from drilling impacts.

Find out which Timken rock bit is best for your needs. Call or write the Timken Rock Bit Engineering Service, The Timken Roller Bearing Company, Canton 6, Ohio. Cable address "TIMROSCO".



Timken threaded
multi-use rock bit



Timken threaded
carbide insert rock bit

ALASKA Newsletter

By CLIFFORD S. CERNICK, Anchorage

SUNSHINE AND SHADOW—Each spring the writer gets out and talks to as many construction people as he can to get a roundup of construction conditions in Alaska right at the brink of the construction season. Although my findings are not quite ready to be passed on to you, I have a preliminary report, which is a blend of sunshine and shadow to speak. In many respects, the 1957 construction season is turning out to be one of the biggest question marks in my five years of news gathering in the field. Anyhow, for what it's worth, we'll give you one preliminary picture.

THE SUNSHINE—First, the sunny side of the 1957 construction scene as it looks here in Anchorage. Weather-wise, things couldn't be better. An early spring has melted most of the snow in coastal areas and all-out construction can be pushed at an earlier date than is usually possible. Shipping facilities for construction equipment and supplies have never surpassed this year's because of the new dock at Seward, improved highways and constant improvements in air service. A large pool of labor is available in Alaska all set to go out on the job. I talked to scores of construction workers in the past few weeks—and they're all impatient to get to work. On the face of it, the 1957 construction year should be a banner one; unfortunately, there are several shadows darkening this somewhat sunny scene.

THE SHADOWS—Biggest shadow confronting contractors and construction efforts alike is the uncertainty of wage negotiations being carried on as this is written. By the time this is published, it is probable some agreement will have been reached. However, from where I sit—and early in April—the outlook is disturbing and dismal. Wage-hour-working condition talks carried out in the past weeks have been unsatisfactory from a standpoint of progress. In Alaskan business and labor circles alike, there is apprehension about a possible breakdown of the negotiations. In labor circles there is talk of a strike. Negotiations, in many respects, have had stormier sailing this year than in any year within my memory.

STRIKE SPECTER—As of this writing, many Alaskan unions have served notice of 30 days as required by Taft-Hartley regulations. The situation is clearly unsettled—and is particularly ominous in view of the fact that 1957 may yet fail to live up to optimistic predictions that it would be a record-breaking construction year. Thousands of jobs and to a great measure, Alaska's prosperity in 1957, depend on a successful conclusion of the current negotiations.

AS A LABOR LEADER SEES IT—One labor leader told me that negotiations with the Associated General Contractors were "broken off after we changed our position 11 or 12 times. The AGC won't budge an inch from their position. They offered us lesser conditions than in the last contract." "What about wages?" I asked. "We didn't even get to that," said the labor leader. He admitted that if unions do decide to strike, it will throw a monkey wrench into vital defense construction projects and also add heavily to Alaskan unemployment.

AS A CONTRACTOR SEES IT—A contractor told me he felt the time had come to stand fast at what is considered to be "the peak" beyond which wages should not be allowed to go. "When some construction men are making more than bank presidents and presidents of major firms, we feel we must call a halt. If we don't stop the wage spiral now, where will it end?" At the same time, the contractor agreed that the strike weapon was a formidable one—and a strike was the last thing anyone wanted.

WORK TO BE DONE—Strike or not, there's a mountain of construction work waiting to be done in Alaska. On the day I'm writing this, the District Engineer awarded two contracts for Army Nike guided missile sites in Alaska totaling \$21,000,000. Work on defense warning sites in the Aleutians is scheduled to get under way, to say nothing of the unfinished work on the defense network farther north. An ambitious program of road and airfield construction is scheduled for the territory in 1957 and the tempo of private and commercial construction does not seem to have been slackened. On most of these jobs, work progress will depend on the outcome of labor-management negotiations currently being held both in Alaska and the United States.

THE AIRPORTS—Eighteen projects for airport construction and improvement totaling \$1,395,000 have been approved by the Department of Commerce. For the benefit of contractors who use Alaskan airports to bring in and take out supplies and personnel, I'll list the fields which will be in better shape this year and next as a result of the program. They're at: Akiak, Allakaket, Crooked Creek, Dillingham, Haines, Hughes, Kalskag, Ketchikan, Kobuk, Kotzebue, Napamute, Nondalton, Port Graham, Seldovia, Shaktolik, Stony River, Teller and Wrangell. Under existing laws, the federal government and Territory of Alaska participate in the airport program on a 75-25% matching basis. However, Senator Warren Mag-

nuson of Washington has introduced legislation under which the federal government would take care of a larger share of the cost.

EMPLOYMENT SITUATION—This year, more than ever before, it is necessary to warn stateside construction men against a "job rush" to the territory. The Alaska Territorial Federation of Labor president Robert C. McFarland told me that labor unions themselves have sent out letters to stateside locals warning construction workers against coming to Alaska in the face of the uncertainty surrounding the territory's job outlook. The Alaska Territorial Employment Service reports that there has been an increase in the number of persons arriving in Alaska from the states hoping to find employment. Employment officials, welfare officials, contractors and union leaders all have urged me to pass along the word that Alaskan jobs are likely to be scarce this year—and even a poor job in the states is better than none at all in Alaska.

STRAW IN THE WIND—Commercial construction in Alaska's bigger cities is apt to take a sharp upturn because of a new feeling on the part of municipal administrators in the territory's population centers. Both Anchorage and Fairbanks are actively working on slum clearance plans. Taking a step beyond this, Anchorage city fathers have scrutinized some of the rickety, frame buildings along Anchorage's main street and other sections of downtown Anchorage and started a brisk program of condemnation. First step was ordering hearings on three buildings scheduled to be condemned. Because of the high value of Alaska real estate in fast-growing city areas, buildings which are torn down as a result of condemnation probably will be replaced fairly quickly with suitable, substantial structures. This means a sizable increase in the rate of commercial construction not only this year but in years to come.

CONSTRUCTION NEWS NUGGETS — Housing in Anchorage has never been more critical with the waiting lists for apartments hopelessly long. Construction men shouldn't count on bringing their families to Alaska . . . Alaska has just gone through one of the mildest winters on record . . . A total of 2,600 persons were seeking jobs the last time I checked with the territorial employment service . . . Polar bear hunting along the Arctic and Bering Sea coast is now in full swing, and many construction men will go back to the states with a new rug for the den . . . The territorial legislature has boosted the income tax from 12 to 14% of what is paid to the federal income tax collector . . . Construction men in Alaska for only a few months are not exempt from paying the income tax . . . Clifford Fenn has been designated resident engineer for a new field office being opened in Juneau by the Alaska District Corps of Engineers.

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depend on the
BLAW-KNOX
"Complete Package"
for maximum profit



Blaw-Knox MultiFoot Paver gives you faster, more complete Mixing

The exclusive cone-shaped drums of the MultiFoot Pavers assure you of thorough mixing in a shorter time or more complete mixing in a specified time than you could get in an ordinary paver with the common cylindrical-shaped drum. The natural end-to-end motion of the aggregate, cement and water produced by the cone drum results in a folding action that completely turns the batches over and over to assure the most thorough mixing in the shortest possible time.

With this more thorough mixing and the faster skip operation of the MultiFoot, hydraulic controls and the automatic cycle you can be sure the MultiFoot Paver will give you more batches per hour. If you are planning concrete paving work be sure to see your Blaw-Knox MultiFoot distributor to get all the facts about these high capacity units.



Self-Aligning Road and Airport Forms

Setting Blaw-Knox Self-Aligning Paving Forms true to line and grade is a cinch. Look at all the features that save time and money. Double-wedge staking system prevents tipping of forms by crooked stakes. One-piece lock-joint end slides give you fast aligned joints. Buttress-type stake pockets together with over-all sturdy construction of the forms prevent mis-alignment. Road forms are available in heights of 6" or more and Airport forms in heights of 12" or more.



Dependable Blaw-Knox Finisher

Team-up a Blaw-Knox two-screed Finishing Machine with a Blaw-Knox Spreader and you can handle the output of two dual-drum pavers working at maximum capacity. With this team you will be sure of turning out highest quality finish from harsh, dry concrete. Easily adjusted widths and choice of traction and screed speeds adapt Finisher to fit any paving job.



Blaw-Knox Precision Subgrader

Here's the only Subgrader that excavates by vibration—cutting through even the hardest subgrade to produce a perfect grade true to crown and cross-section. Fast and accurate, it produces more work with less power at a lower cost per square yard to assure accurate control of slab thickness to save concrete.

Fast Accurate Batching Plants

Blaw-Knox Aggregate and Cement Bins and Batching equipment are available to match the high capacity of all units in the Blaw-Knox Complete Package of Concrete Paving Equipment. Both Cement and Aggregate Batching Equipment are available with manual, push-button air-operated or automatic controls.





Only Blaw-Knox Concrete Spreaders spread with a Blade — the Natural Way!

Even the driest and harshest concrete is easily and naturally spread with the automatic transverse action of the spreading blade, shown in circle at left. This transverse motion of the spreading blade spreads concrete uniformly to elevation required and clears the path for forward motion of the spreader. Since there is a minimum of action on the concrete, there's no segregating effect regard-

less of its dryness or size of aggregates. Automatic reversing of the spreader blade relieves lateral pressure so alignment of forms is never disturbed. Blade can be set to automatically clear pre-installed center joint. A vibratory attachment that operates off the spreader power unit can be added that will assure maximum density without segregation even in dry, harsh concrete. Even with vibratory attachment only one operator is needed. Width easily adjusted to meet all paving requirements.

All "Complete Package" Paving Equipment Job-Proved

Blaw-Knox "Complete Package" Paving equipment has become the first choice of contractors throughout the country. Contractors with a spread of Blaw-Knox equipment know that they can depend on its many tested and proved design features plus

one distributor source for parts and service to keep their jobs on schedule. If you are planning to bid on concrete paving, plan to use the only line of equipment with experience—see your nearest Blaw-Knox Distributor today.

For more information on any of these units send for the following bulletins by number — MultiFoote, No. 2616; Road Forms, No. 2370; Finisher, No. 2517; Subgrader, No. 2227-R; Batch Plants, No. 2488; Spreader, No. 2485.



BLAW-KNOX COMPANY

Construction Equipment Division

45 Charleston Ave., Mattoon, Illinois

ENGINEERS

on the move



LT. COL. SEYMOUR RUBENSTEIN, recently appointed Executive for the San Francisco Army Engineer District. In announcing the new appointment **Col. John A. Graf**, District Engineer, stated the new executive officer will assist in supervising a civil works construction program for the Northern California coastal region involving flood control works, harbor development, dams and levees.

The Wyoming Highway Department announces several promotions and transfers. **Glen T. Shrum**, assistant state construction engineer, has been transferred to the maintenance division as assistant maintenance engineer. Taking his place is **Oliver F. Baldwin**, who moves to Cheyenne from his present post as district engineer at Rock Springs. **W. G. Ainsley**, who was district maintenance engineer at Sheridan, has been promoted to replace Baldwin. **G. H. Saffell**, project engineer at Sheridan, becomes the new district maintenance engineer for that district. Other field promotions include **Adrian G. Clary**, project engineer at Worland, to project engineer, Sheridan; and **John H. Milan**, assistant project engineer at Lander, to project engineer, Worland.

In the Cheyenne headquarters office, **Kirby H. Olds**, road design engineer, has been advanced to assistant plans and office engineer, and **E. A. Bass** will head the road design section. Filling Bass' former position as assistant road design engineer will be **Willard M. Anderson**.

Richard C. Frey, formerly highway construction inspector with the State of Nevada, has joined Western-Knapp Engineering Co., San Francisco, Calif., as mining engineer designing major construction mine plant projects. Frey is

currently assigned to U. S. Steel project (Atlantic City, Wyo.) now in its planning stage.

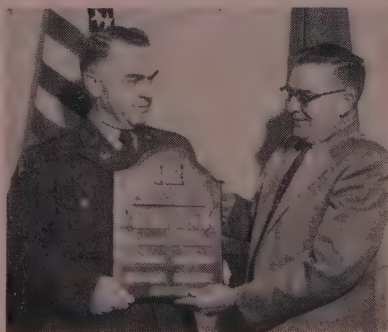
Col. John S. Harnett, now assistant division engineer, South Pacific Division, Corps of Engineers, San Francisco, will become district engineer when **Col. John A. Graf** leaves in July for Washington, D. C.

J. P. Kourkene has established an office specializing in prestress concrete design and construction. His office is at 321 South Beverly Dr., Beverly Hills, Calif.

Kourkene is a graduate of Massachusetts Institute of Technology, and has had eight years' experience in various phases of prestressed concrete construction, including consulting service to the Texas State Highway Department. His service to contractors or steel suppliers includes: estimating, engineering calculations and drawings, technical assistance on shop and field problems, lease of portable cable manufacturing machinery, and lease of powered field equipment for stressing and grouting.

A recent major project in which his prestress services were used was the Construction of the Santa Clara River bridge at Saticoy, Calif., comprising 23 continuous spans of 75 ft. This project was described in *Western Construction*, March 1957, p. 40.

Jack Butler, engineer with the Corps of Engineers, is employed in contract administration in the Walla Walla Dis-



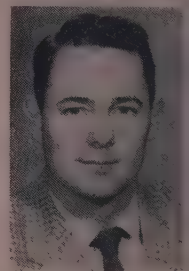
COL. ROBERT E. CRON, JR., District Engineer, presents safety plaque to **George W. Brown**, safety engineer of the Albuquerque District, Corps of Engineers. The "traveling" safety plaque was established by the Southwestern Division in 1951. Albuquerque District had the best safety record in that year, again in 1953 and 1956, thus becoming the first District to win the plaque permanently.

trict at Walla Walla, Wash., with the title of construction management engineer. Recently he was on an assignment at Larson AFB, Washington.

J. H. Martin, Jr., is project engineer for Vinson Construction Co. on the second section of Putah South Canal at Vacaville, Calif., under construction for the Bureau of Reclamation at a contract price of \$2,143,000. Before moving to this job, Martin was Vinson's project engineer on a construction at Tacna, Ariz.

Clifford C. Fenn has been designated resident engineer for a new field office being opened in Juneau by the Alaska District Corps of Engineers. The new Juneau office will replace the Petersburg Civil Works field office which closed last January, and will have charge of District Civil Works projects throughout southeastern Alaska.

Portland Cement Association, through **Robert H. Lochow**, district engineer at Seattle, Wash., announces the appointment of **Lawrence C. Miller** as field engineer for Spokane, southeast Washington and north central Idaho. Miller,



a junior member of the American Society of Civil Engineers and the Structural Engineers Association, was formerly employed in the structural design section of Weyerhaeuser Timber Co., and the consulting firm of Horace J. Whitacre & Associates in Tacoma.

Col. Carroll T. Newton has been assigned as district engineer at Los Angeles, Calif., by the Corps of Engineers, succeeding **Col. Arthur A. Frye, Jr.**, who has been assigned to the Far East. Newton's new assignment is effective in July. The Corps also announces that **Col. Harry O. Fischer**, who was district engineer at Fort Worth, Texas, has been assigned to the U. S. Army, Alaska, to be engineer there, reporting in August.

Selected to serve on the Rules Committee in connection with The James F. Lincoln Arc Welding Foundation's 1958 award program "Welded Bridges for Interstate and Defense Highways" are three Westerners: **Charles E. Andrew**, chief consulting engineer, Washington Toll Bridge Authority; **Raymond Archibald**, J. E. Greiner Co., Seattle, and **P. M. Stephenson**, bridge engineer, Oregon State Highway Department. See news item on page 99.



VERSATILITY... HIGH PRODUCTION *all in one low-cost team*

Here it is—the Allis-Chalmers HD-6 crawler tractor (63 belt hp) and the Model 44 scraper (4 yd struck, 4.7 yd heaped). This self-loading combination is a natural for many contractors . . . big enough to move dirt fast, small enough to leave room for profit on low-yardage jobs.

In addition to low first cost, the HD-6 has dozens of features that help keep operating costs down . . . including, 1,000-hour lube intervals for truck wheels, idlers and support rollers.

Full hydraulic control speeds jobs, simplifies operator's work. And the Model 44 scraper has these important big-scraper advantages: high apron lift, forced ejection, wide cutting edge, high flotation tires and ample clearance.

For all the facts on this low-cost tractor-scraper combination, see your nearby Allis-Chalmers construction machinery dealer now.

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Hins Tractor Co.—Eureka and Willits
West Coast Engine & Equipment Company—Berkeley

SOUTHERN CALIFORNIA
Construction Machinery Company—San Diego
San Joaquin Tractor Co.—Bakersfield
How Sales & Service Co.—Los Angeles and San Diego

IDAHO
Southern Idaho Equipment Co.—
Idaho Falls and Twin Falls
Southern Idaho Equipment Co. of Boise, Inc.—Boise

MONTANA
Mountain Tractor Company—Missoula and Kalispell
Richland Machinery Company—Sidney
Seitz Machinery Company, Inc.—
Billings and Great Falls

NEVADA
A D Machinery Company, Inc.—Elko and Las Vegas
Reno Equipment Sales Co.—Reno

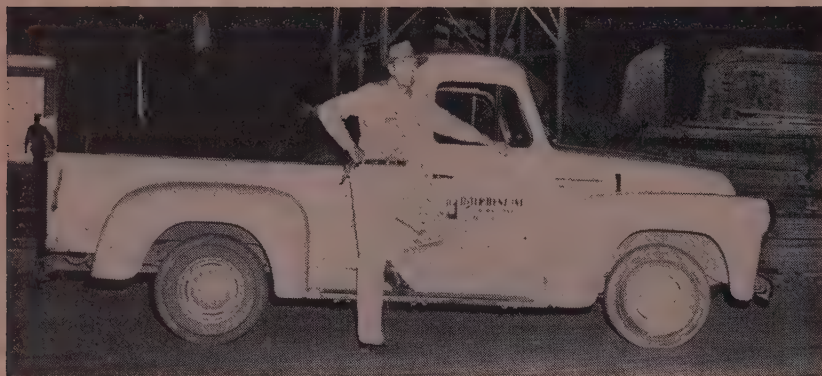
OREGON
Haupt Tractor Company—
Medford and Klamath Falls
Wood Tractor Company—Portland
Timber Tractor Company—Springfield

UTAH
Cate Equipment Company—Salt Lake City

WASHINGTON
Pacific Hoist & Derrick Company—Seattle
American Machine Company—Spokane

WYOMING
Studer Tractor & Equipment Company—Casper

SUPERVISING the jobs



NOW UNDER WAY is the job of roofing 19 acres of hangars at Moffett Field in California. The area to be covered is spread over the smaller two of the Naval Air Station's three hangars. Contract, which was awarded to Dale Benz, Inc., of Phoenix, Ariz., at \$1,015,000, covers hangar conversion: new wood sheathing, roofing, electrical system, lightning protection system and miscellaneous repairs. Shown above is **Donald P. Case**, project engineer for the Bentz firm. General foreman is **Joe Meads**. Contractor estimates the project will be finished this year.

Duncan C. Manning, Jr., is superintending excavation, grading, and bituminous surfacing, while **George Wiggers** is superintending structures and related construction, on a \$2,254,719 recent award to Cox Brothers Construction Co. and J. E. Haddock, Ltd. Job is in Orange County, Calif., and covers 6.6 mi. of freeway, together with frontage roads and ramps to be graded and surfaced, and four bridges to be built, on Route 185. Contractor started work here in February and expects to have it complete August 1958.

* * *

Carl C. Jacobson and **Arthur W. Rogers**, general superintendent and project superintendent respectively, head the construction force working for Tanner Bros. Contracting Co. on grading and surfacing of the Prescott-Ashford Highway, Yavapai County, Ariz. **G. S. Tanner** is doing the purchasing, **John H. Tanner** is engineer, and **Raymond Hershner** is field office manager. Under construction since March, the \$337,237 job is expected to finish about July.

* * *

Bob Hawk is supervising a recent award to Northwestern Engineering Co. for grading, structures, and concrete pavement near Gilcrest on State Highway 3 in Weld County, Colo. Other important men on this \$694,273 project are **Fred Singleton**, foreman, and **Al Gaudin**, field accountant.

Joe Mansfield, superintendent for Pioneer Construction Co., is in charge of work consisting of grading, structures and plant-mix surfacing on 10.2 mi. between Delta and White-water in Delta and Mesa counties, Colo. Pioneer was granted the award on a low bid of \$699,997 and started work in March.

* * *

John E. Nonenmacher, project manager, with **Wilbur A. Sisson** and **Bob H. Harris**, field superintendents; **John Heasley**, project engineer, and **James R. Canning**, office manager and engineer, are key men on a contract which was awarded to J. H. Wise & Son, Inc., to construct Hot Cell Area building at the AEC's National Reactor Testing Station in Idaho. Wise's bid was \$469,100. Scheduled for completion this fall, the work started in February.

* * *

Mel Schlichter is supervising construction of two overpasses over the U. P. Railroad, and one highway overpass on State Highway 2, Adams County, Colo. The contractor is Monaghan & Smith Construction Co., who got the award on a bid of \$224,762, started working in February, and expects to finish the job in July.

* * *

Andy Collins and **Roy H. Smith**, superintendents for Healy Tibbitts Construction Co., are in charge of installing concrete fender system for

two bridges in San Mateo County, Calif. Other key men on this \$211,265 job are **Dick Sheppard**, who is the job engineer, and the following foremen: **Lee Stilwell**, **Al Hagan**, **John Homan** and **Harry Bridgewater**. Construction started in March and will probably end in July.

* * *

G. L. Compton, partner in the construction firm of J. C. Compton Co., has **David Lofts** as his foreman of the crusher crew on a recent highway award to the firm. **G. L. Rowell**, another partner, directs the paving, with **D. J. Holmes** doing the supervising, aided by **Paris Chase** and **Ivan Wickersham**, foremen. This is a \$520,886 project on Route 28 and U. S. 395 between Alturas and the Oregon State Line, Modoc County, Calif. Work entails complete repaving of section. Job will be finished in August.

* * *

John Ford, Jr., is superintending a \$2,309,498 construction of detours, a combination reinforced concrete and structural steel bridge, and approaches, to be graded across Petaluma Creek, near Black Point in Marin and Sonoma counties, Calif. Foreman on the project for Ben C. Gerwick, Inc., the contractor, are **Bill Ferraris**, pile-driving; **W. McCrea**, carpenter, and **Kenneth Smith**, concrete. Resident engineer for the California Division of Highways is **M. H. Jacobs**. Work started in March and Gerwick estimates it will be finished about October 1958.

* * *

A. N. Regalia of the Baldwin Contracting Co., Inc., is project manager on a recent award won by the joint venture firm of Baldwin Contracting Co., and H. Earl Parker, Inc. The contract which involves 3.7 mi. of grading, surfacing and construction of one bridge and widening another in Auburn, Placer Co., Calif., went to the joint venturers at a cost of \$2,400,697. General superintendents are **J. Perry Parker** (H. Earl Parker, Inc.) and **A. J. Vercruyssen** (Baldwin). Grading superintendent is **Edward F. Alt** of the Parker organization, and structure superintendent is **Charles Schaefer** of Baldwin. Project engineer is **Frank N. Garrison**, also of Baldwin. Under way since February, the project will probably be complete by the end of this year.

* * *

J. M. Curlee, general superintendent for Bechtel Corporation, is in charge of a contract from Pacific Gas & Electric Co. for the building of diversion dam and powerhouse on the Feather River in California. **Ralph Core** is project engineer. Other engineers are **Jim Marvin** (cost) and **Norman Gadway**. **C. L. Jeffs** is office manager. Among the other contractor personnel are **Dan Harris** and **Ray Owens**, assistant superintendents; **A. Kiewer**, carpenter foreman; **Elmer Parker**, master mechanic; **Ray Powers**, general foreman, power-

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Athey-Cat PR21-DW21 maneuvers easily in tight quarters, handles big rock.

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Trailer-Tractor	Capacity
Athey PR21-Cat DW21	34-tons, 22.5 cu. yds.
Athey PR20-Cat DW20	34-tons, 22.5 cu. yds.
Athey PR15-Cat DW15	22-tons, 15.6 cu. yds.
Athey Hydraulic Ejection-	
Cat DW21 (or DW20)	31-tons, 22.5 cu. yds.
Athey PD20-Cat DW20	30-tons, 22 cu. yds.
Athey PH20-Cat DW20	45-tons, 62 cu. yds.

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house; and **Jack Lloyd**, general foreman, dam.

Elmer Hall is resident engineer; **Mike Klemm** is inspector on the dam, and **Roy Fredricks**, inspector on the powerhouse. Job is scheduled for completion about November.

* * *

Ward W. White, project superintendent for Peter Kiewit Sons' Co. and Fred J. Early, Jr., Co., Inc., is in charge of a recent award to this joint venture covering a reinforced concrete box conduit storm drain with appurtenant works, including laterals and catch basins, special structures, sanitary sewer. This is an \$8,522,412 project being built for the Los Angeles County Flood Control District. Other key men on the large project, just getting under way, are **Jim Fuller**, project engineer, and **L. E. Kinsella**, purchasing agent. Completion date is set at January 1959.

* * *

H. E. Finell is job superintendent for A. T. Fox, whose company recently won a \$1,206,880 award for construction of major naval facilities at Coos Head, north of the California-Oregon state line. Assistant superintendent is **Archie Vettengl**, and **Wilson** is job engineer. Under way since Feb. 28, Fox expects to finish job by April 1, 1958.

* * *

R. L. Dever, superintendent for Armstrong & Armstrong, is in charge of work on a 7.9-mi. section of the Socorro-North road in Socorro County, N. Mex. A 4-lane highway, contract in-

volves grading, hot-mix surfacing, 8 concrete bridges and miscellaneous drainage structures. Assisting as foremen are **Clyde Rossow**, grading; **T. C. Carr**, bridge; and **L. D. Arnold**, crusher. Work started in February; will be completed about May 1958. Contract: \$1,811,361.

* * *

Robert Chandos, superintendent, is in charge of a \$129,631 award to Gardner & McCall for grading, surfacing and construction of a bridge, located in the cities of Torrance and Redondo Beach, Los Angeles County, Calif.

* * *

Hugh Cameron, general superintendent for Reed & Martin, Inc., is in charge of construction of ammunition storage facilities at Ladd AFB in Alaska. Assistant superintendent of this \$2,219,561 award is **Jack Hansell**. **H. C. "Ole" Olson** is carpenter superintendent. Work has been under way for the past month and according to the contractor will be finished about July 1958.

* * *

Philip A. Stewart and **D. W. Arntzen**, partners in the firm of Wayne Construction Co., with **H. S. Giske**, project engineer, are directing a recent \$1,893,023 award to the company for construction, design, fabricating and testing radar antenna covers for various installations in Alaska. **Wisbeck** & **Konzen** are acting as consulting engineers. Project will be finished some time in 1958.

* * *

Glenn Campbell, superintendent for Reed & Martin, Inc., heads the list of

job personnel on construction of an addition to the operations buildings at Campion Air Force station, and further construction at Galena Airport, Alaska. Of five months' duration, job is just starting, with **Earl Conn** acting as carpenter foreman, and **Bill Yrjanc**, equipment foreman.

* * *

Arch Johnson, project manager, and **John Ferguson**, superintendent, are principal men on construction of the 22-story office building going up in San Francisco for Crown Zellerbach Corp. This \$15,000,000 contract was awarded to Haas & Haynie Construction Co. A two-year project, work has been in progress since March 1956.

* * *

Henry Ramsey, project manager, **Vern Stanford**, superintendent, and **Frank Anding**, chief engineer, are head men on a \$2,224,000 contract covering erection of ward buildings at the Fairview State Hospital in Orange County, Calif. Contractor **Robert E. McKee** is just getting under way on this construction which will finish September 1958.

* * *

John Tryon and **Otto Lieske** have been named to supervise a recent award to S. S. Mullen, Inc., covering complete military installation including construction of an airfield at Anchorage, Alaska. This \$4,461,554 DEW Line project comes under the jurisdiction of **R. S. Brown**, area manager for Mullen, with **D. W. Moen** serving as project manager, and **W. L. Bergman** as project engineer.

Glen Canyon Project key men

Shown here are four of the top men on the Bureau of Reclamation's Glen Canyon Unit of the Upper Colorado River Storage Project. At the right is **L. M. "Lem" Wylie**, a veteran of Hoover Dam, project engineer for the Bureau. At the lower left is **Earl M. Cooper**, project manager for Mountain States Construction Co., holder of the \$2,452,340 contract for the 2,740-ft. long right diversion tunnel. In the center, below, is **Olen H. Hamrick**, general superintendent for Mountain States. At the

lower right is **William A. "Bill" Choate**, project manager for Kiewit-Judson Pacific Murphy, holders of the \$4,139,277 contract for the construction of the 1,028-ft. long steel arch bridge which will span the canyon 700 ft. above the Colorado River. A detailed review of the Glen Canyon Project, written by **L. N. McClellan**, Chief Engineer of the Bureau of Reclamation, appeared in the February issue. Several spectacular photos were presented last month on the cover and page 94.



Wylie



Cooper



Hamrick



Choate

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SMOOTHEST LOADING You get crowding action PLUS with a hydraulic torque converter drive that multiplies torque 350 percent. You quickly and smoothly load the toughest materials — no butting, no ramming, no engine stalls. And there's a scooping action, too, with the tip-back bucket. Result — heaping loads fast!

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Seltz Machinery Company, Inc.—
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NEVADA
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Reno Equipment Sales Co.—Reno

OREGON
Hauptert Tractor Company—Medford and Klamath Falls
Wood Tractor Company—Portland
Timber Tractor Company—Springfield

UTAH
Cate Equipment Company—Salt Lake City

WASHINGTON
Pacific Hoist & Derrick Company—Seattle
American Machine Company—Spokane

WYOMING
Studer Tractor & Equipment Company—Casper

Alf Eriksson, project manager, and **Benjamin E. Nelson**, general superintendent, are head men on construction of sewerage and drainage works being built for the Meadowview Sewer Assessment District, Sacramento, Calif. by **Fred J. Early, Jr., Co., Inc.**, at a cost of \$1,400,000. **Joe Kohles** is assistant superintendent; **R. R. Randall** is engineer, and **D. Ratzell** is in charge of the office. Carpenter foreman is **H. Dahlke**, and concrete superintendent is **T. Odum**. Early started work here Oct. 25 last and expects to be finished in August.

Stockton Construction Co. has the subcontract for underground sewer and drainage lines, with **Jack Weeby** in the superintendent spot. Reinforcing steel is subcontracted to **Pittsburgh-Des Moines Steel Co.** **E. L. French** is doing the electrical work under subcontract.

Fred Michel is superintendent for **Anderson Bridge Construction Co.** which has contract for erection of an 84-ft. high box girder bridge over **Peasley Canyon** road in **King County, Wash.** Carpenter foreman is **Burt Brewer**, concrete foreman is **Axel Malmstrom**. This \$396,847 contract was delayed three months in starting to enable a portion of the grading work to be finished.

D. H. Bunge, project manager, and **D. D. Davis**, project superintendent, are top men on a recent award to **Paul Hardeman, Inc.**, for construction of expended core facilities at the **National Reactor Testing Station** in **Idaho**. This \$3,392,000 project started April 1 and is expected to be finished about April 15, 1958.

Harry Boswell, project manager, and **Garland Cannon**, project superintendent,

head the job personnel working for **Morley Building Co.**, contractor recently awarded a \$2,083,900 contract for a 4-story library building and a 2-story music building, with site development, located in **San Bernardino, Calif.** **Milt Stein** is office manager.

John Sweet is superintending construction of a high school at **Hawthorne, Calif.**, for **Morley Building Co.**, which was awarded this contract on a bid of \$1,370,000. The office is managed by **Milt Stein**. Work has been going on since February and will probably end this August.

C. G. Johns, general superintendent for **B. L. Metcalf Co.** is in charge of a recent \$1,779,000 contract which **Cliff Kallaway** is superintending, aided by **Harry Howe**, foreman. Started in April, job consists of a 13-building school addition which will take 260 days for completion.

Victor McFarland, project superintendent for **Stolte, Inc.**, is in charge of 4.9 mi. of grading, surfacing and constructing one bridge in **Tehama County, Calif.** **Herb Whiting** is superintending the excavating and **George Phillips** is master mechanic. Recently started, the job will probably be finished about Oct. 1. Bid price \$1,129,955.

Afton Bohn and **Shirley Craig**, superintendent and assistant superintendent respectively, are **Gibbons & Reed Co.**'s supervisors on a \$4,976,184 job of grading and paving 4.4 mi. and erection of slab bridge east of **Floriston, Calif.**, and the **Nevada** state line. Project engineer is **Harold Cockburn** and the office is in charge of **Dale Johansen**. Work started in April and will end in mid-1958.

H. D. Brown, field superintendent for **Olson Construction Co.**, is in charge of eight chemical plant buildings going up in the manufacturing area of **Brigham City, Utah**. Work on this \$1,000,000 project has been under way since March and will probably end in September.

V. A. Hellums, superintendent for **McCormack Construction Co.**, of which **R. W. McCormack** is general manager, heads the job personnel on a recent award for construction of radar installations about 16 mi. northeast of **Lewistown, Mont.** **L. B. Harradine** is superintendent—operations area, in which this \$2,220,293 project is situated. Office manager is **Charles Farris**. The job has just started and will run to July 1958.

Richard W. Richardson, superintendent, assisted by **Ted Jones**, piledriver foreman, is in charge of construction of a reinforced concrete box girder, 28-ft. roadway and aluminum railing on **Highway 1, Martin Way, Thurston County, Wash.** **John E. Alexander**, contractor, was awarded the job on a low bid of \$119,965, started working in March, and expects to finish the job in July.

Charlie C. Lewis is supervising the \$559,587 award to **Jack Adams**, contractor, for 2.7 mi. of grading, drainage structures, sub-base, cement treated base course, hot plant bituminous surfacing, and miscellaneous on the **Portals** urban road in **Roosevelt County, N. Mex.** Field clerk is **Roy G. Harris**; structure foreman, **J. A. Truelock**. Work has been under way since early March, with August set for the finish.

Jack Burchett and **W. Galbraith**, foremen for **C. L. Hubner Co.**, are key men on a \$445,722 contract for grading and surfacing from **Eads** north on **State Highway 58** in **Kiowa County, Colo.** Under way since March, **Hubner** expects to have the job finished in June.

Walter Gott and **C. R. Jurgensen**, superintendents, are in charge of a \$1,213,019 award to **O. D. Cowart** for road work in **New Mexico**. **Ted Raley** is grade foreman and **Roy Neal** is structure foreman. Under way since March, the work consists of 6 mi. of grading, drainage structures, base course, hot mix, two parallel bridges, 5-span reinforced concrete slab on steel pipe pile piers and abutments, located at the **Bernalillo County** line-east road in **Bernalillo** and **Valencia** counties. **Cowart** expects the work to continue till January 1958.

Warren G. Briggs, superintendent, heads the job personnel on **Hoops Construction Co.**'s recent award for grading, graveling and oiling 27.3 mi., **Gold Acres** to **Beowawe, Nevada**. Other important personnel on this \$581,125 job are **Harry King**, grade foreman; **Bill Warren**, master mechanic; **F. Earl Forney**, timekeeper, and **Roy Fields**, mechanic. April 1 was the starting date on this job which will be finished about July 1.



Grover J. Duff, Chairman of the **Arizona State Highway Commission**, points with pride to alignment of the first highway improvement project in **Arizona** to be constructed and financed under the new 1956 Federal-aid Highway Act. With Commissioner Duff are **Wm. N. Price**, **Arizona Highway Department** district engineer, and **Edward O. Earl**,

president of **San Xavier Rock & Sand Co.**, project contractors.

The new construction will parallel the existing **Tucson-Benson Highway** in **Pima County** and will extend over **U. S. 80** for about 7¼ mi. Work under the \$387,607 contract has started and is scheduled to be completed by Nov. 30, 1957.

Heaped loads up to 25 cu. yds. were easily handled in fast time by this DW21-No. 470 Lowbowl Scraper for L. G. Arnold, Inc. Other Caterpillar-built units in the company's line-up include a D9 used as pusher; one non-current DW21; two D8s; two No. 12s; one D6 with tamper; one D7 with Bulldozer and a No. 80 Scraper.



"OUTPRODUCED BY FAR ANY OTHER MACHINES ON THIS JOB"

Phil Dudenhoefer, grade foreman, L. G. Arnold, Inc., Eau Claire, Wisconsin

CAT* Lowbowl Scraper, push loaded by a D9, set the following pace on relocation of U. S. 53, Wisconsin:

- 1.** Averaged 12 to 15 minutes a trip with heaped loads on a three-mile round-trip haul.
- 2.** Loaded sandy gravel in 70 seconds and topsoil in 45 seconds.

Here's more proof that Caterpillar Lowbowl Scraper design really pays off on the job. The proof comes from F. L. Carr, Vice-President, and Phil Dudenhoefer, grade foreman, of L. G. Arnold, Inc.

Quoting F. L. Carr: "The new DW21 and D9 pusher have more than lived up to all of our expectations. The low-bowl design of the new scraper has even improved the easy loading feature of Caterpillar-built hauling equipment."

Quoting Phil Dudenhoefer: "In my 28 years in this business, I've seen all sorts of earthmoving machines, and Caterpillar beats them all. As grade foreman, I've got both feet right down in the dirt where I observe and record the output and performance of every machine. I'll say this: the DW21 and No. 470 Lowbowl Scraper with the D9 pushing outproduced by far any other machines on this job!"

The job: The relocation of about 10 miles of U. S. 53 between Eau Claire and Chippewa Falls, which involved the handling of 78,059 cu. yd. of borrow (sandy gravel), 42,901 cu. yd. of unclassified and 93,272 cu. yd. of overburden (topsoil). The Caterpillar DW21-No. 470

Lowbowl Scraper (struck capacity 18 cu. yd.), carrying heaped loads up to 25 cu. yd., made four trips an hour on a three-mile round-trip haul. Loading time, with the D9 pushing, averaged 70 seconds for sandy gravel and 45 seconds for topsoil.

On job after job, under varying conditions, the Cat Lowbowl Scraper is showing its heels to other earthmovers. Your Caterpillar Dealer, who backs you with prompt service, will be glad to show you *facts* and *figures* comparing its performance with other units.

For *proof* that it will pay you to put DW21-No. 470 Lowbowl Scrapers on your job, see him today!

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New Films . . .

KEY TO THE EMERALD EMPIRE, a new 28-min., 16 mm color and sound motion picture telling the story of construction of Lookout Point Dam on the Middle Fork Willamette River, is available from the U. S. Corps of Engineers for showing to schools, civic groups and other interested organizations.

Also available for showing are 28-min. color and sound films of other Northwest dams: The Dalles on the Columbia River, Detroit on the North Santiam, Mud Mountain on the White, and Albeni Falls Dam on the Pend Oreille.

Requests for these films should be addressed to the **Technical Liaison Branch, North Pacific Division Corps of Engineers**, 210 Custom House, Portland 9, Ore.

MODERN METHODS for Joining Metals is a new motion picture showing a variety of welding processes and applications. The 20-min. sound and color film illustrates the importance of the welding engineer and shows the many factors involved in electric welding. Arrangements to view this picture may be made by writing to **Linde Air Products Co., Division of Union Carbide & Carbon Corp.**, 30 East 42nd St., New York 17, N. Y., or by contacting your nearest Linde office.

ON THE MOVE, a new color-sound movie, is announced by **Baldwin-Lima-Hamilton Corp., Construction Equipment Division**, Lima, Ohio. The 28-min., 16 mm film, which deals with the subject of transportation, points out the important role played by shovels, cranes and other road-building equipment. Covered is the gigantic St. Lawrence Seaway project, material handling and turnpike construction. Copies are available on a loan basis to associations, and engineering, and student groups. Scheduling is being handled by the BLH Advertising Department at Lima.

HIGHWAY LIFE LINES depicts the best methods for selecting and applying traffic paints. The 16 mm film is available from **Hercules Powder Co., Advertising Department**, Wilmington 99, Del. Against a backdrop of highway scenes from coast to coast, the 16-min. film covers such subjects as the methods of evaluating traffic paints, factors influencing paint performance, and various methods of applying traffic paints.

THREE FILMS are ready for distribution and three others will be produced later this year by **Columbia-Geneva Division, United States Steel Corp.**, 120 Montgomery St., San Francisco 6, Calif. A genial character dubbed Dunbar is the central figure in the new series of full color, sound slide, educational film strips about pipe for presentation at meetings of distributors and plumbing contractors of the West.

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HOPTO MODEL 360 57-90—Big capacity 90 GPM triple tandem pump and split hydraulic system handles half-yard backhoe. Full 360° continuous swing from over cab position.

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- Rugged hydraulic systems with generous overload factors, large oil reservoirs, heavy-duty pumps and valves.
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TRICKS of the TRADES



Colorado overpass gets new face

DENVER'S 30-year-old West Colfax Avenue Viaduct has been taking a beating from a daily estimate of 35,000 vehicles every day of its life. The city's ice removal program also takes its yearly toll with the use of salt on the old structure.

As a vital link on U. S. Highway 40, and as an overhead span above the industrial district and the rail yards, the old viaduct deserved a real face lifting, and more important, a structural reinforcement.

The Latimer Construction Company of Denver was awarded the job contract by the State Highway Department, and Fred Mattei of the Department was chosen to represent the State in overseeing the job.

The original design of the structure called for protecting and reinforcing the steel girders with a layer of air-placed mortar. The reconstruction work started with exposing these girders for inspection and repair. This was a slow and tedious task since small hand chipping guns had to be used to break the extremely tight bond of the concrete to the steel. One man, on an eight-hour shift, rarely removed more than four square yards of concrete.

A tough problem that had to be licked

was the fact that the flow of mainline passenger trains couldn't be interrupted, yet extensive scaffolding was required. The scaffold problem was solved by building a walk-way 45 ft. long and 5 ft. wide, that was self-powered to move vertically and horizontally. There was less than two feet clearance when trains rushed by under the scaffold.

Asphalt, sometimes 10 in. thick, had to be removed with hydraulic rock rippers and hauled some five miles away. The street was then surfaced with new asphalt.

Every nook and cranny of the giant viaduct had to be investigated for spalling areas of deteriorated concrete. Literally tons of loose scale and deteriorated concrete were chipped, broken, sand-blasted, and washed off in order to prepare this old landmark for its new face. For the actual gunning job, an Airplaco Model 1500 Nucretor concrete gun was used together with an Airplaco Mix-Elevator, continuous dry mixer. Both units were mounted on a portable gunning rig and hitched to the back of an aggregate carrying truck.

This set-up was very mobile, as it had to be, because the viaduct was over a mile long. Both sides of the curb, the handrails and deck patches topside and

underneath had to be repaired. All together there were in the neighborhood of 33,000 feet of curb, handrail and deck to be repaired, plus the understructure of the entire viaduct.

This under-the-bridge work was largely overhead, and that is where the gun really saved time and money, because of the no-slump characteristic of air-placed concrete.

Thanks largely to a lot of pre-planning, and also because of the portable rig operation, the viaduct job was completed well within the allotted 90 days.

Drain anti-freeze to avoid trouble

SERVICING the cooling system of shovels, trucks, tractors, cranes, and other construction equipment for hot weather duty is just as important as servicing them for frigid weather. Unless all winter-worn anti-freezes are drained out—including so-called "permanent" types—the result may be overheated engines or more serious damage.

Here are a few spring maintenance tips from cooling system experts of the Du Pont Company, manufacturer of "Zerone" and "Zerex" anti-freezes, which may help avoid expensive repair bills:

(1) Corrosive anti-freeze solutions are a major cause for overheated engines. These dangerous solutions eat into the vital parts of the cooling system, producing rust, which clogs up the radiator and narrow water passages in the engine block. Overheating also can mean serious engine damage, such as scored cylinders, wrapped cylinder heads, "seized" motors, burned and sticky valves, etc.

(2) Many troubles attributed to overheating can be traced to a general misunderstanding of the word, "permanent" in anti-freeze, which really means winter long, or seasonal, not year after year.

For example, all so-called "permanent" types can turn acid in cooling systems after one season's use. Air and exhaust gases seeping into the cooling system oxidize the glycol, forming harmful acids. As these acids form, they are neutralized by rust inhibitors. In time, however, the inhibitors become depleted, leaving the solution dangerously corrosive. For this reason, it is more economical in the long run to drain out and discard the worn solution, and install fresh anti-freeze in the fall.

(3) Do not be misled by hydrometer readings showing that winter-worn solutions still afford adequate protection against freezing. There is no way the hydrometer can simultaneously indicate whether the anti-freeze solution has turned acid and is excessively corrosive.

(4) Adding a fresh "dose" of rust inhibitor to winter-worn solutions also will not solve the corrosive problem. This only temporarily slows up corrosive ac-



If you can't find the right rig for the job— Build your own machine

"WHEN you've got a job of material handling to do, be sure that you've got the right equipment, even if you have to make it." This is the philosophy of Jim Chelf, a private and contract carrier of Denver, Colorado.

Lattimer Brothers of Denver has a pipe laying contract for a water main between the Moffat Tunnel Filter Plant and the Waterton Plant of the Denver municipal water system. Chelf recently took the sub-contract for unloading the pipe from the railroad cars, hauling it to the site and stringing it along the right-of-way.

There will be between 500 and 600 carloads of this concrete pipe, built by Lockjoint Pipe Co. in their plant near Wichita, Kansas, and shipped into Denver by rail. Generally three sections of pipe are loaded on each railroad flat. Each section of pipe is 16 ft. long and has a 6-ft. outside diameter. The wall thickness is 6 in. It weighs about 22,000 lb. per section.

Chelf demanded a machine that was versatile. It must give positive control at all times. It must handle the pipe with

ease and have plenty of power to spare. It had to be mobile. Further, he demanded that it be usable on many different kinds of terrain, so that when needed, he could use it to unload the flatbed trucks and string the pipe.

There was nothing in the market that suited his ideas of what such a machine should be. So he designed one himself and had it built to his own specifications.

Actually the machine is in the form of an "A" frame, but it is quite unlike any ordinary "A" frame. The tubular framework portion is built of drill stem, secured from an oil well supply house. It was engineered and designed to give maximum strength and was arc welded throughout. This work, as well as the assembly of the completed machine, was done by Eaton Metal Products Co. of Denver.

The rear tandem was built by the Winter-Weiss Co. of Denver. It is mounted on sixteen 7.00 x 18 heavy duty tires. For ordinary work or traveling over the road, this tandem is a normal eight-foot width, but when used

for stringing pipe on rough or uneven ground, it may be extended to a ten-foot or twelve-foot width to give a firmer base.

The two Braden winches which do the lifting are powered by a Wisconsin VF4 (3¼ x 3¼) gasoline motor.

The LaTourneau "Tournapull" on the front end furnishes plenty of hauling power and will take the rig over the road at 25 mph. or better.

The "A" frame has a maximum height of 25 ft. On the road the entire machine is just 40 ft. long. It has a lifting capacity of 50,000 lb.

The machine has proven highly satisfactory. It is quite maneuverable and fast in operation. Nine cars of pipe have been unloaded in a single day without any fuss or sweat. More could have been handled if they had been ready on the siding.

While ordinarily it is used to transfer the pipe from the railroad cars to the flatbed trucks, it can and has been used at the unloading point on the pipe line, to swing the pipe from the trucks and place it in proper position, when the terrain was such that the ordinary "A" frame, usually used for unloading, could not do the job easily or safely.

tion, it cannot eliminate the damaging acid salts already formed.

For safe, trouble-free fleet operations, the National Bureau of Standards, automotive authorities, and anti-freeze manufacturers recommend this program before hot weather begins:

- 1) Drain out and discard winter-worn antifreeze solutions from the radiator and engine block.
- 2 Clean and flush the cooling system, using a chemical cleaner, if necessary.
- 3) Check all parts of the cooling system for leaks or wear; replace or repair where necessary.

(4) Refill radiator with fresh water, and add a chemical rust inhibitor.

Although this program applies to all water-cooled engines, operators using the "Anti-Freeze Analyzer" will apply it only to engines containing corrosive anti-freeze solutions. Maintenance men using the analyzer can detect quickly, right on the spot, which solutions are so corrosive they should be discarded, and which are safe for another season's use. The analyzer—good only with "Zerex" anti-freeze, a permanent type—not only saves the possible cost of replacing radiator cores and water pumps, or making other cooling system repairs, but allows safe re-use of many gallons of anti-freeze.

A 1956 edition has just been released of the book entitled "2525 Review Questions For Surveyors." The author is **Russel C. Brinker** whose address is Box 153, Blacksburg, Virginia. Price of the book is \$3.50. For the first time the book contains actual licensing examinations which are incorporated in the volume with statements covering the time allowed and the references permitted. As a result the book represents a final test for men preparing for examinations in surveying.



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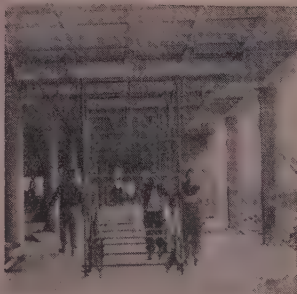
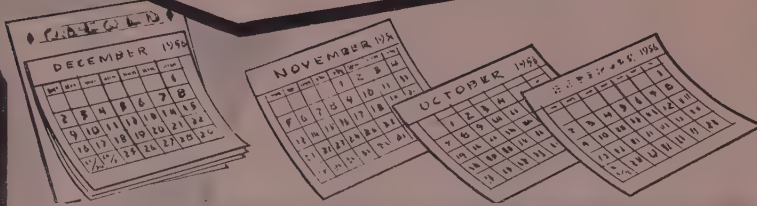
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CUTTING WEEKS OFF SHORING SCHEDULES



Progressive contractors who have employed the **ADVANCE Shoring System** are well aware of the substantial savings of both labor and materials that is possible on every structural concrete shoring job. Beaver-Advance engineering know-how spells the difference. Statements from satisfied users more than justify our optimism.

One Project Superintendent writes:

"From past experience on jobs of this size, and using the old forming system, we would have used 45 to 50 carpenters at one time. We averaged only 30 carpenters on this job."

Another reports: "We realized a time savings of 55 days, based on a 12-month concrete pouring schedule."

High production, extreme versatility and low use cost are stand-out features of **ADVANCE**—the scaffold that keeps every job on schedule and in the profit column. Get complete details from your Beaver-Advance distributor.



Beaver-Advance
CORPORATION
Ellwood City, Pennsylvania

BEAVER-ADVANCE Corporation, Ellwood City, Pa.

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Please furnish complete information on the **ADVANCE** system for shoring structural concrete.



Hanging scaffold for tilt-up walls

DESIGNED by Superior Scaffold Co. of Culver City to specifications by Smith & Jex, Los Angeles, Calif., contractors, is a new scaffold which is shown suspended from a tilt-up wall. The scaffold is mounted on small wheels and can be rolled along easily by one man. Ed Blankenship, superintendent for Smith & Jex, is shown hooking cross bracing in place. The spreader bar at the top is snapped into place by the Auto-Lock clip system.

Air jet removes concrete slab pans

A NEW METAL FORM for use in waffle-type concrete joist construction is quickly blasted free of the hardened concrete with a jet of compressed air, leaving smoothly-patterned ceiling surfaces. The manufacturer is Ceco Steel Products Corporation, Chicago, Ill.

With Steeldome forms, one man presses an air gun against a fitting set into the form, while another man stands by to grasp the form as it is blasted free. This method protects the smooth concrete surfaces from chips and scratches, leaving ceiling suitable for finished locations.

Flanges forming standard-width joist soffits are an integral part of the domes. When erected, the Steeldomes are butted at all soffits joints, eliminating the common defects of forms which must be lapped, and creating the smooth surfaces desired for exposed ceilings. The rigid, integral soffit flanges permit the economy of skeleton centering in one direction instead of two. If attached or

suspended ceilings are required under raffle-type construction, ceiling hangers are easily installed through holes provided in the pans. Underfloor electrification is also easily accomplished. Standard Steeldomes have a void of 36 x 30 in. and an overall plan size of 36 x 36 in., including flanges. Standard depths are 8, 10, 12, and 14 in.

"American Civil Engineering Practice" is the title of a three volume reference library of which volumes I and II have just been completed and released by **John Wiley & Sons, Inc.**, 440 4th Ave., New York 16, New York. Each of the first two volumes carries a price of \$15.00.

This comprehensive reference work was prepared by authorities on all phases of civil engineering working under the general direction of Robert W. Abbett.

Contents of volume I starts with a section on community planning and runs through such subjects as surveying, traffic engineering, highway engineering, airports, railroads, soil mechanics, foundations, earth work tunnels and fundamental mathematical tables.

Volume II continues with comprehensive sections on such subjects as hydraulics, hydrology, dams, river engineering, hydroelectricity, irrigation, drainage, water supply, sewage disposal and harbor engineering.

Volume III, when released, will cover various phases of structural engineering including buildings, bridges, special structures and earthquake resistant design.



Simple device positions flow meters

USE of flow meters to measure accurately the deliveries of water to farms is becoming more and more common on both Federal and private irrigation projects, so the simple gadget here described may be useful to many readers. The Wellton-Mohawk Division of the Gila Project, on which construction is now being completed by the United States Bureau of Reclamation, has installed a large number of open flow meters manufactured by the Sparling Meter Co., of El Monte, Calif.

The meters are installed on the downstream headwall of the turnouts, the propeller just entering the outlet end of the turnout pipe. They are held in place by an upper and lower bracket bolted to the concrete face of the headwall and designed for easy and quick removal. On the Gila Project it is required that the ditchriders inspect each meter in operation twice an 8-hr. shift and, if necessary, remove any trash or moss from the propeller that might interfere with the proper operation of the

meter. This created problems.

Removal was very easy but replacement was difficult because the lower bracket was submerged under water moving at relatively high velocity, and it was very hard to position the hole in the clamp on the meter shaft housing over the pin on the bracket.

Garrett Speelburg, foreman of plant mechanics, headquarters shop, Gila Project Maintenance Division, solved the problem with the very simple and fool-proof device. The device consists of a 1/4-in. plate of cast aluminum reinforced on the lower side with gussets, two vanes projecting outward, set at an angle of 95 deg. with each other. At the apex of the angle a semi-circular cut is centered, having a radius the same as the outside radius of the shaft housing tube of the meter. In positioning, the tube is pulled against one of the vanes until it drops into the semi-circle at the apex, at which point the hole is centered with the pin on the wall bracket and the meter drops into place.

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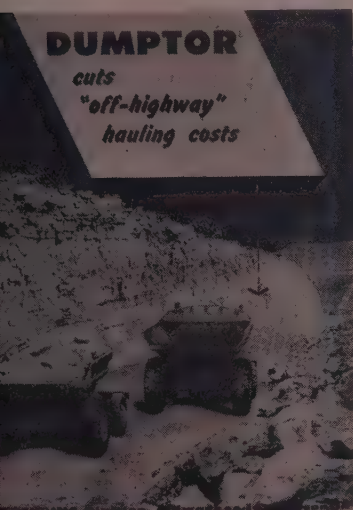
THE GENERAL TIRE & RUBBER CO. • Akron, Ohio

NEW LITERATURE

For your convenience in obtaining free copies of literature described, the company address is provided with each review.

Koehring Dumptror cuts hauling costs

A new 24-page illustrated bulletin on Dumptror, a product of Koehring Company, shows how hourly haul out can be increased by approximately



%. On-the-job photos, combined with schematic drawings, show how fast loading, elimination of turns and a one-second gravity dumping operation makes this additional work load possible. Copies can be had by writing to Koehring Company, Milwaukee 16, Wis.

Bulletin describes new truck loader

An illustrated bulletin describing the new M-B truck loader operation and specifications is now available from the M-B Corporation, New Holstein, Wis. The M-B truck loader is an hydraulically operated self loader adaptable to most trucks. A unique hydraulic "jaw" reaches out and draws materials into the bucket, providing a full load without jamming the truck into the pile. The bulletin gives full details on the operation and function of this exclusive feature.

Engine bearing manual

A comprehensive, 100-page "Mechanics' Engine Bearing Reference Manual" is being offered to construction men responsible for the maintenance and repair of construction machinery and related automotive equipment by Cleveland Service, 6545 Carnegie Ave., Cleveland 3, Ohio. The manual deals with maintenance, service, performance analysis and the selection of various types of engine bearings.

Carpullers for moving rolling loads

A new 24-page, two-color bulletin, C-616, "Carpullers for Easy Moving of

Rolling Loads" has just been issued with descriptions, illustrations, data, tables and specifications for Carpuller requirements. The bulletin illustrates and describes the Electric Capstan Carpuller for car moving, barge moving, pipe bending or any haulage of similar nature; also Tugmore Capstans, Horizontal Head Type Capstan Carpullers, Drum Type Carpullers, Friction Drum Type Carpullers, etc. Write to Superior-Lidgerwood-Mundy Corp., Superior, Wis.

Steel forms for concrete construction

Metal Forms Corp., manufacturers of a complete line of steel forms for concrete construction, has released a 20-page general catalog. The booklet contains complete feature details and illustrations covering curb and gutter forms, road paving forms, building forms, circular tank and silo forms and manhole forms. Copies are obtainable from Metal Forms Corp., 3300 North Booth St., Milwaukee, Wis.

Cummins PT Fuel Injection System

A 12-page booklet answering all types of questions on the Cummins PT Fuel Injection System has just been released by Cummins Engine Co., Inc., Columbus, Ind. Cutaway views of the four PT fuel pump assemblies as well as the PT injector illustrate the inner workings of this diesel fuel system. A section is also devoted to optional governor arrangements. The PT Fuel System is adaptable to all Cummins diesels built since 1932.

New catalog on tilt-up mixers

A new Tilt-Up Mixer catalog has been prepared by L. Burmeister Co., 4535 W. Mitchell St., Milwaukee 14, Wis. The bulletin completely describes the Burmeister mixer with exclusive tilt-up features for use in ready-mix plants, Porto-Plants or for central mix paving. Such features as positive tilting, blade design, main and edge rollers, split drum, ring gear, and hardsurfacing are covered in detail. A center spread gives complete specifications of the units which range from 1 to 7½ cu. yd.

Wickwire wire rope slings

Three new folders describing suggested applications and ordering specifications for wire rope slings have been made available by the Wickwire Spencer Steel Division of the Colorado Fuel and Iron Corp. The folders describe Wickwire's Uniflex wire rope slings, Multiflex rope slings and Maxiflex wire rope slings. Each folder describes specific applications for which each sling is best suited with illustrations of typical applications. Copies are available from the company's New York Advertising

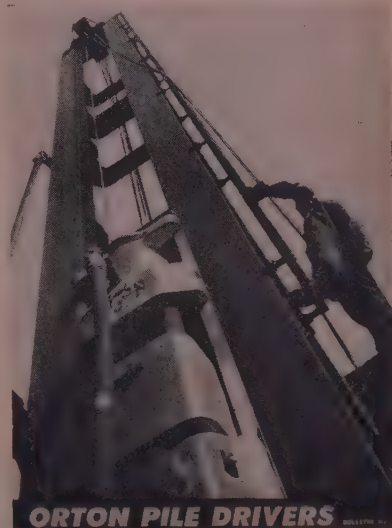
Dept., 575 Madison Ave., or at any of the company's regional sales offices.

Comprehensive perlite manual

An 80-page manual containing all related specifications, data and detailed drawings for complete roof and floor systems, curtain wall back-up, and other building sections is being offered by the Perlite Institute. All design data and specifications for each system or building component are complete in a single detachable unit in the handy loose-leaf manual, and additional copies of each of the 18 different specification and data units are available. Easy-to-read charts and tables eliminate the need for computing U factors, dead loads and load carrying capacity for many types of construction. Each unit folder contains detailed drawings and photographs of the particular system of construction and complete technical data. Copies may be obtained from members of the Perlite Institute or through the Perlite Institute, 45 West 45th St., New York 36, N. Y.

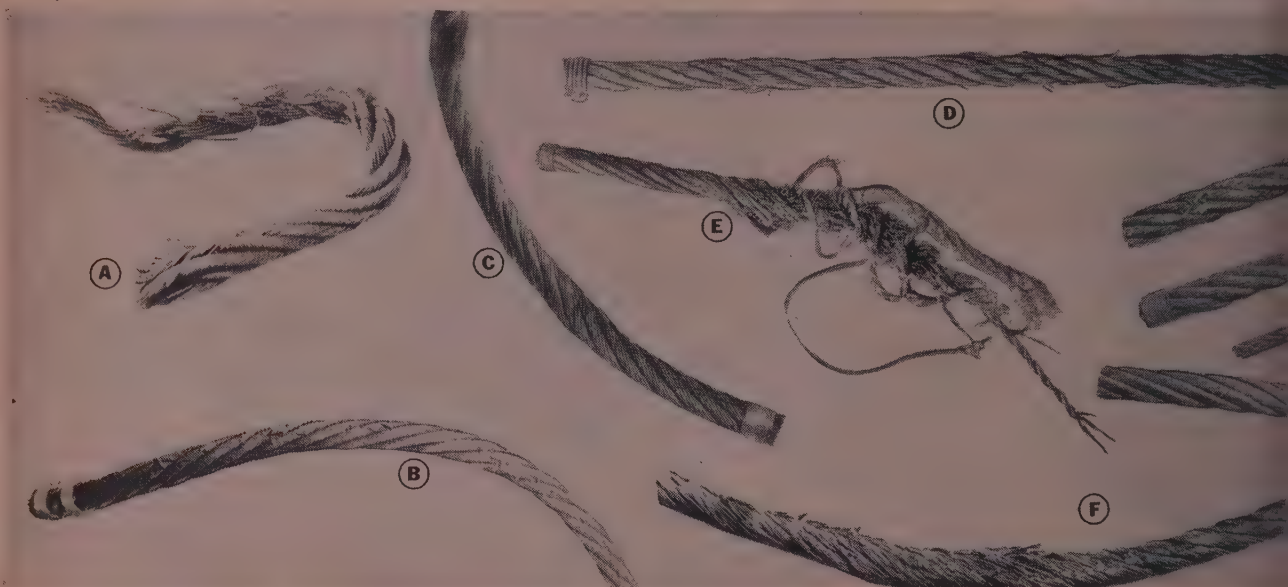
Orton pile drivers

Orton Pile Drivers is the title of a brochure published recently by the Orton Crane & Shovel Co. The featured unit is a new self-contained, revolving diesel locomotive pile driver with Torque-Control fluid clutch. The brochure gives general operational capacities as well as facilities and abilities of these pile drivers. Also described is the Orton combination locomotive crane and pile driver, a cost-saving, self-pro-



elled machine which uses one power plant to transport and operate two diesel-powered units. Bulletin No. 90 is available from the manufacturer, 609 South Dearborn St., Chicago 5, Ill.

Tuffy[®] Wire Rope Tips



Tuffy gives you a quick run-down here on some of the mortal enemies of wire rope — the abuses that quickly ruin rope efficiency or end its life abruptly long before you have had the service you paid for.

Even the best wire rope is a sitting duck for the enemies which won against the wire rope pictured on these pages. When you avoid or eliminate them you make important gains in longer rope life, better service and greater economy. Remember, your Tuffy distributor will be glad to work with you against these and other wire rope hazards.

It's the "end of the line" for wire rope when these things happen:

A. Mangled in a wedge socket. Here's the result of improper socketing. This fatal rope injury was caused by a poorly designed or worn out wedge socket. Failure at the dead end can damage other sections of the rope.

B. Rusty road to ruin. Rust — No. 1 enemy of steel — takes a heavy toll in wire rope life. It's an insidious, silent type of killer, often doing irreparable damage before it's even noticed. The one-strand break shown above resulted when the rope was allowed to become rust-bound through lack of lubrication. With other conditions ideal, tests show properly lubricated rope has up to 10 times the life expectancy of dry rope.

C. The crushing blow. The Sunday punch for this piece of wire rope was delivered by a tractor cleat — just one of many crushing injuries that result when wire rope is run over or banged into by a hard, sharp object. Even the best rope is no match for this kind of mistreatment.

D. Strangled by misfit sheaves. When the bearing surface of a

Tuffy Special Wire Ropes are tailored to special use. Ordering is easy.



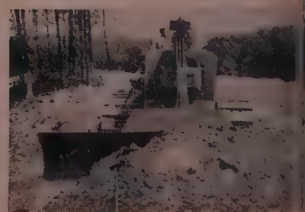
Tuffy Scraper Rope

Moves more yardage per foot because Tuffy Scraper Rope is specially built to take the beating of extreme drum-crushing abuse. Flexible; withstands sharp bending; hugs sheave grooves and winds snugly and smoothly on drums. High resistance to load shock on slack line.

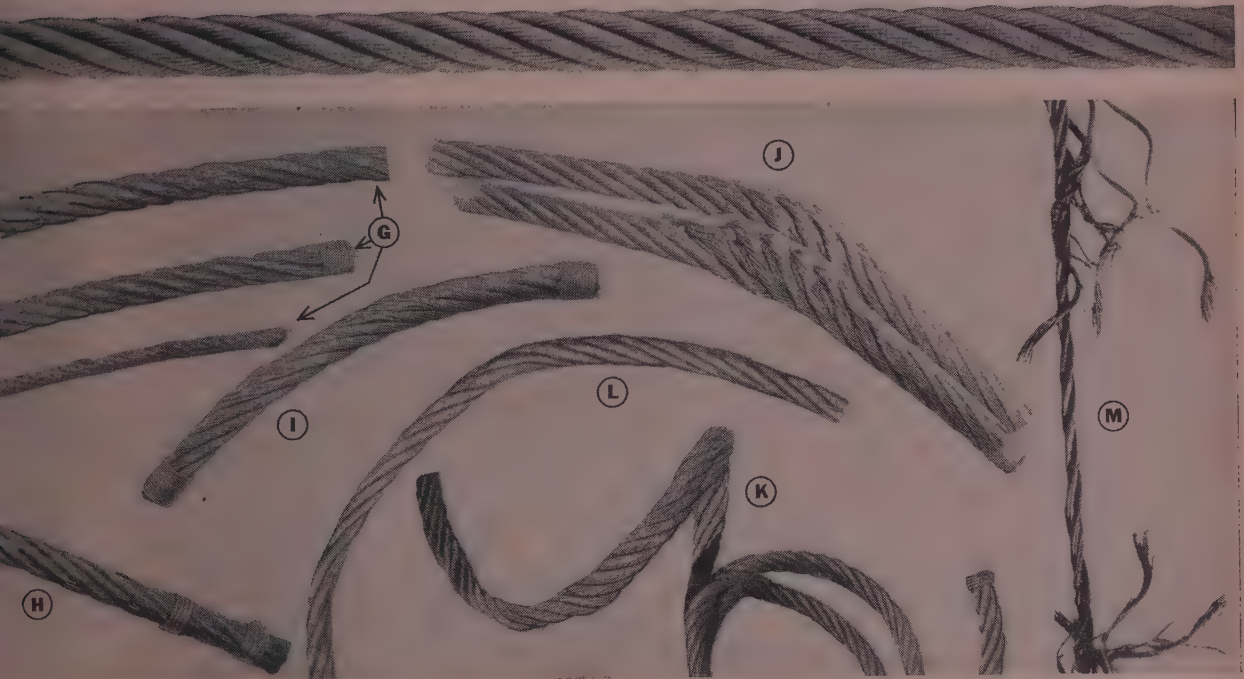


Tuffy Dragline Rope

A longer-wearing line for all dragline operations. Special abrasion resisting construction which also gives extra flexibility. Tuffy Draglines also spool better, ride better on grooves and hold tightly to drums when casting. Consistently dependable in handling any material — wet or dry dirt, sand, gravel, rock, cement or minerals.



How wire rope is crippled and killed without a fighting chance



ave is too small for the rope diameter, pinching action
destroys the rope especially when it is overloaded. The
shown above was knocked out in just 1½ hours of service.
Apparent suicide! This rope jumped out of sheave and was
destroyed by pulling around the shaft. Actually it was a
e of sudden slack which threw the rope out of the sheave.
This rope came to an untimely end by operating over a
ave that did not turn. Note the exceptionally heavy abra-
on one side of the rope.

Victim of "the bends." Excessive bending soon wears out
e. Generally, more flexible ropes are used as bending
esses increase (with decrease in tread diameter of sheave or
um). If a rope is operated on a sheave too small for its bend-
characteristics, early failure is certain. Through an exhaus-
series of bending tests, Union engineers have compiled
a that you can use to be sure you get the rope construction
it will give you the longest service life. Ask about it.

On the "blink" from a kink. This open kink resulted from
shandling of wire rope. Guard against kinks by proper
nding on the drum. Never pull a loop smaller; always
arge it, then straighten out the rope.

Crushed and worn from "beatings on the drum." Drum wear
gives wire rope severe punishment even under normal oper-
ating conditions. This wear is found at the cross-over points
and at the flange. Excessive drum crushing results from
operating on too large or too small a drum. Here are typical
"drum beatings":

I. Cross-over wear

J. Cross-over crushing on drum

**K. Drum-crushing on over-
sized drum**

**L. Drum-crushing on under-
sized drum**

Although drum wear cannot be eliminated, its effects can be
greatly reduced. Under properly engineered procedures, two
and three times the service can be obtained from the same
line. Union Wire Rope engineers will help you with this
problem. Get in touch with us for more information.

M. Overloaded — soon exploded. Wire rope is "prescribed"
for a given use on the basis of breaking strength plus a safety
factor of 4. The grade of steel, type of construction and size of
the rope determine tensile strength. It must be properly re-
lated to the loads it will carry, or expensive and dangerous
early failures are likely to occur.

ust say **Tuffy** give length and size, and forget complicated specifications.

Tuffy Slings and Hoist Lines

re's a team that cuts hoisting and
wn time costs in all types of materials
ndling.

Tuffy Slings are made of a patented, 9-
ft machine-braided fabric that stays
tra flexible, and isn't materially dam-
ed by knotting or kinking.

Tuffy Hoist Line is a special construc-
on with the extra flexibility and tough-
ness for longer service life on overhead
ines, derricks and clamshells.

Tuffy Dozer Rope

ng after ordinary ropes are worn out,
uffy Dozer Rope has the stamina it
es to keep on handling the blade. 150'
els mounted on your dozers let you cut
worn sections without wasting good
e. This unbeatable combination piles
sizeable savings on dozer rope costs.



**Your Tuffy distributor will help check
your equipment**

Condition of equipment is a big factor in longer rope life and
greater economy. Your Tuffy distributor will help you check
equipment and operating conditions to make sure everything is
in your favor for getting the greatest service out of your Union
wire rope. Ask him to lend a hand in a thorough inspection. He'll
be glad to do it. And if there are still knotty problems, Union
Wire Rope Corporation engineering department will help further.

union



Wire Rope corp.

2146 Manchester Avenue, Kansas City 26, Mo.

Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand

Unitized aggregate plants

Portable aggregate plants manufactured by **Iowa Manufacturing Co.** are diagrammed in a new bulletin that shows how they can be set up in various combinations to produce crushed and screened aggregate to meet practically any quantity or specification requirement. A special double page gate-fold devotes a page each to the different types of primary units, intermediate scalping units, secondary units and screening and bin units. A copy of this new bulletin, Unit 6, may be obtained by writing to Iowa Manufacturing Co., Cedar Rapids, Iowa.

Machines, Money and the Contractor

This is the title of a new booklet issued by **C.I.T. Corporation** which outlines the various financing plans offered by the company to contractors. These include the Payd Plan which relates payments to depreciation of equipment, the Equal Monthly Payment Plan, the Winter Skip-Payment Plan, Lease and Rental Plan, and Capital Loan Plan. These and other C.I.T. services are discussed.

IH issues mailer on TD-24 crawler

International Harvester Co. has just made available an eight-page, two-color mailer on the 200-hp. TD-24, largest in the IH crawler line of seven units. Entitled "Boss of The Big Jobs," the pamphlet emphasizes the solid framework of the unit, planet power steering, and the option of torque converter or gear drives. Line drawings illustrate components of the torque converter drive system, the main frame, and a cutaway exposure and explanation of the planet power steering system. Diagrams illustrate steering clutch positions when operator desires unit to make gradual, featured or pivot turns. Send for folder CR-565-G, **International Harvester Co.**, Construction Division, 180 N. Michigan Ave., Chicago 1, Ill.

Gar Wood dump bodies and hoists

Gar Wood Industries' new 12-page catalog describes and illustrates the company's medium duty dump bodies and arm-type hoists. Bodies for every hauling need are pictured with all the special features for the particular job indicated. Arm-type and direct lift hoists, as well as the popular conversion hoists, are clearly illustrated and described. Specifications for hoists with capacities ranging from 6 to 12 tons are also outlined in the brochure. Copies are available from **Gar Wood Industries**, Customer Service Dept., Wayne, Mich.

Punch-Lok catalog and manual

Just released is **Punch-Lok Co.**'s current catalog. The catalog is an instruction and training manual as well as a compilation of the company's standard type hose clamps, grooved hose fittings, and special tools and replacement parts. Separate sections are detailed coverage of such subjects as Punch-Lok Methods,

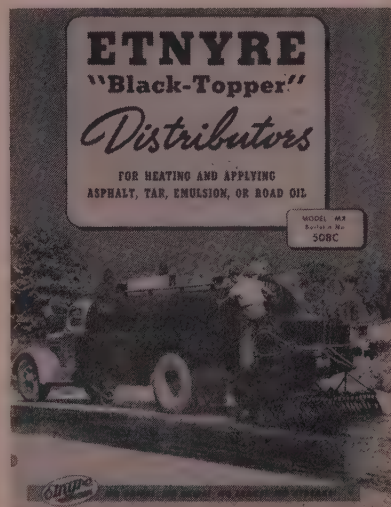
Uses and Applications, and How to Apply Punch-Lok Clamps. For copies, write to **Punch-Lok Co.**, 321 North Justice St., Chicago 7, Ill., for Form Cat. 300RG-56.

GE bulletins on two-way radios

General Electric's Communication Products Dept. has published two bulletins on two-way radio selective-calling. ECR-448 describes "Individual Call," which enables an operator to turn down radio volume until he receives a light or buzzer signal indicating an incoming call. ECR-439 explains "Group Call," showing how a radio-equipped fleet may be sub-divided into as many as ten different groups according to job functions, by types of vehicles, or by locations served. For copies, write to the manufacturer, **Electronics Park**, Syracuse, N. Y.

Etnyre Black-Topper distributors

A new six-page catalog presents the Model MX Etnyre Black-Topper distributors for heating and applying as-



phalt, tar, emulsion or road oil. The catalog gives full details and specifications plus auxiliary equipment for three styles, including rear engine drive, front engine drive, and semi-trailer mounting. Styles and equipment are illustrated. Standard tank capacities, weights and mounting data chart are included. Write **E. D. Etnyre & Co.**, Oregon, Ill.

Wall chart of conversion factors

A reference table for engineers and other executives in wall chart form has been published by **Precision Equipment Co.** Included are common conversions as well as many conversions that are difficult to locate in reference manuals, such as atmospheres to Kgs./sq. cm, cm./sec. to mi./hr., cu. ft. to liters, microns to meters, quintal to lb., etc. Write to **Precision Equipment Co.**, 3716 N. Milwaukee Ave., Chicago 41, Ill.

Bulletin describes Littleford units

A new bulletin, HH-36, "The Littleford Trail-O-Dryer and Dual Feeder Bin," is now available from **Littleford**

Bros., Inc., 453 E. Pearl St., Cincinnati 2, Ohio. The two units described are the Model 25-T Trail-O-Dryer designed to heat and dry sand and aggregate for bituminous mixers or for other operations requiring pre-dried material, and the Littleford Model 5T25 Dual-Feeder Bin designed to feed aggregate into the inlet end of the Littleford Trail-O-Dryer.

Wire rope for special jobs

Hercules Flattened Strand wire rope is the subject of a four-page folder issued by **Leschen Wire Rope Division** of The Watson-Stillman Co. Flattened Strand is a special type of wire rope for use on special wire rope jobs, such as large overhead cranes, cable haulage ropes, dredge ropes and many other jobs. Cut-away diagrams of the rope accompany a table of specifications. For a copy, write the manufacturer, 2727 Hamilton Ave., St. Louis 12, Mo.

Truss-type Armco steel buildings

A new bulletin from **Armco Drainage & Metals Products, Inc.**, describes truss-type steel buildings for large structural requirements. Clear-span widths range up to 100 ft. with areas from 4,800 sq. ft. up. Dimensions and specifications are given and drawings illustrate how the buildings are erected. Typical installations are shown. Write to the company's Product Information Service, Middletown, Ohio, for copies, mentioning SX-14156.

'Work Bulls and attachments

"Designed for Each Other," a new booklet by the Work Bull Division of **Massey-Harris-Ferguson, Inc.**, Racine, Wis., tells the story of the five Work Bull tractors in the M-H-F family and describes their 20 interchangeable attachments. This literature points out how each unit is engineered to provide "Big Builder" road gear flexibility for the small road builder budget, and added economy and flexibility for the major road construction firm. Write to Work Bulls, 12-L Quality Ave., Racine, Wis.

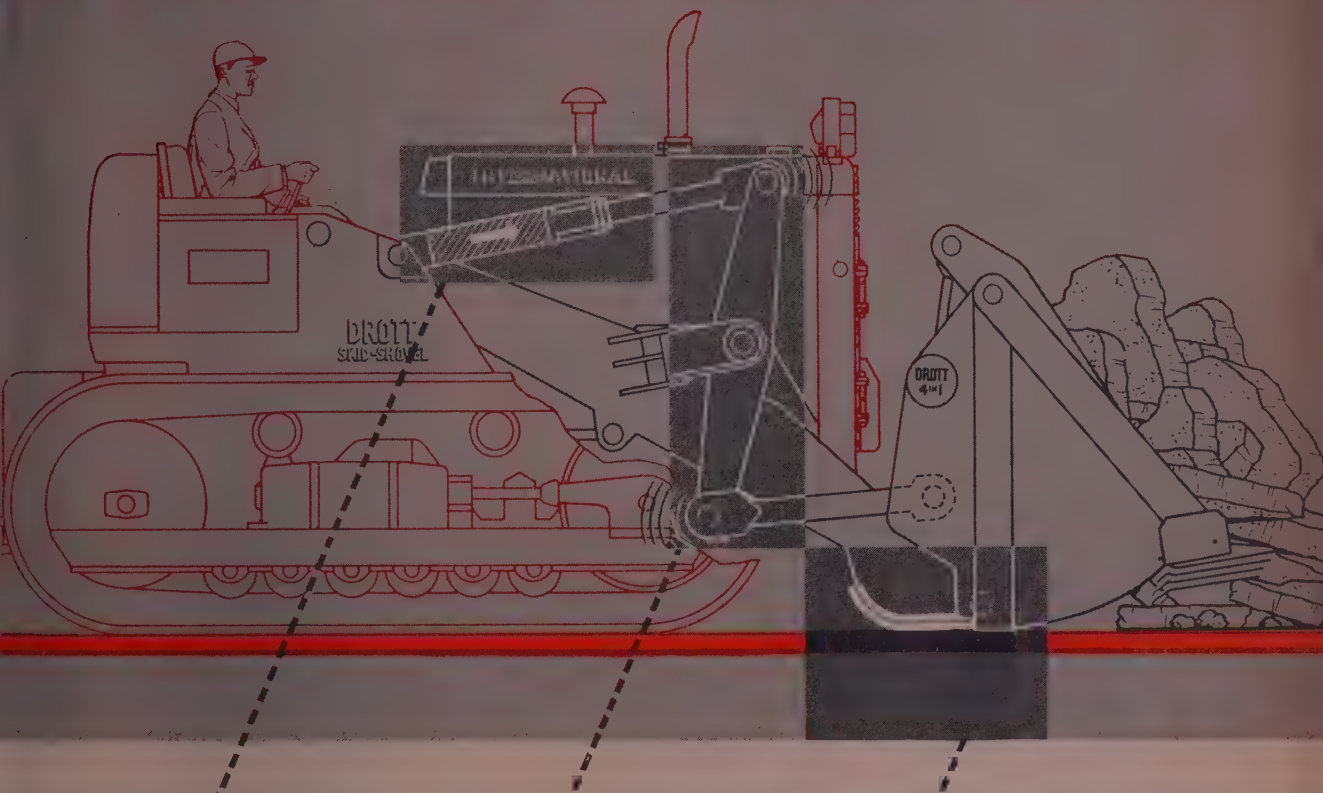
Superior loader described

The new Superior industrial loaders are described in a four-page illustrated brochure distributed by **Superior Equipment Division** of Superior Pipe Specialties Co., 106 East Dundee Road, P. O. Box 341, Wheeling, Ill. Among the new features described is the new pivotal position of the bucket rams on the Model H228 Loader. Specifications of Superior Loader buckets and crane are given along with those of the loaders.

Small tractor-bulldozer

The new Speedcat, reputed to have the speed of a wheel tractor with the pull of a crawler, is the subject of a four-page illustrated folder issued by **Mead Specialties Co.**, 4114 North Knox Ave., Chicago 41, Ill. A full-length picture of the unit is provided and complete specifications are given.

LET'S TAKE A CLOSE LOOK AT **TRUE** pry-over-shoe break-out-action



Full hydraulic power transfer!
 Famous International Drott *triple-power* hydraulic force results from ingeniously applying oil pressure upon the piston's *full face*—instead of using the customary, and limited, rod-end area for the “power-push” surface! Only International Drott gives you this tremendous hydraulic power to produce concrete-smashing, tree-grubbing, boulder-bucking pry-action break-out!

Far greater leverage. See how International Drott scientifically-correct *lever length* transfers *full* triple-power hydraulic force to the fulcrum. No costly power-dissipating “step-downs” here to lose one-fourth to one-half of your hydraulic power, as ordinary design does! Instead, International Drott full power-applying leverage gives you tough-job-handling digging force and capacity ordinary loaders can't even begin to equal!

Ground-based fixed fulcrum!
 Here's how exclusive International Drott design provides the famous frame-mounted skid-shoes—to act as the absolutely necessary *fixed fulcrum*. Without this, true pry-action break-out is impossible. The big exclusive International Drott skid-shoes provide the steady, ground-based platform for true ground-level bucket-heaping roll-back of 41°!

Only *original* and *exclusive* International Drott design transfers *full* hydraulic power to give you tremendous *extra* excavating force! Here's how exclusive

International Drott “separates the men from the boys” in heavy-duty loader design—and gives you front-end loader performance nowhere else available.

Prove to yourself you command a vast new job-range and capacity—with this super-powerful excavating, bucket-heaping pry-action. See what happens when you team this performance with the *versatility unlimited* of an exclusive Four-In-One. Compare how *exclusive* shock-swallowing Hydro-Spring “gentles” trouble-causing impact by 67%! Ask your International Drott distributor for a demonstration!

International Harvester Company, Chicago 1, Illinois
 Drott Manufacturing Corp., Milwaukee 15, Wisconsin

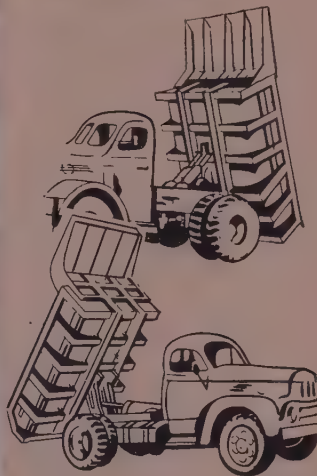


INTERNATIONAL

DROTT®



TODAY'S BIGGEST VALUES IN ORE AND ROCK MOVERS



Marion rock bodies can be mounted with twin jack telescopic hoists (photo at left and top illustration) and with double arm underbody hoists (bottom illustration).

MARION ROCK BODIES and HOISTS . . . they're made to stand abuse

Designed for the severest type of service, Marions are built to take it under a shovel on all types of rugged off-highway operations.

Heavy steel armor plate combined with thick oak planking and on-the-job designing is assurance of "day-in day-out," long-life use from all Marion rock bodies. Together with heavy-duty Marion hoists, these rugged bodies will move big payloads fast with minimum downtime and maintenance costs. The result is substantial savings over a period of many years, making Marion rock bodies and hoists today's biggest values for handling rock and ore.

MARION

BODIES AND HOISTS

MARION METAL PRODUCTS CO.
MARION, OHIO, U.S.A.

SEE YOUR MARION DISTRIBUTOR AND SAVE!

M & F Equipment Co.
824 Arno St., N.E.
Albuquerque, New Mexico

Bogard GMC Company
2626 South Fourth Avenue
Tucson, Arizona

J. H. Holan Corp.
302 East Pima St.
Phoenix, Ariz.

Truck Body Company
2865 East 26th Street
Los Angeles 23, California

Ruckstell California Sales Co.
2985 Ford Street
Oakland 1, California

Ruckstell California Sales Co.
452 West Yolo
Fresno, California

Woeber Auto Body & Mfg. Co.
4950 Jackson St.
Denver 16, Colorado

Pacific Body Builders, Inc.
1812 N.E. Grand
Portland 12, Oregon

Alloy Manufacturing
Route No. 4 (West on U. S. 10)
Spokane, Washington

Washington Truck Equipment, Inc.
3626 Airport Way
Seattle 4, Washington

Erwin H. Johnson, Inc.
Box 1831, 1101 3rd St., N.W.
Great Falls, Montana

Preco Control for motor graders

A complete description of the Preco automatic blade control for Caterpillar No. 12 Motor Graders is given in a four-page brochure published recently by Preco Inc., 6300 E. Slauson Ave., Los Angeles 22, Calif. The Preco Automatic Blade Control automatically controls the exact slope required, regardless of the position of the grader or the unevenness of the terrain. Pictures of the Preco Control in action are included.

Floodlights at work

A picture story of Til-Lee L-P gas floodlights at work is presented in a four-page brochure published by Wm. W. Lee and Son, 20 East Jackson Blvd., Chicago 4, Ill. Various arrangements of these lights are shown along with a detailed equipment photograph. Also available is a catalog sheet of the unit giving specifications and operating data.

Pushing pipe underground

A six-page brochure illustrating the use of Rodgers Hydraulic Jacks on a sewer job has been issued by Rodgers Hydraulic, Inc., 7401 Walker St., Minneapolis 26, Minn. Large detailed photographs show how the pipe was pushed underground without excavating. A brief descriptive text accompanies the pictures.

Davis industrial equipment

New literature from Mid-Western Industries, Inc., describes the Davis line of industrial equipment. Among the units described and illustrated are the Davis Pit-Bull which is produced as a complete unit, the Model 185 Davis back-hoe for M-H-F 202, 303 and 404 Work-Bull and other popular tractors, Models 102 and 500 loaders, and the Davis fork lift. The eight-page brochure is illustrated with photographs of the units on and off the job. Copies may be obtained by writing Mid-Western Industries, Inc., 1009 South West St., Wichita, Kan.

Bay State blade catalog

"Abrasive Products for the Building Trade" is the title of a comprehensive catalog just made available by Bay State Abrasive Products Co. of Westboro, Mass. A special table aids quick and accurate selection of masonry saw blades and portable electric saw blades for specific applications. Also described are concrete saw blades, special purpose wheels and special products and accessories. Descriptions, sizes, catalog numbers and special features of the blades are covered in full. Literature describing Bay State blades for cutting concrete and asphalt is also available.

News of Concut bump cutter

A catalog sheet describing the new Concut Precision Bump Cutter for eliminating bumps in concrete and asphalt surfaces has been issued by Concut Sales, Inc., 331 N. Santa Anita Ave., Arcadia, Calif. The bulletin contains brief specifications and operational data and a full-length picture of the unit.

INSLEY type WB

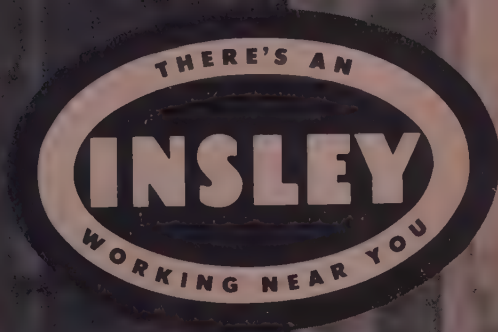
...for the long reach!

The Insley Type WB is as versatile as it is efficient. Its performance has been proven over and over again in a wide variety of jobs from coast to coast. The WB is a dependable machine—easy to service and maintain. It is convertible to all front-end attachments and available with crawler, Maxi self-propelled carrier and truck mountings. Gasoline, diesel or electric power.

Shown is an Insley Type WB truck crane with 110-foot boom and 30-foot jib, owned by Independent Iron Works, Oakland, California.

Let your Insley distributor show you an Insley at work.

INSLEY MANUFACTURING CORPORATION
INDIANAPOLIS, INDIANA



Barnes literature on Porta-Pump

A new folder covering operating characteristics and applications for their lightweight Porta-Pump line has just been released by Barnes Manufacturing Co., Mansfield, Ohio. The new printed piece describes Barnes self-priming Porta-Pump, a low-cost, mobile unit available with gasoline, electric or universal drive. Complete specifications, plus an easy-to-read Pump Performance Chart are included.

Lubriplate lubricants

An eight-page circular has been issued by the Lubriplate Division of Fiske Brothers Refining Co., Toledo

5, Ohio. It specifies the Lubriplate products recommended for the various types of construction machinery, and gives the names of Lubriplate dealers throughout the country.

Proper wire rope for construction

By means of photographs and drawings with reeving diagrams, a new brochure lists the proper wire rope specification for all types of construction equipment. Included is a discussion of Lang Lay vs. Regular Lay rope, rope constructions and proper wire rope to use for clamshell bucket operation. Called "The Correct Wire Rope for Contractors' Equipment," the brochure is number

5702 and is available from Macwhyte Company, Public Relations Dept., Kenosha, Wis.

Cleaners for construction equipment

A new, four-page folder, based on field photos and reports by users of how they profit from cleaning construction equipment with Malsbary HPC (high pressure combination cleaners, is now available from Malsbary Manufacturing Co., 845 92nd Ave., Oakland 3, Calif. Ask for Form No. C-921.



LEFT HAND VIEW

RIGHT HAND VIEW

From Bakersfield to Boston . . . Syracuse to Seattle
St. Paul to Savannah . . . From Paducah to Everywhere . . .

CONTRACTORS TIE RE-BARS WITH IDEAL

. . . the first and only TWO in one tie wire reel!

Across the nation . . . for greater safety and savings, more and more contractors are "speeding up" their wire tying jobs with IDEAL reels. If your job calls for tying and placing re-bars . . . no matter what the tonnage . . . here's why it will pay you to use IDEAL reels.

Only IDEAL gives versatile RIGHT or LEFT hand use without time-consuming, change-over adjustments . . . it's two reels in one.

SAVES TIME—Speeds tying efficiency 25%, often much more . . . up to 6 and 8 more ties per minute.

SAVES MONEY—Stops costly wire waste. Gives 33% more usage per pound of wire on average.

SAVES MEN—Cuts accidents. Prevents lost man-hours. Approved by leading bonding companies.

Write or wire for brochure and the name of our distributor in your territory.

IDEAL Reel Company
PADUCAH, KENTUCKY

IDEAL
tie wire reel

Construction materials catalog

A 28-page catalog dealing with the Presstite-Keystone line of construction materials for highways, airfields, streets and sewers, has just been released by the manufacturer. Divided into Paving Product and Sewer Sealer sections for convenient reference, the new catalog includes illustrated descriptions, application photos and other pertinent information for every product. The Paving Section includes joint sealing compounds, expansion joints, concrete curing compound, air entraining agent and preparation and application equipment. The Sewer Sealer Section includes the Presstite three-step system of sewer sealing as well as other hot and cold applied sewer joint sealers in the company's line. Address requests to the Presstite-Keystone Engineering Products Co., 39th and Chouteau Ave., St. Louis 10, Mo.

Catalog on precision instruments

The David White Instrument Co., Milwaukee, Wis., manufacturers of surveying instruments, announce a new four-color catalog containing information about the company's entire line of precision instruments. Pictorial and descriptive information is given, and the company's new products are listed. Requests should be addressed to David White Instrument Co., 2501 N. 19th St., Milwaukee, Wis. . .

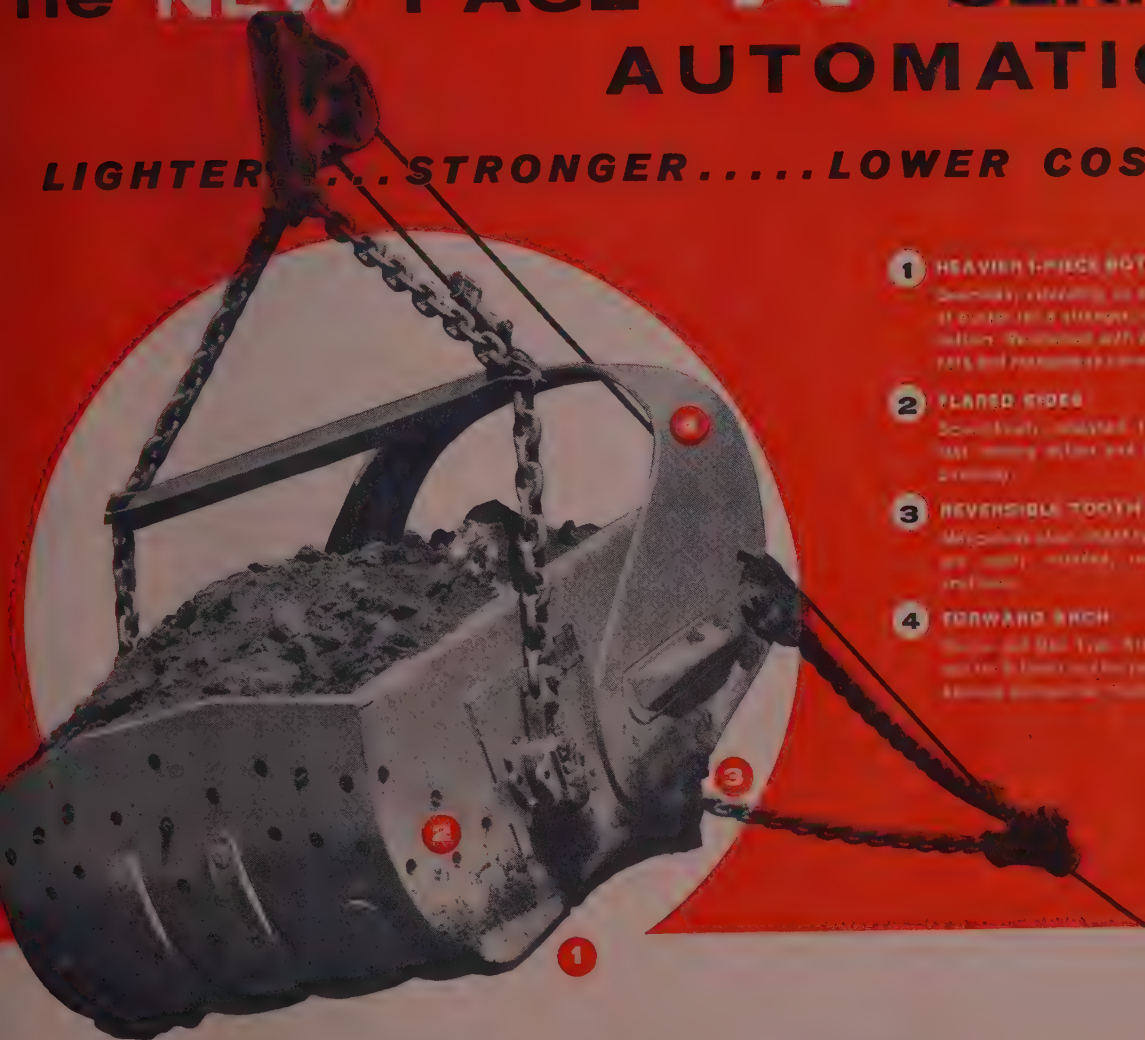
Completely new masonry saw

A completely new and different masonry saw is described in an eight-page color brochure distributed by Clipper Manufacturing Co. The Supermatic, 2-hp. masonry saw is described in detail with special attention called to the Sta-Level Head and Hi-Lo Control Wheel which makes all adjustments automatically. Copies of circular No. 2017 can be obtained from the company, Suite 245, 2800 Warwick, Kansas City 8, Mo.

ANNOUNCING . . .

The NEW PAGE "A" SERIES AUTOMATICS

LIGHTER . . . STRONGER LOWER COST



- 1 HEAVIER 1-PIECE BOTTOM PLATE**
Specially designed to dig and dump at bottom in a stronger, longer lasting bucket. Reinforced with alloy steel ribs and protected from abrasion.
- 2 FLARED SIDES**
Specially designed to allow full dumping action and positive side dumping.
- 3 REVERSIBLE TOOTH POINTS**
Manganese steel tooth points that can be easily changed, turned around and used.
- 4 FORWARD ARCH**
Standard Mac Type Arch that supports the bucket and the bottom member. Allows complete rotation.

AVAILABLE IN 3 TYPES:

AM for Light-Medium work
11 sizes from 1/2 to 3 cu. yds.

AC for General Purpose work
Ideal for wide variety of digging.
11 sizes—1/2 to 3 cu. yds.

AH for Heavy Duty work
Heavier construction throughout.
For toughest digging, 10 sizes—1/4 to 3 cu. yds.

If you've wanted a lighter weight dragline bucket that would stand up to the toughest usage . . . that would dig faster and dump cleaner, and increase the production of any dragline—the new Page "A" Series Automatics are what you've been looking for.

Page "A" Series Automatics incorporate new design and construction principles that permit building a rugged, lighter weight bucket that will out-produce any other make by 10 to 30%. "A" Series Automatics have the unmatched digging ability that have made Page Automatics the preferred production buckets for any type of digging.

Made in 3 service types, with capacities from 1/2 to 3 cubic yards, "A" Series Automatics are available for immediate delivery. Ask your nearby Page Automatic Distributor for complete details.

Write for A57 Catalog — contains full information on "A" Series Automatic Buckets.



Page
Automatic Dragline
Buckets
Walking Draglines

If it's a PAGE... It DIGS

NEW EQUIPMENT

For your convenience in obtaining more information quickly, the manufacturer's address is provided with each review.

Concrete batching plant weighs 3 materials for single batch at one time

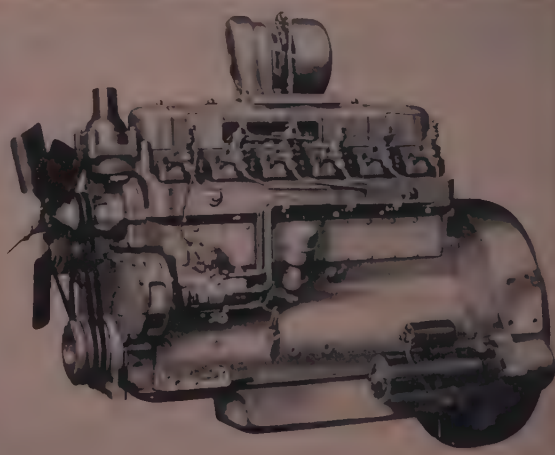


A new concrete batching plant produces over 300 yd. per hr. with one operator in a one-stop or two-stop set-up. The plant, designed especially for the road building program by **The Noble Company**, obtains its high capacity through a unique system of weighing three materials for a single batch at the same time—sand, coarse aggregates and cement. It batches accurately to rigid specifications and supplies two or three dual drum pavers. In factory-assembled sections all within legal width for highway transport, the plant can be moved to the most practical batching site and quickly erected on timbers or concrete. All batching components are permanently housed within the bin center section and require no removal on transport. Electrical connections are made by simple twistlock couplings. Three pen recorder as optional equipment produces a continuous record on a single chart of the cement, aggregates and sand weights, batch designations and time of day. Cement silo has facilities for direct loading of cement spreader trucks. The Noble Company, 1860 Seventh St., Oakland 20, Calif.

New Waukesha supercharged diesel engine

This latest Waukesha supercharged engine model, the 197-DLOS, is a compact and powerful heavy-duty, four-cycle, full diesel engine of 302-cu. in. displacement. The patented combustion chambers burn all standard "high-speed diesel fuels" having cetane values of 45 or above. The exhaust turbocharger system of supercharging affords a great increase in horsepower with a minimum of parasite load. Even without an intercooler the maximum power available from the model is 131 hp. at 2,800 rpm. Without positive drive from the

engine, the parasitic load decreases at part engine load, which improves over-all fuel economy throughout the speed range. Other advantages of the exhaust turbocharger are a relatively light and compact installation, flexibility in mounting, and



the elimination of mufflers on most applications due to the smoothing out of the exhaust impulses by the turbocharger turbine. For complete information about the supercharged engine equipment, write to **Waukesha Motor Co.**, P. O. Box 379, Waukesha, Wis.

'We Have All the Work We Can Take Care of.'....



F. T. Anderson and Son with Two of Their JOHN DEERE TRACTOR Work Units

THESE are money-making days for folks who want to be their own boss and who are properly equipped to handle general contracting work.

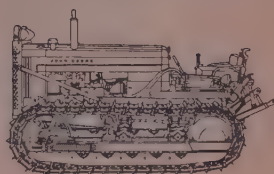
Take the F. T. Anderson and Son team of Sonoma, California, for instance. In the spring of 1955, Mr. Lloyd Anderson started in the small contracting business by trading his farm machinery in on some John Deere "40" Tractors and allied working equipment. He and his son soon found that they had so much business they needed more equipment, and within a period of 8 months they had four John Deere units working in Sonoma, Napa, Marin, and Solano counties.

Mr. Anderson states: "We have all the work we can take care of. Our John Deeres are sure good tractors. They are reliable, economical to operate, and give us nothing but successful operating time. We dig everything . . . move anything. These tractors help us do the job better than any other make we could test, and better than others that we see on the job. Yes, sir, we sure are satisfied with our four John Deere units."

Take a tip from the Andersons—enjoy the fuller profits that can be yours with dependable, economical John Deere-powered equipment. Talk with your nearest John Deere industrial dealer. Look for his name in your phone book classified section.

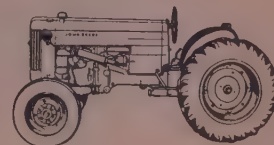
John Deere Crawler

30 h.p. high torque engine.
Highly maneuverable.
Choice of track shoes.



John Deere Utility

30 h.p. wheel-type.
Direction Reverser optional for both tractors.



Send for FREE LITERATURE

JOHN DEERE • Industrial Division

215 S.E. Morrison St., Portland 14, Oregon
651 Brannan St., San Francisco 19, Calif.

Please send me your latest literature on the John Deere Tractors and Equipment.

Name _____
Title _____
Firm _____
Address _____
City _____ State _____



Backed by nearly 40 years of tractor manufacture for dependable service and quality.

**SAW CONCRETE & ASPHALT
FASTER WITH THE ALL-NEW**

Clipper
SAILS RIGHT THRU
• SELF-PROPELLED

36 H.P. CONCRETE SAW

**Over 32 Outstanding
Features Found on No
Other Concrete Saw!**

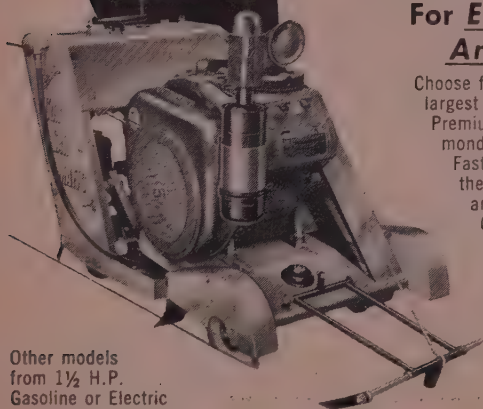
Here is
Engineering
Leadership
by Men Who
Know the
Concrete
Sawing
Industry



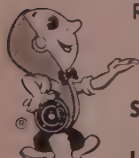
**BEST BLADES
For Every Saw
Any Job!**

Choose from the world's
largest selection of
Premium Quality Dia-
mond Blades for the
Fastest Cutting at
the Lowest Cost on
any job. Let your
Clipper Factory
Trained Repre-
sentative help
you select the
right Saw and
Blades for
your job!

**Call him
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Priced from \$395



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DENVER 16, COLO., 4303 Brighton Blvd.
Phone ALPine 5-6790

THE CLIPPER MANUFACTURING CO.

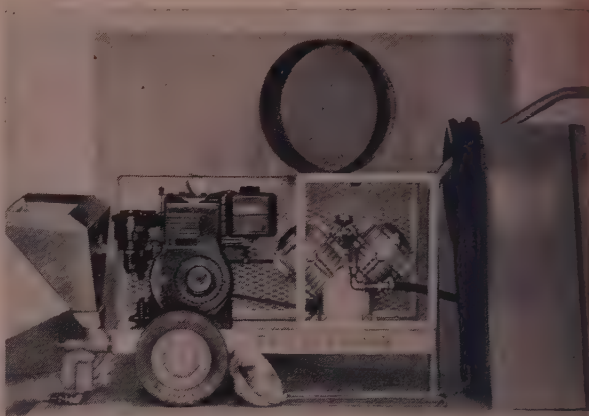
2804 S. Warwick • Victor 2-3113 • KANSAS CITY 8, MO.

Offices in Principal Cities Coast to Coast

FACTORIES IN ENGLAND, FRANCE, GERMANY, ITALY

Lightweight dash gun easy to operate and clean

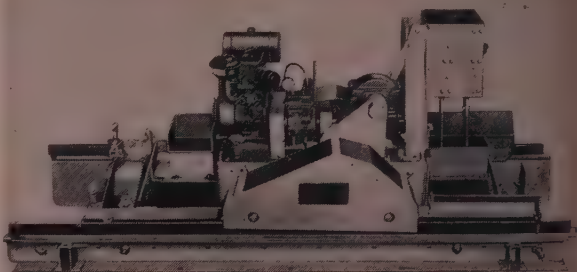
A new dash gun for applying dash or cementitious wash, acoustical plaster, plaster bonds, etc. is being produced by Cyclone Sandblast Equipment, 42 Clara St., San Francisco 7, Calif. Hopper, airjets and nozzles of the Tex-Sprayer are



all made of stainless steel and are quickly detachable by the turn of a thumbscrew. The air-supply line enters the gun through the base of the handle making it easy and fast to clean with the hose out of the way. A simple valve control combines the right volume of air pressure and material flow. The Tex-Sprayer's two-cylinder air compressor never requires oil lubrication and is powered by a 2-hp. Briggs & Stratton engine with rewind starter. Electric motor drive is optional. The completely outfitted Tex-Sprayer dash gun unit, including all accessories such as material screen, hopper filling material screen, hopper filling dipper and spray shield, sells for \$302.50 with gas engine drive, \$295.00 with electric motor drive.

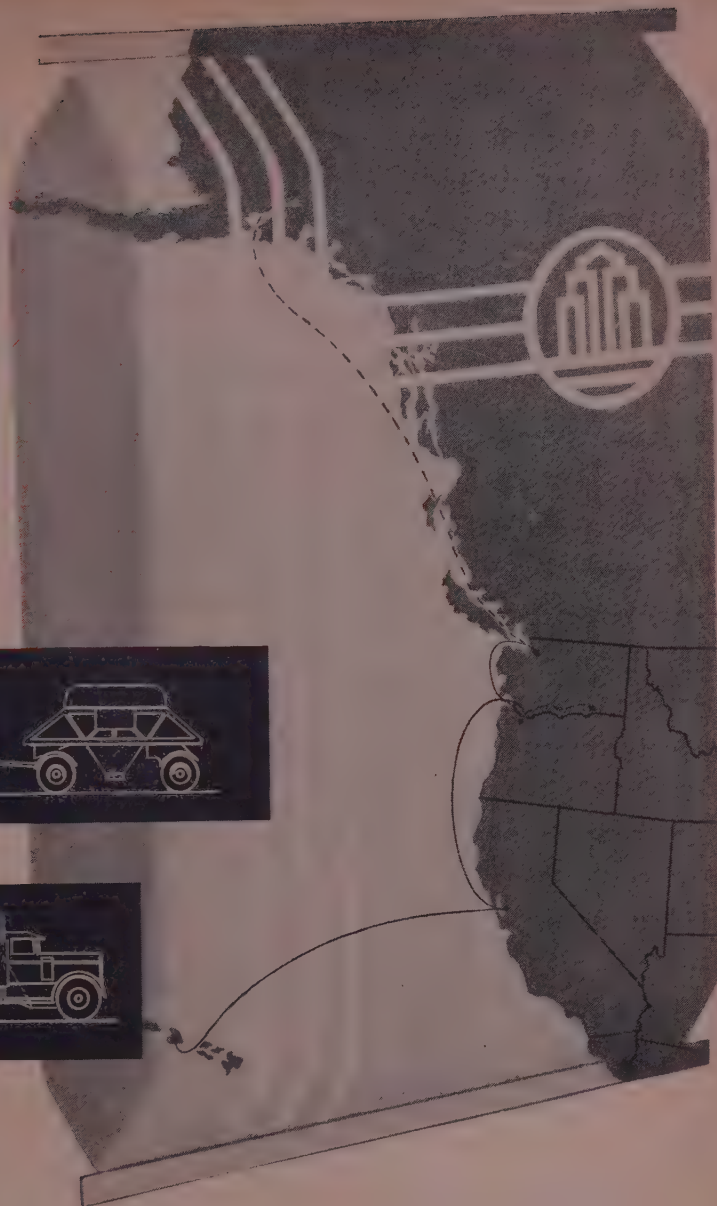
Curb and gutter paver features vibrator

A new model curb and gutter paver which lays up to 10 in. ft. per min. has been announced by Dotmar Industries, Inc. 502 Hanselman Bldg., Kalamazoo, Mich. Among the improved features of the Model S-57 is a vibrator mounted on the rear hopper of the machine which prevents tearing or dragging, assures smooth flow of grout or concrete. The



hopper is mounted on rubber to prevent transmission of vibration to other parts of the machine. Air for the vibrator is supplied by an air compressor, tank and gage on the machinery deck. A mechanical tamper with its tamping shoe, operating in the forward hopper works down and compacts the concrete eliminating hand tamping and spading. The paver can be readily adapted for paving integral gutter, curb and sidewalk, or sidewalks alone up to 72 in. wide, and highway median strip or widening strip. Model S-57 is described in Bulletin 57 available upon request from the manufacturer

In your
own
back yard



WHEREVER YOU ARE in the WEST

There is a Permanente facility nearby to serve you.

Our business is local. These distribution plants and the people who operate them are your neighbors, working with you in building the West — as well as your local economy. Permanente's service motto, "On the Job, on Time," means cement when and where you want it!

Dependable Service On the Job,
on Time From these Permanente
Distribution Plants

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LOS ANGELES
PORTLAND
SEATTLE

PASCO
ANCHORAGE
FAIRBANKS
HONOLULU

PERMANENTE
CEMENT COMPANY



**ON THE JOB — ON TIME
EVERYWHERE IN THE WEST**

QUESTION:

WHAT LUBRICANT IS BEST FOR
GEARS IN TRUCKS, TRACTORS,
ALL HEAVY DUTY EQUIPMENT?

PENNZOIL 4000 MULTI PURPOSE GEAR LUBRICANT

Pennzoil's new 4000 series withstands greater shock loads and guards against tooth scoring. It resists oxidation and is stable under high heat. It is a non-corrosive type, has a low channeling point, and is non-foaming. Film strength is exceptional and protects hypoid gears under the most severe high heat and load conditions.

NO QUESTION ABOUT



QUALITY

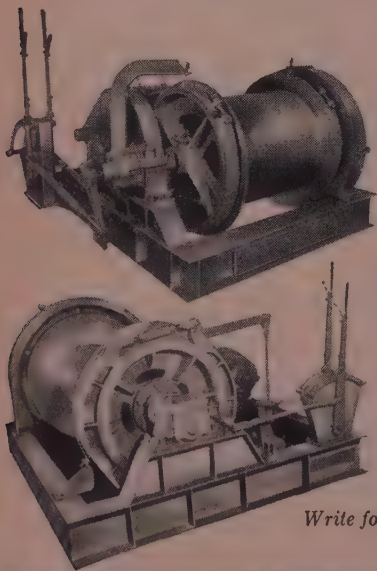
THE PENNZOIL COMPANY

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Los Angeles 15

INCLINE • HAULAGE • MINE HOISTS

Small • Medium • Large



Your hoisting necessities can be met by equipment engineered and designed to suit, yet consisting of a combination of standard parts. Consult Superior-Lidgerwood-Mundy.

Write for Bulletins and Catalogs

SUPERIOR-LIDGERWOOD-MUNDY CORPORATION

Main Office and Works: SUPERIOR, WISCONSIN, U.S.A.
Pacific Coast Representative: GEORGE E. SWETT & COMPANY
100 Howard Street, San Francisco 5, California

Eimco makes heavy-duty fork lift

A new heavy-duty fork lift featuring hydraulically-operated four-way tilting and leveling has been introduced by Eimco Corporation, 634 South Fourth West St., Salt Lake City, Utah. Capable of lifting 15,000 lb. to a full reach height of 14 ft., the machine is held suitable for most any application requiring



ing reach, high power and maneuverability. It is produced as an attachment for the Eimco Model 105 tractor. For maximum visibility and greater work control, the Eimco fork lift seats the operator at the front of the machine. Uni-drive transmission with independent track reversal for spin turns, provides versatility and operating ease. Tilting mechanisms effect smooth pickups of heavy and unwieldy loads regardless of slope. The fork lift is interchangeable with the Eimco front-end loader attachment and was designed to provide a unit flexible enough to meet materials handling jobs on uneven or sloping ground as easily as in prepared storage areas.

Reduced weight on new Koehring truck crane

Production on a new 45-ton capacity truck crane has been started by Koehring Company. Total weight for the unit is only 90,080 lb. For critical moving conditions, this can be reduced to 67,000 lb. by removal of boom, counterweight and outrigger beams. Designated the Koehring 445, the new truck crane can use up to a 120-ft. boom. Straight boom jibs, 15,



20, 25 and 30 ft. long with cable are available for special high lift crane service. Safety boom limit stops and power boom lowering are standard equipment. Powered by a Waukesha 145GKB engine that delivers 214 hp. at 2,400 rpm., the truck has eight speeds forward, four in main and two in auxiliary. Top speed is 31.8 mph. Truck chassis, mounted on a 220-in. wheel base, is 10 ft. 1 in. wide and 30 ft. 2½ in. long. Tires are 14.00 x 20-18 ply, carried on Budd heavy-duty 10-stud wheels. Two outrigger housings are furnished for extra stability. Complete prices and specifications can be obtained by writing to Koehring Company, Milwaukee 16, Wis.



Lima Type 1201 dragline equipped with an 85-ft. boom, dredging channel into Biscayne Bay at Ojus, Fla. Approximately 250,000 cu. yds. of sand and coral rock will be moved to complete this job

LIMA dragline speeds dredging operation in Florida

This big Lima Type 1201, owned by L. C. Morris, Inc., of Miami, Fla., is making quick work of dredging a channel into Biscayne Bay. Day in and day out, their Lima takes fast, steady bites of sand and coral rock. It's the built-in quality extras—such as piston-ring-type dirt seals and retainers in crawler rollers... flame or induction-hardened moving parts for longer life... properly balanced weight for maximum efficiency... anti-friction bearings at all important points... oversize drums and sheaves for long cable life... and extra-wide, extra-long crawlers for greater stability—that result in big production with minimum repair and maintenance.

It will pay you to get the full story on Limas from your nearby Lima distributor, or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.



**COMPARE OTHERS WITH LIMA
FOR QUALITY AND YOU WILL
SPECIFY LIMA**

Shovels . . . $\frac{1}{2}$ to 6
cu. yds.
Cranes . . . to 110 tons
Draglines . . . variable
Smaller capacity models
available on rubber

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LIMA SHOVELS • CRANES • DRAGLINES • PULLSHOVELS
BALDWIN-LIMA-HAMILTON
Construction Equipment Division — LIMA WORKS



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... products for **Concrete**

CONCRETE CURING COMPOUNDS

Clear — Pigmented — Black

TILT-UP COMPOUNDS

Wax Base — Non-Wax Base

LIFT SLAB COMPOUNDS

YOUTZ-SLUICK METHOD

Wax Base — Non-Wax Base

SPRAY EQUIPMENT

Hand and Power Operated

JOINT-SEALING COMPOUNDS

(COLD APPLIED IN 3 TYPES)

Ready Mixed Rubber Base Mastic,
Rubber Base Emulsion and 2 Component Mastic

SEALING COMPOUND APPLICATORS

AIR-ENTRAINING AGENT

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**AIR METERS FOR
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- Comply with all leading specifications
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Denver, Colorado, K. C. Construction Supply Co.
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Salt Lake City, Utah, Intermountain Concrete Specialties
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600 Lairport Street, El Segundo, California

Swivel wheel featured on belt conveyor

A new portable belt conveyor, known as a swivel under-carriage assembly is being produced by **Sam Mulkey Co.** The swivel wheel feature adds utility to the conveyor and broadens its usefulness by allowing the entire unit to be propelled with



ease, parallel to the job, thus making faster pours and allowing the contractor to follow the progress of the job lengthwise as well as vertically. By use of the swivel wheel undercarriage, vertical height of the conveyor is automatically increased one foot without lengthening belt or conveyor proper. The rear wheels are on a fixed swivel turning 90 deg. Front wheels rotate the full 360 deg., "crazy-wheel" fashion, thus allowing for angling of conveyor without altering the rear wheel setting; backing up or warping around the entire unit. For further details, write to **Sam Mulkey Co.**, P. O. Box 270, Lees Summit, Mo.

Shovel Supply Co. announces two new rollers

Two new models of self-propelled rubber-tired rollers are being manufactured by **Shovel Supply Co.**, 4900 Hines Blvd., Dallas, Tex. The 9-wheel 10-ton and 11-wheel 12-ton Fergu-



son rollers embody such new features as quickly removable disc wheels, hydraulic steering and rigid one-piece steel body. The 11-wheel model is equipped with torque converter and straight line reverse without having to throw out the clutch. Both models are equipped with water sprinkling tanks and mats when desired. For catalog sheets and prices, contact the manufacturer.

Blast hole drilling rig has own air supply

Worthington Corporation recently announced availability of its new **Blue Brute** Tractor-Mounted drilling rig for production blast hole drilling on rock excavation projects. The **Blue Brute** drilling rig is a completely self-contained unit carrying its own air supply and driven either by the tractor

H&L

teeth that really dig



A GOOD TEAM

H & L RAPID RIPPER

- Narrow sharp replaceable point penetrates in hard, compacted ground
- Lightweight — Easy to handle — One man can attach or detach

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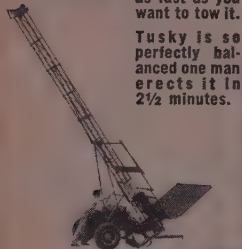
THE FINEST IN HYDRAULIC AND STRUCTURAL ENGINEERING.
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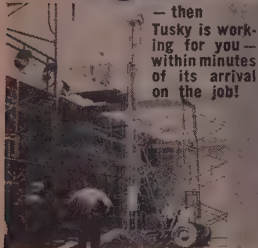
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engine or a cross-mounted portable. The two hydraulically controlled jibs can be operated through a total arc of 100 deg. vertically or horizontally. The boom can be extended for any distance up to 5 ft. providing a large drilling area and making it possible for more blast holes to be drilled from one location than conventional equipment which must be located after each blast hole is drilled. A specification sheet containing additional data on the Blue Brute drilling rig is available upon request from the Worthington Corporation, Advertising & Sales Promotion Dept., Harrison, N. J. Ask for Bulletin No. 1221-S2-P.

Low cost rake attachment for Arps blades

A new rake attachment for Arps utility blades has recently been announced by the Arps Corporation of New Holstein, Wis. Sturdily built with closely spaced spring steel tines, the



eight-foot rake is attached easily in only two or three minutes by simply removing two nuts and one pin and sliding the tool into place. The rake may be angled either to the right or to the left, or in any one of eight positions. In an angled position, the rake will discharge materials in a windrow; in the normal position, it can be used for grading, leveling and mulching soil. An optional gage wheel is readily adjusted to maintain consistent depth penetration for land leveling operations. It can be easily detached when not required. Price of the rake is said to be surprisingly low. The rake and frame are also available separately without the blade.

New size fast move coupler added to FMC line

A new size industrial coupler has been added to the line of FMC Fast Move Couplers for portable aluminum pipe lines. The new 2½-in. coupler, engineered for use with schedule 5 (IPS) aluminum pipe, is now available with a permanent baked-in dry lubricant to reduce friction wear and extend the usefulness of all FMC industrial couplers. Like the 2-, 3- and 4-in. sizes, the new 2½-in. coupler withstands working pressures up to 1,000 psi. and is available attached or unattached to pipe. Detailed information on the couplers may be secured by writing the John Bean Division, Food Machinery and Chemical Corp., P. O. Box 145, San Jose, Calif.



Crush-proof suction hose

A new crush-proof, smooth bore suction hose has been introduced for use in the contractor field. A special Stycon cord is embedded in rubber between multiple plies of high-grade hose duck. Greater resilience is given the hose so it snaps back automatically if flattened, either by trucks, contractor equipment or falling rocks. Available in 1½ in., 2 in., 2½ in. and 3-in. sizes with lengths up to 50 ft., this new crush-proof suction hose is designated Vitalic 368 by the manufacturer, **Continental Rubber Works**, 2037 Liberty St., Erie 6, Pa.

Sprocket accessory stops roller logging on tractor links

A boon to track-type tractor operators working in mud or snow are new Rollfree Sprockets which positively prevent clogging or jamming and consequent track-sliding and flattening of the rollers. Rollfree Sprockets are sold by **The Skookum Co., Inc.**, 8524 N. Crow-



ford, Portland 3, Ore., and their dealers, in sets of four that are adaptable to most makes of tractors. The sprockets are easy to install. Each sprocket comes apart and is bolted into position around the roller without having to break the track. The sprocket teeth are engaged by the moving track pins, which keep the roller turning in spite of heavy mud or snow.

Automatic asphalt curb extruder

An automatic asphalt curb extruder called the Curbilder was introduced recently by the **Miller Spreader Corp.**, 2020 Simon Rd., Youngstown, Ohio. It is available in two models: the Twin-Form, MC-200 and the Mono-Form MC-100. Both Curbilder models carry the same specifications but differ in that the Twin-Form has two compacting chambers while the Mono-Form has only one. Machine design places curb at extreme edge of pavement or within one inch of any wall or obstruction. Curbilder extrudes, compacts and smooths asphalt curb in one operation at a rate of 48 to 120 in. per min. Compaction ranges from 90 to 110%. The Curbilder requires one operator who drives and steers the machine and two loaders.



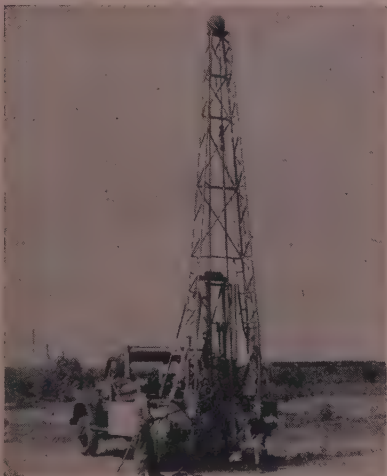
Conveyor places 700 tons fill daily

Power-Pack Conveyor Co. announces an improved conveyor for back filling ditches, trenches, curbing or pipelines. The new conveyor attaches to the hauling vehicle and delivers material up to 8 ft. beyond the side of the truck and at heights up to 3 ft. New and exclusive feature of the unit is its adjustable discharge deflector for easy control of material placement. Convenient control of belt speed and volume of material de-

livered to the belt assures smooth placement of material without spillage. These adjustments can be made while the unit is in action. Conveyor belt is powered by an 8-hp. gasoline engine, has a capacity of three tons per min. and can unload and distribute more than 700 tons of material per day using only two men. Write to **Power-Pack Conveyor Co.**, 13910 Aspinwall Ave., Cleveland 10, Ohio, for complete information and prices.

Mobile rotary drill does four jobs

A new, high-powered mobile rotary drill, the B-52 Pacemaker, handles auger boring, core and percussion drilling and soil sampling with equal speed and versatility, according to the manufacturer, **Mobile Drilling, Inc.**, 960 North Pennsylvania St., Indianapolis, Ind. The Pacemaker features the exclusive Mobile Drill "hollow stem" auger that permits



undisturbed soil sampling without withdrawing auger from hole. Coring may also be continued through the hollow stem of the auger when rock has been reached. Self-powered, the unit can generate up to 5 tons push or pull ram force, with a twin hydraulic feed that responds to fingertip control. Literature available.

New line of pile hammer leads

A new and complete line of pile hammer leads is now available from **McKier-**

nan-Terry Corp., Dover, N. J. The structures, for attachment to crawler and truck cranes, feature all-welded tubular sections that give high strength and rigidity with minimum weight. Five basic lead types are available, to which additions and variations can be made to suit particular customer requirements. The new McKiernan-Terry leads are sectionalized for easy transport and erection.

Multi-purpose motor pump

A new multi-purpose motor-pump combination designed specifically for all 6 and 12-volt battery applications such as vehicles, tail gate lifts and graders has been introduced by **Webster Electric Co.**, 1909 Clark St., Racine, Wis. The compact combination, which measures only 12½ in. in length, includes a four-bolt foot mounting integral with the motor for ease of installation in crowded locations. Direct coupling eliminates alignment problems between pump and motor and any need for external flexible couplings.





Ideas For Earth

TWIN-POWER SETS NEW ON SCORES OF JOBS

*Gives productivity
not offered*



New "Euc" has struck capacity of 24 yds.

This Model TS-24 is Euclid's latest development in Twin-Power Scrapers. It has a struck capacity of 24 yds. and 32 yds. heaped at 1:1 slope. Tractor is powered by 300 h.p. engine with 3-speed Torqmatic Drive. The rear axle is driven by a 218 h.p. engine with separate torque converter and semi-automatic transmission. Hydraulic steering provides full 90° turns. Tires are 27.00 x 33 standard with 33.5 x 33 optional. Top speed with full payload is 26 mph. using standard size tires.

Pipeline Padding Costs Reduced More than 50%

ARIZONA — Western Pipe Line, Inc. of Austin, Texas is laying 245 miles of 34" pipe across northern Arizona and a 141 mile connection of 20" pipe to Phoenix. It's a tough job across rugged terrain and requires equipment that can take steep grades and rough going.

The pipe must be protected with a 6" blanket of selected material—about one yard of dirt per lineal yard of pipe. Two "Twin" Scrapers have been working on the padding operations hauling material from 1200 ft. to several miles over grades as much as 39%. The contractor reports that the production and work-ability of these scrapers have cut padding costs in half as compared with former methods used.

Rush Job Finished 4 Months Ahead of Schedule

SOUTH DAKOTA—J. H. Beckman Construction Co. of Sioux Falls was awarded a grading contract for 6.8 miles of U. S. Route 16 that involved 360,500 yds. and had to be completed in 6 months. Four Euclid Twin-Power Scrapers, supplemented by 3 other scrapers, some crawler equipment and 3 motor graders, were put on the job and worked 11 hour shifts six days a week.

Because of their Twin-Power and all-wheel drive, the "Eucs" worked independently without assistance from pusher tractors. On one cut they self-loaded 20 bank yards of gumbo and shale in about 45 seconds—completed the 870 ft. haul cycle over cut and fill in an average of 2.83 minutes. Hourly production was 353 yards. Self-loading sand and top soil in another cut the Euclids averaged 21.6 yards in less than a minute. The complete 600 ft. cycle took about 2½ minutes and hourly production averaged 415 bank yards.

With these versatile, fast dirt-movers on the job, grading was completed far ahead of the rush schedule.

Versatility Pays Off at Noxon Rapids

MONTANA — Two Twin-Power Euclid Scrapers are being used by Morrison-Knudsen Co., Inc. at Noxon Rapids Hydro-electric Project on the Clark Fork River in Western Montana. They are building roads, helping with excavation at the dam site and supplementing a large fleet of other Euclid hauling equipment.

Working in heavy wet clay sand and gravel the "Twins" up loads of 18 yds. or more with help from pusher tractors. With single tires and all-wheel drive work in soft and rutted areas have plenty of power to heaped loads over long hauls travel speed.

Owner says "Euc" Twin-Power Scrapers have revolutionized dirt moving in the V

SOUTH DAKOTA — Harris Construction Co. moved 1,000,000 yds. of shale for a railroad relocation job at Mowbride with only 6 scrapers, one motor grader and one roller. That's probably as small a scraper equipment as you'll ever find on a project of this size yet production averaged 13,000 yds. per 10-hour shift. Cycle time on a 1600 ft. haul was about 4 minutes . . . each "Twin" averaging 225 yds. per hour. Owner Ken Harris has found the Twin-Power Scraper the most efficient dirt mover he's ever used and this railroad job wasn't the first time he had parlayed Twin-Power into low cost high production.

In April of 1956, Harris set a new earthmoving record on Montana highway work by moving 90,000 yds. on hauls up to 4000 ft. during six 10-hour shifts. At the same time he was working on the road job, Harris had a 1,200,000 yd. subcontract at Glasgow Air Base, 26 miles away. He moved his "one man earthmoving crews" from one job to another according to weather conditions and work requirements. The "Eucs" were used to the best advantage all the time because there was only an hour's travel time involved and they worked independent of pusher tractors normally needed by scrapers for efficient operation.

3 Million Yard Waste Dump Moved by "Twin"

ONTARIO, CANADA — Moving old waste dump from a drain bed presented a tough problem. Steep Rock Iron Mines, Ltd. material, consisting of wet shale, grade ore, stone and boulders heavy—about 3200 lbs. per cu. yd. Hauling conditions were so bad because of the soft, spongy material so it seemed that the job had to be truck-shovel operation. In spite of these adverse conditions a Twin-Power Scraper was strated on a haul of 5800 ft. trip with grades up to 10% and performance was so outstanding that four machines were purchased. They are now effecting major savings on an almost "impossible" scraper job.

Twins Tackle Tough Road Job

VIRGINIA — Contractor Robert T. Main used a Twin Scraper TC-12 Crawler in a highway cut that had stopped other scrapers because of the extremely soft footing. This combination of Euclid's had plenty of power, traction and flotation to get the job done efficiently—it replaced a dragline that was brought in when it too the job couldn't be done by scrapers.

movers

TWIN
EDITION



RECORDS

and cost advantages
any other equipment



Improved Model of "World's Most Powerful Crawler"

Euclid's Model TC-12 Twin Crawler now has more horsepower, more work area and more accessibility than any other production tractor. Powered by two 218 h.p. engines with separate Torquematic Drives on each track—a total of 436 h.p.! Standard shoes are 27" wide and there are now 8 track rollers to give still better balance with heavy attachments.

"Twins" Move Nearly 40,000 Yds. Per Day

NEBRASKA — Western Contracting Corp. of Sioux City, Iowa, used 30 "Twin" Scrapers and 5 Euclid TC-12 Crawlers to move 3 million yds. on a plant site grading project with a 5 month completion limit. Equipped with 6 yard sideboards and push loaded by the big "Twin" crawlers to get maximum production, the scraper fleet worked 20 hours a day and moved close to 40,000 yds. daily on hauls of 1500 feet.

This leading contractor's belief that Euclid Twin-Power is tops for cost earthmoving is backed by 10 years of previous experience on high production jobs. At Ft. Randall, Nebraska they used a fleet of 30 Model TC-12 Scrapers and 5 Model TC-12 Crawler Dumps powered by two 300 h.p. engines. For a 1.5 million yd. Indiana Turnpike project Western purchased 15 Model TC-12 Scrapers and 5 Model TC-12 Crawler Dumps. After finishing a big job, part of the Twin fleet was assigned to Oahe Dam while others tackled a highway project in Michigan. This well-known contractor is so "sold" on Euclid Twin-Power Scrapers and Crawlers that estimates and bids are made on the basis of the low cost production that "Twins" provide.

Couldn't Believe His Own Stop-Watch

IOWA — When a contractor-visitor to Wilbur Nielsen's road grading job made a time check on 3 Twin-Power Scrapers he sent to town for another stop-watch because he couldn't believe the time registered on the one he'd used!

The "Twins", equipped with 6 yd. sideboards and push loaded by a torque converter crawler tractor, got loads of better than 24 yds. in an average of 50 seconds. In spite of the mile and a half long haul, the three scrapers averaged 336 yds. per hour. Working 10½ hour shifts six days a week, with an availability record of 95%, Nielsen's "Eucs" completed the grading well ahead of schedule.

**"TWINS" are
making
headline
news!**

Twin-Powered Euclid Equipment is out-performing all other equipment by a wide margin — the profit margin — on all kinds of earthmoving. With "Twins" in your fleet you'll have a bidding advantage that can pay off in more jobs and more profit. Get the facts from your Euclid dealer and you'll know why owners everywhere have proved Euclids are your best investment.



EUCLID DIVISION
GENERAL MOTORS CORPORATION
Cleveland 17, Ohio

OWEN

Engineering scores again

Never before have so many important and improved features been combined in a bucket as in the new OWEN "SCL" wide-type materials handling clamshell bucket... redesigned from bowl to head.

OUTSTANDING IS THE 75% TO 100% INCREASE IN CABLE LIFE.

Here's how it's done. The closing line now leads straight through the center plane of the head of the bucket to first lower sheave, thus eliminating bending of the closing line around upper guide sheaves as in conventional block and tackle and lever arm buckets.

Reinforced arms and crosshead afford greater durability without adding weight to bucket. Available in sizes ranging from 3/4 to 3 cubic yards inclusive.

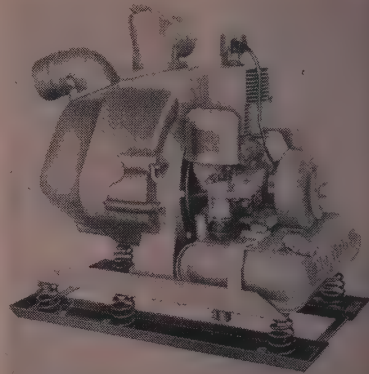
Write today for additional information.

The OWEN BUCKET Co.
BREAKWATER AVENUE, CLEVELAND 2, OHIO

BRANCHES: New York • Philadelphia • Chicago
Berkeley, Calif. • Fort Lauderdale, Fla.

New high-volume, pressure pump

A new centrifugal pressure pump has just been announced by **Homelite**, Port Chester, N. Y. The new Model 24S3-1P is a high volume pressure pump which



has a capacity range of 55 gal. of water per min. at 70-lb. pressure to 205 gal. of water per min. at open discharge. The self priming pump weighs only 107 lb. and is mounted directly on the crankshaft of a Homelite, single-cylinder air-cooled, two-cycle gasoline engine. It has a guaranteed suction lift of 28 ft., total head up to 185 ft.

Sheppard power steering kit fits all Huber maintainers

R. H. Sheppard Co., Inc., Hanover Pa., manufacturers of diesel engines and power steering gears for industrial applications, has developed a new full-time power steering gear that can be installed on any current model Huber-Warco Maintainer. The new Sheppard gear, a completely integral unit, is offered in kit form. The kit includes everything necessary to make the installation on any Huber-Warco Maintainer, new or used. Complete specifications and prices available from **Huber-Warco Co.**, Marion, Ohio.

New tool splits Euclid TC-12 tractor

A simple means of "splitting" the Euclid TC-12 twin-engine tractor, by pushing the pivot shaft out of its housing



with hydraulic power, has been developed by the **Owatonna Tool Co.**, 38 Cedar St., Owatonna, Minn. By remov

Power-Transfer Differentials put **MORE PUSH** in a **PAYLOADER**



more **TRACTION** means more **PENETRATION**

There's more punch — more push — more penetration with a "PAY-LOADER" because automatic power-transfer differentials assure better traction in adverse conditions — on loose underfooting, sand, mud, snow and ice. If one wheel slips, more power is automatically transferred to the opposite wheel, enabling a "PAYLOADER" to keep driving forward, where ordinary tractor-shovels spin helplessly. You get traction and action instead of wheel-spinning, time-and-power-wasting inaction.

These special, more-costly but more-effective differentials are but one of the many reasons why you get more tractor-shovel when you buy a "PAYLOADER" . . . why they dig more, carry more and deliver more loads per day than any comparable size tractor-shovel. You also get 4-stop power-shift transmissions, planetary final drives, power-steer, wheel power brakes, hydraulic load-shock-absorber . . . and you get the exclusive "PAYLOADER" bucket motion with 40° tip-back at ground level plus powerful pry-out action.

Your "PAYLOADER" Distributor is anxious to prove that a "PAY-LOADER" can out-perform anything in its class. He wants you to try it on *your* work and let *you* be the judge. Call him today!

Power-Transfer Differentials...

automatically direct the most power to the wheels that are gripping — whenever the other wheels tend to spin on mud, loose sand, ice, snow, etc.



THE FRANK G. HOUGH CO.

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Send full data on 4-wheel-drive "PAYLOADER" units.

☐ Model HO	☐ Model HH	☐ Model HU
2 1/4 yd. payload	1 3/4 yd. payload	1 1/2 yd. payload
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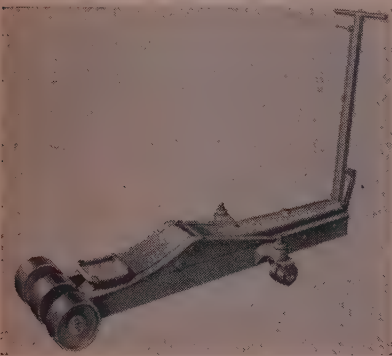
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY



ing the cover plate, retainer caps, and other retaining parts, mounting the tool in existing cover bolt holes and applying pressure, the big tractor is split in a fraction of the time normally required. Complete details on the Y-712A Euclid Pivot Shaft Pusher tool can be obtained from the company.

Weaver announces 20-ton jack

The Weaver Manufacturing Co. has just announced their new Model WA-85 Super-Giant 20-ton jack. The company claims that it is the only hydraulic floor



jack over 10-ton capacity on the market. The Weaver Super-Giant jack rolls on big tandem roller bearing wheels and ball race casters. Long, low slung frame with triple front wheels reaches under extreme overhangs. Saddle lifts to 25½ in. Safety lock prevents accidental lowering of load and safety valve prevents overloading. Detailed information available from the manufacturer, Springfield, Ill.

New controls for Gar Wood ditcher

Hydraulic controls have been added to Gar Wood Industries' Model 160

ladder-type ditcher. Designed for water main and deep sewer excavation, the ditcher is now equipped with a hydraulic boom hoist for fast, positive positioning of the boom. The boom is raised, lowered and held by an independent package-type hydraulic control system. No friction boom clutch or brakes are required. Double-acting hydraulic cylinders provide full crowd for the boom. The 160 digs to a depth of 16 ft. with widths from 18 to 48 in. Shiftable boom allows the 160 to work close to buildings, utility poles, streets and obstructions. Reverse digging speeds allow undercutting of sidewalks and pipes. Gar Wood Industries, Inc., Wayne, Mich.

Odometer measures tractor mileage

A new type odometer, which accurately records the distances traveled by Caterpillar track-type tractors, is now being made available by Caterpillar Tractor Co., Peoria, Ill. The unit can be easily and inexpensively mounted on both spoke-type and disc-type idlers. The unit gives excellent accuracy in the low speed ranges, registering positive mileage in both forward and reverse gears.

Asbestos base puncture sealant

Complete puncture sealing protection for tubes and tubeless tires is provided by a new type of liquid puncture sealant which can be injected directly into the tire while it remains on the wheel. Called Rubbertex, it is a special non-flammable asbestos base liquid that eliminates the use of latex or synthetic rubbers, cannot freeze, gum up or change characteristics under extremes of temperature. Additional information and prices may be obtained directly from United Rubber-tex Corp., 260 Madison Ave., New York, N. Y.

New diamond bond saves blade life, increases concrete cutting 70%

A totally new segmented-type diamond abrasive blade has been developed by the Felker Manufacturing Co. Using new materials and new manufacturing techniques a bond structure as tough and dense as rolled steel plate has been produced. Voids, gas pockets and exaggerated graininess of the bond metal are completely eliminated and a more positive anchoring medium is insured. The process also overcomes fracturing of the graded diamond particles resulting from intense molding pressures, thus insuring greater cutting speed and efficiency. For further information about the new Felker Di-Lock diamond blades, write to the company, 1128 Border Ave., Torrance, Calif.

Far-Pul belt clamps cut down time

A fast, easy way of installing conveyor belts, is made possible by new equipment known as the Far-Pul Belt Clamp. Light in weight, this time-saving rig employs fast-acting jacks in place of slow, un-



wieldy take-up screws. It can also be used to shorten a conveyor belt joined with Flexco or Flexco hinged fasteners. Bulletin FP-1 fully describes and illustrates the operation of this device. Write to Flexible Steel Lacing Co., 4607 Lexington St., Chicago 44, Ill.

IH announces new power unit

A new model diesel power unit, the UD 281, has been announced by International Harvester's Construction Equipment Division, 180 N. Michigan Ave., Chicago 1, Ill. The four-cylinder unit has a 60-hp. rating at 1,800 rpm., five more hp. than the UD 264, its predecessor. This smallest of six diesel power units in the International line has a piston displacement of 281 cu. in., with a 4½ x 5¼ in. bore and stroke.

Ransome introduces heavy duty ripper

The Ransome Corporation of 2729 Park Ave., Philadelphia, Pa., announces the introduction of the new Model R-89 ripper for use in heavy duty ripping, for attachment to bulldozers 43 to 60 in. high in the 150 to 320-hp. tractor range. The new ripper features the one man rack and pinion depth adjustment available in other Ransome rippers. It has a 4 x 7-in. ripping shank with a new 28-lb. cast manganese tooth.



Ottawa backhoe and loader approved for M-M tractors

The Ottawa industrial backhoe and front end loader have been approved for mounting on the Minneapolis-Moline 445 industrial tractor and the backhoe has also been approved for the 445 utility tractor. Features of the backhoe are Ottawa's patented One-Trol (single operating lever) which controls all the actions of the front end loader, and dual One-Trols on the backhoe permit the operator to coordinate all movements of

the bucket, stick and boom. The backhoe, which is available in two models (one to dig 11 ft., the other 8½ ft.), can be equipped with buckets from 12 to 36 in. in width. An automatic ejector which positively ejects wet or sticky materials without loss of cycle time, is an exclusive feature of the Ottawa Backhoe. For more information, write the manufacturer, Ottawa Steel Div., L. A. Young Spring & Wire Corp., Ottawa, Kan.

DE-WATERING PROBLEMS LICKED WITH FLYGT PUMPS ON FEATHER RIVER PROJECT



For construction of a power plant for Pacific Gas & Electric Co. on the famous Feather River, Bechtel Corp. was awarded a contract to build a power house for housing two 53,000-kilowatt turbine generator units, an up-river concrete diversion dam 420 feet long and 60 feet high, and installation of the greater portion of a penstock 780 feet long and approximately 14 feet in diameter. Known as the POE project, the work presented some interesting and difficult de-watering problems. For instance, certain areas of the power house site were well below the river surface and continual seepage required pumping from the lower elevations to a 43 foot head, where the water was returned to the river.

As an important part of the pumping equipment, three submersible Flygt electric pumps—a 3" Model B-80 and two 8" Model B-150/200's—were installed. Results regarding the utility and performance of the Flygt products indicated they do a remarkable job, without question. They proved easier to handle because they can be put to work and forgotten. Service requirements were held to the minimum because Flygt Pumps are perfectly sealed to keep water out of the electric motor, and are easily maintained. Observers reported the 8" Model Flygt Pump was one of the "pumpiest" pieces of equipment they had ever seen. Their flexibility of application proved ideal for this particular operation.

Pump operators find Flygt Pumps tops in performance. Users particularly like their fool proof features, the advantage that they work in any position, and the fact that they do not clog up. They can take a lot of solid stuff like mud and sand without hurting them in any way. The rubberized pump casing and hard chrome alloy impellers combine to make Flygt Pumps rugged equipment.

Flygt centrifugal pumps range in size from 1½"—65 GPM capacity to 8"—2850 GPM capacity. Head capacities range up to 210 feet. Weights range from 70 to 1300 pounds. Ask for complete information today.

CHECK THESE FLYGT FEATURES

- ✓ Electric
- ✓ Heavy Duty
- ✓ Submersible
- ✓ Continuous Duty
- ✓ Will pump up to 30% solids
- ✓ Resistant to salt water
- ✓ No priming needed
- ✓ Easy to handle
- ✓ No installation costs
- ✓ Low maintenance costs
- ✓ Quick and easy to service



CALL OR WRITE YOUR NEAREST
FLYGT PUMP DEALER

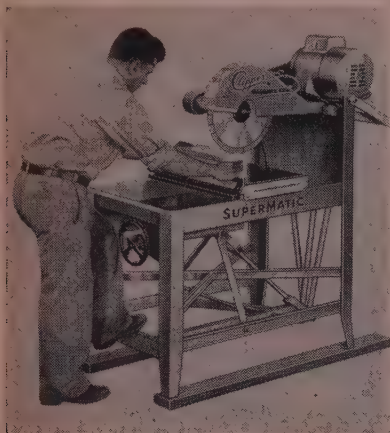
CONSTRUCTION MACHINERY CO., San Diego, Calif.; CROOK COMPANY, Los Angeles & Bakersfield, Calif.; WIN-WARD CO., Pomona, Calif.; C. H. BULL, San Francisco, Calif.; WEST COAST ENGINE & EQUIPMENT CO., Berkeley, Calif.; CAL-ORE MACHINERY EQUIP. CO., INC., Medford, Oregon; CRAMER MACHINERY COMPANY, Eugene & Portland, Oregon; THE CARRINGTON COMPANY, Seattle, Washington; TURNER SALES COMPANY, Spokane, Washington; SATCHEL EQUIPMENT COMPANY, Salt Lake City, Utah; PIONEER EQUIPMENT COMPANY, Phoenix, Arizona; RENO EQUIPMENT SALES COMPANY, Reno, Nevada; CUMMINS RIO GRANDE SALES & SERVICE, Albuquerque, New Mexico; CONSTRUCTORS EQUIPMENT CO., INC., Denver, Colorado; HALL-REARY MACHINERY CO., Billings, Butte, Great Falls & Missoula, Montana.

Stanco
—MFGS. & SALES INC.—

1931 Pontius Street
Los Angeles 25, California

Clipper markets all new masonry saw

Features of the new Clipper Supermatic 2-hp. masonry saw include the Sta-Level cutting head and Hi-Lo Control wheel. The Hi-Lo Control wheel automatically makes all adjustments,



keeping the cutting head level ready to cut at any height, without the operator having to turn off the motor. The Supermatic is five saws in one. It is a wet or dry masonry saw and can be quickly converted to a light duty concrete saw and a track saw. Frame extensions can be added to increase the saw width up to 6 ft., to cut sills, copings, and large stone and masonry units. Complete in-

formation on the Supermatic is contained in circular No. 2017 which may be obtained from **Clipper Manufacturing Co.**, 2800 Warwick, Kansas City 8, Mo.

Power take-off for IH trucks

A front-mounted power take-off unit for field installation on heavy duty International trucks with Red Diamond engines has been introduced by the motor truck division of **International Harvester Co.**, 180 North Michigan Ave., Chicago 1, Ill. It is designed primarily for use on transit mix trucks. Rated capacity of the assembly is 50 hp. at 2,100 rpm. It drives a shaft attached to a mixer transmission, which in turn furnishes power at reduced speed to the mixer barrel. Advantages of the unit include greater payload capacity resulting from elimination of a separate mixer engine, low initial cost and nominal maintenance. Power to the mixer is not affected by clutch operation.

Alternator electrical systems provide increased battery output

A line of alternator electrical systems designed for over-the-road equipment has been announced by the **Leece-Neville Co.**, 1374 East 51st St., Cleveland 3, Ohio. The new models are especially valuable where such accessories as flasher lights, two-way radio, spot lights and the like, cause high battery draw, and where low travel speeds cannot provide suffi-

cient recharging of batteries. Models include both a light-duty unit and a heavy-duty unit, with capacities of 12 volts, 50 amperes. Also available are a light and heavy-duty model with capacities of six volts, 60 amperes.

Utility blade extensions

End extension pieces for utility blades, bringing the overall width of the blade to eight feet, have recently been announced by the **Arps Corporation** of



New Holstein, Wis. The extensions are contoured to fit the Arps model AB-6 and AB-7 blades and are equipped with reversible cutting edges. They add one foot to each end of the blade, giving it added capacity for moving loose dirt and snow and are conveniently bolted to the blade, making them easy to attach and remove.

PRIMACORD

Detonating Fuse

Plain • Reinforced • Wire countered • Plastic

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Complete detonation—no unexploded caps or powder. Cannot be set off by friction, sparks, ordinary shock; even a direct hit by lightning did not detonate Primacord.

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Contacts every cartridge, even in deck loads. Initiates entire charge almost simultaneously. Can be hooked up to fire front line first, giving relief of burden and better fragmentation.

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Lowest overall cost because you get full efficiency from the explosive—no waste; and better fragmentation with less powder. Only one cap required—no cap in the hole.

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IT'S NEW!

IT'S FREE!



Contractors Get This!

New idea in "job-applied" pump selection shows ways to speed construction projects—keep "on schedule"—by moving more water more efficiently, *job after job!*

Handy chart inside lists operations you perform regularly—matches them up with pumps that do those jobs better, faster, at lower cost. Get a Barnes Construction Pump Selector from these distributors:



Central Equipment Co., Berkeley, Calif.

The C. H. Jones Equipment Co., Salt Lake City, Utah

Larson Equipment Co., Los Angeles, Calif.

Lowry Equipment Co., Redding, Calif.

The Rix Co., Inc., San Francisco, Calif.

Write Department L-57 for details

BUT SUPPOSE THE STEEL HADN'T BEEN DELIVERED ON TIME?

Somehow, schedules seem easier to make than to meet. And if delays do occur, costs can skyrocket. That's why so many western builders have learned to specify structural shapes from Kaiser Steel. Because, with Kaiser, an order placed is a promise kept—for delivery right on the nose. Kaiser Steel's fully integrated facilities are unique in the West, permitting careful control of quality all the way from mine to market. Combine this with our nearby location and full line of structural shapes (the most complete produced on the Coast) and you've built a mighty strong case for building with shapes from Kaiser Steel.

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built to serve the growing West

For specifications WRITE: KAISER STEEL CORPORATION

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Midget vibrator packs a wallop

On the market now is a new lightweight concrete vibrator with a very small head, only 1 1/4 in. in diameter. This little vibrator, manufactured by Stow Manufacturing Co., is driven by a 1/2-hp. universal motor at 12,000 vibrations per min. The Power Midget is shown here being used to vibrate the narrow fins of prestressed beams. Because of the small head, it is extremely effective for vibrating concrete in narrow forms such as precast work. The 4-ft. flexible shaft has a core made of the highest grade of music wire and a strong rubber covered casing. The universal motor is rated at 6.6 amps. at 11,000 rpm.; it has a trigger switch

mounted in the handle. For data on this vibrator, write the manufacturer, 56 Shear St., Binghamton, N. Y.

Newco boom pendant thimbles

A new boom pendant thimble in the open and closed is now being produced by the Newco Manufacturing Co. from high carbon electric steel castings. The manufacturer claims that it will increase fatigue resistance of the wire rope and dampens vibrations. A complete range of sizes both in the open and closed are now available. All sizes are interchangeable with standard open and closed sockets. Write for full details to Newco Manufacturing Co., Dept. 103, P. O. Box 5939, Kansas City 11, Mo.

New front end loaders for industrial tractors

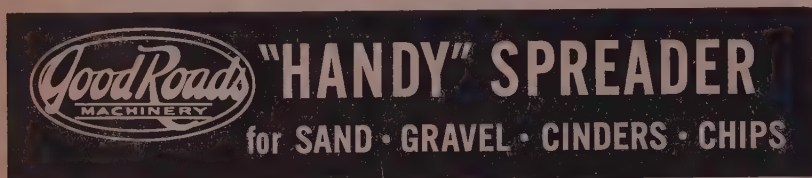
A new line of tractor-mounted front end loaders is announced by Superior Equipment Division of Superior Pipe Specialties Co. The loaders feature a



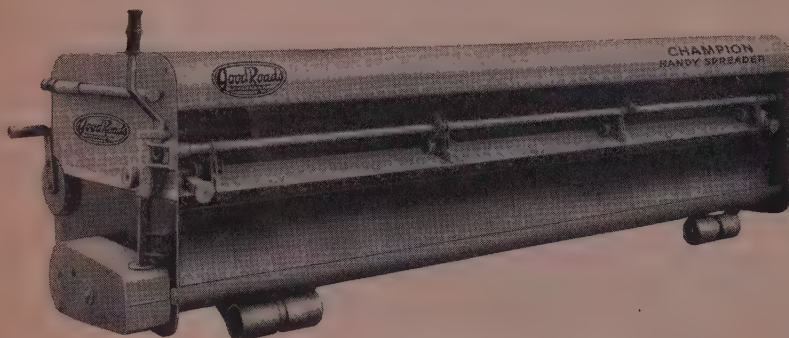
new extra-strong tubular frame, part of which acts as an hydraulic oil reservoir. Bucket rams are mounted so that they cannot spring and hydraulic piping is enclosed in loader arms for protection. The loaders have an especially strong pry-out action for heavy or frozen loads. They can be mounted on most models of low silhouette four-wheel industrial tractors. Further information will be furnished by R. Allen Wahl, Superior Equipment Division, P. O. Box 341, Wheeling, Ill.

New ripper for Cat D4 tractor

Availability of a new ripper for use with the Caterpillar 60-in. gage D4 tractor having grouser widths up to 18 in. has been announced by Caterpillar Tractor Co., Peoria, Ill. The No. 4 ripper is equipped with three alloy steel teeth having replaceable tips. Two additional teeth are optional. Since these ripping teeth are removable, the user has a choice of the number of teeth to use. The teeth may be inserted backwards, and ripping performed while backing up. By inserting the teeth upside down when not in use, additional ground clearance may be obtained. The tool is de-



**AUTOMATIC TRANSMISSION ELIMINATES
FEED ROLL GEAR SHIFTING**



DURABLE • FAST • MANEUVERABLE • LIGHTWEIGHT

• The Good Roads "Handy" aggregate spreader is designed for improved and economical spreading of sand, slag, stone, gravel, cinders, calcium chloride, etc., up to 1" in diameter . . . in depths from powder thin to 3".

A flexible keyboard of tempered-steel fingers permits foreign obstacles to drop through without clogging . . . eliminates streaks or spots . . . provides the most accurate and smoothest spread possible. Spread is positively controlled by micrometer adjustment from powder-fine to 3-inch

depth—once set, it remains constant for entire job. Quick-Shut-off starts and stops material flow instantly without a dribble.

Location of all controls on left-hand side of hopper permits efficient one-man operation and hitching. Adjustable standard truck hitch fits any size, model or make dump truck and adapts to any width spreader.

The "Handy" spreader is available in 6 models for spread widths of 8, 9, 10, 11, 12 and 13 feet. Narrower widths can be accomplished by use of block-off plates.

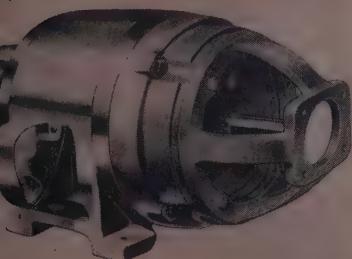
For complete details see your local distributor, or write to: Good Roads Machinery Corporation, Minerva, Ohio.



igned to afford maximum ground penetration of 12 in., ripping width up to 71 in., and 15 1/4-in. ground clearance when fully raised.

Special motors for hydraulic pumps

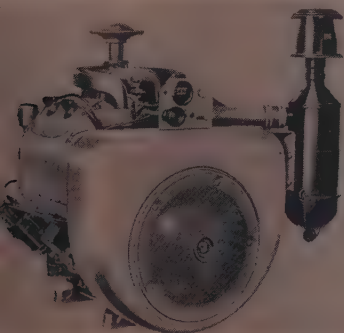
A special series of motors, designed particularly for hydraulic pumps, has been developed by U. S. Electrical Motors, Inc. These motors, available in



waterproof, totally-enclosed, and explosion-proof designs, incorporate a face type registered bracket for mounting the pump on the motor. This method of coupling provides many advantages: shorter, more compact package is achieved; built-in alignment of the pump motor is insured; and installation time is greatly reduced. For further information regarding these motors, write for data sheets Sec. 245, pages 45 to 48, U. S. Electrical Motors, Inc., Box 1058, Terminal Annex, Los Angeles 54, Calif.

Wisconsin Vee-4 air-cooled engine

Another new model Wisconsin air-cooled engine has been announced by Wisconsin Motor Corp., 1910 South 3rd St., Milwaukee 46, Wis. Designated



as the Model VH4, it is a 30-hp., four-cylinder V-type engine of basic high torque design and operates at a maximum speed of 2,800 rpm. The VH4 will be supplied as an open engine with or without side-mount fuel tank or as a completely housed power unit with either built-in or underslung fuel tank. Specification literature (Bulletin S-196) available upon request.

Three-boom mine drilling jumbo

Development of the first completely self-operated three-boom mining drill



Above: Pouring section of first floor of new 5-story Herman Miller Bldg., Dayton, Ohio. Right: Close-up of operator using a Master "1-Man" vibrator between closely spaced reinforcing rods.



"1-Man" vibrators cut cost on \$4,000,000 office building

"Our two '1-Man' vibrators are the best pieces of equipment on the whole job," says Zimmer Miller, Supt., Miami Valley Construction Co. "We use them exclusively to vibrate the 7,000 yds. of concrete going into footers, columns, walls and slabs on this job. We cover 6,950 sq. ft. with each slab pour and *one man* with a Master vibrator keeps up easily with the pour and thoroughly vibrates the heavily reinforced pan slab.

"We like these vibrators because we know they can take it and because they save us money every day on the job."

You'll like the new "1-Man," too, because it gives you *100% longer life* than other makes. The motor is sealed in the vibrating head; there's no flexible shaft to get out of whack; no oiling or greasing problems. It's actually a self contained, *precision* built vibrator. It weighs only 25 lbs. . . and with no heavy engine or motor to drag around, one man handles it easily. Plugs into any regular 115 volt AC or DC outlet. Find out yourself . . . write for free folder or ask your Master distributor for a free demonstration.

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- WEST COAST MASTER, INC. Los Angeles, California
- WORTHAM MACHINERY COMPANY Casper, Cheyenne, Newcastle, Riverton, Rock Springs and Sheridan, Wyoming
- THE SAWTOOTH COMPANY Boise, Idaho



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of them



advertisement



See how positive-action tailgate wipes bowl clean

Touch a fingertip switch, then watch Fullpak's positive-action tailgate move forward to eject the load. See how it wipes the bowl clean of mud, marl, or sticky clay in a single pass. No "carry-backs" here... the bowl is left clean. And you will notice that the inside of the bowl is cleanly designed, with no angular obstructions to block material flow. Operation of the tailgate is smooth, positive, efficient, and dependable.

Use BIG B Tournapull prime-mover with Rear-Dump or Lift-and-Carry Crane



◀ When your work runs into blasted rock, or other shovel-loaded materials, you can interchange your Fullpak Scraper with a 35-ton "B" Rear-Dump... keep your Tournapull prime-mover working with no time lost. The "B" Rear-Dump is highly maneuverable... makes 180° turns in less than its overall length, offers a big target for dragline or shovel, makes over-the-edge dumps clean and safe. Tournapull Rear-Dumps are at work all over the world. You will find them profitable tools to include in your equipment spread.

You can further extend the work-capacity of your "B" prime-mover with a Tournapull Lift-and-Carry Crane. Use it to handle pipe, culverts, bridge steel, pre-cast concrete sections, heavy machinery, and parts. Use it to unload trucks and rail cars. "B" Crane has a capacity of 30 tons; maximum lift, 24'9"; reach, 25'.

These LeTourneau-Westinghouse trailing units may be interchanged quickly and easily with the Fullpak Scraper. Each may be purchased at about one-third the original cost of scraper and prime-mover. Ask for complete details.



**Complete more work
in less time...
make more profits**

If your work includes big-yardage contracts, you can use a fleet of BIG B Tournapulls, with new 27-yd. Fullpak Scrapers, for bigger production and bigger profits. Next time you have a big-volume job to figure, call in your LeTourneau-Westinghouse Distributor and let him help you determine the ownership-operating cost of a BIG "B". Then compare it with your present equipment. On yard-for-yard production, you will find it your top money-maker.

Make this comparison soon! It is necessary that you act promptly if you want delivery in time to meet early job completion dates. 'Phone or wire... let us give you complete facts and specifications.

*Trademark BP-1439-G

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS
A Subsidiary of Westinghouse Air Brake Company

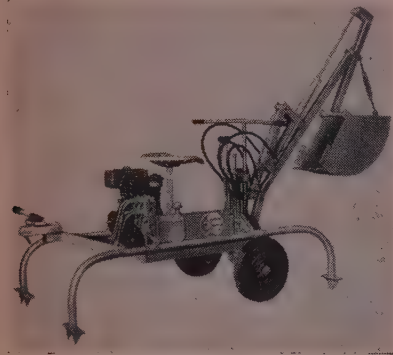
Where quality is a habit



jumbo has been announced by the **Thor Power Tool Co.** whose engineers say it will effect time and cost savings up to 50%. The giant new jumbo can operate at maximum efficiency in an area as large as 18 ft. wide and 10 ft. high. It weighs 7,800 lb. completely equipped with drifter rock drills and mountings. One man can operate the three booms without leaving his station at the air controls. Emphasizing speed and ease in setting up and operating, the machine requires only air hose connections. For full information, write to Thor Power Tool Co., 175 North State St., Aurora, Ill.

Portable backhoe for industrial jobs

A low cost, portable, powered backhoe designed to eliminate hand digging is announced by the **Charles Machine Works, Inc.**, Perry, Okla. This new ma-



chine is capable of digging to a depth of 5 ft. for trenches, bell holes and excavations. The Ditch-Witch backhoe is a trailer unit and may be towed behind a car at normal road speeds. It weighs 500 lb. and has its own complete gasoline power unit and hydraulic system.

Highway digger mounts on tractors

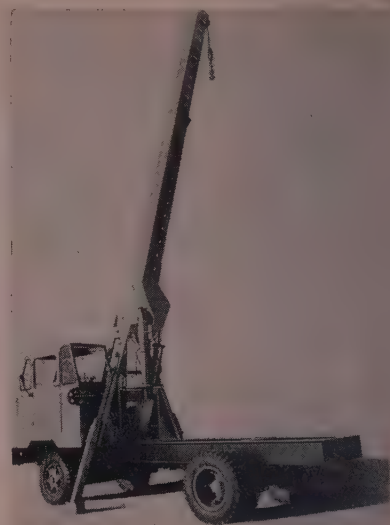
A new heavy-duty highway digger has been announced by the **Roper Manufacturing Co.** of Zanesville, Ohio. The



new digger digs to the 48-in. required depth for setting post and guard rails, with augers available to 14-in. diameter. It is easily mounted on tractors generally used for mowing brush and along highways. Standard equipment on the new digger includes a slip-clutch Universal joint, 3/8-in. spiral flighting with hardened long-wear edges, and a specially hardened "fish-tail" point for fast penetration.

Carrier optional with Hydra-Lift

Maximum ruggedness and mobility are combined in the especially designed carrier now available as optional equipment with the Pitman Hydra-Lift, Model



60HB, shown here. Also new is the "high mounted" boom shown. With this boom it is possible to haul much higher capacity loads on any truck a Hydra-Lift is mounted on. Hydra-Lift requires only 44-in. space behind a truck cab and has a lifting capacity of 6,500 lb. **Pitman Manufacturing Co.**, 300 West 79th Terrace, Kansas City, Mo.

40% FASTER THAN ANY OTHER DRILL

• The McCarthy Vertical Auger Drill cuts drilling time in earth, clay, compacted sand and gravel, hard pan, shale, sandstone and rock as much as 40%. Rugged construction permits you to drive 2 to 24-inch augers to depths of as much as 125' faster than any other drill. Get the facts on the powerful McCarthy today. See how you can complete shot hole, exploration drilling, foundation holes, dewatering operations, well drilling, highway construction and heavy contract work faster than ever before. The versatile, vertical McCarthy gives you more than any other drill. Write for Bulletin M-100 now. Let us show you how you can turn new profits on your drilling job.



McCarthy Vertical Auger Drill Model 106-24



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Radial Cone
 2,500,000 gal.



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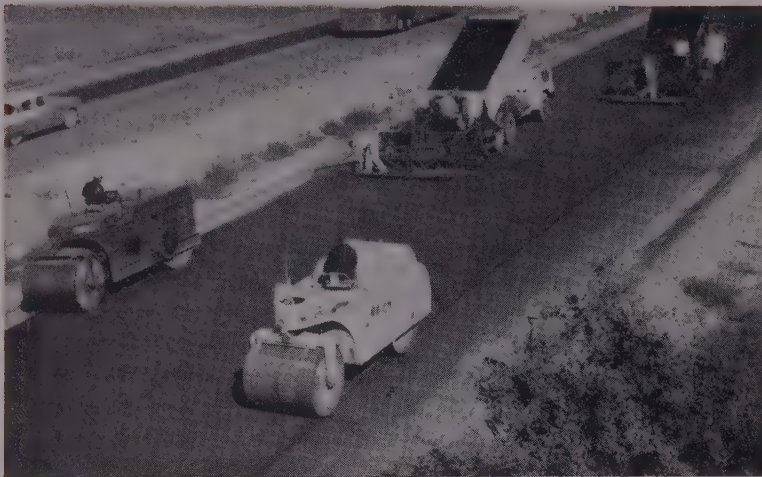
Obloidal Design
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Tandem Spreading of the Asphaltic Concrete speeded the resurfacing work as...

Bitumuls and Asphalt Put New Life in Famous Ridge Route on U. S. Highway 99

IN JUNE OF 1956, one of the largest resurfacing contracts ever let was awarded to Schroeder & Co., Sun Valley, California. With completion scheduled for January 1957, speed was essential. So was close coordination and timing on deliveries of the asphalts required for this record undertaking.

The job called for 21 miles of multi-lane Asphaltic Concrete resurfacing; 13 miles of sub-sealing, crack-sealing and priming of old rigid-type pavement ahead of resurfacing; 8 miles of sealing and prim-



Applying Bitumuls Slurry Seal to existing bituminous pavement ahead of resurfacing.

ing existing bituminous 4-lane divided roadway; and extensive shoulder work. The total estimated cost was well over half a million dollars.

The quantities of asphalt and Bitumuls required for this job are impressive too: For sub-sealing, 1,700 tons of Grade 10-25 Air

Baltimore 3, Md.
Mobile, Ala.
Inglewood, Calif.

St. Louis 17, Mo.
San Juan 23, P.R.
Oakland 1, Calif.

Refined Asphalt; for resurfacing, 3,500 tons of 200-300 Penetration Paving Asphalt; for seal and prime work, 140,000 gallons of Bitumuls.

Here's how the job progressed—On the old rigid-type pavement, slabs were drilled and sub-sealed with Air Refined Asphalt; then the cracks and joints were filled and sealed. This treatment was followed by the application of two lifts of Asphaltic Concrete to provide a uniform 3-inch thickness. On this phase of the operation, two spreaders equipped with special shoulder extensions placed the mix to a full width of 37 feet in a single pass.

The existing bituminous pavement required only a 1-inch overlay of Asphaltic Concrete as opposed to the 3 inches specified for the rigid-type section. Ahead of the placement of this 1-inch thickness, Bitumuls Slurry Seal was used to seal and prime the old surface.

This job, because of its unusual size and many complexities, provides an excellent example of the ability of American Bitumuls & Asphalt Co. to deliver a full line of asphaltic products to meet every need... and to deliver it on time. It will pay you to check with our office nearest you for all your asphalt requirements.



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& Asphalt Company**
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Tucson, Ariz.
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Lightweight differential hoist

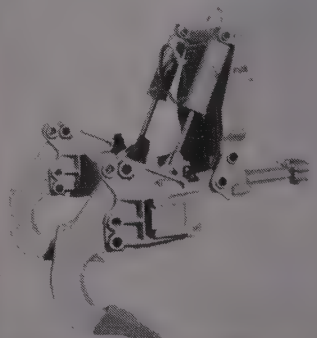
A new, lightweight differential hoist, with capacity of 1,000 lb., has recently been developed by Thern Machine Co., 3760 West Fourth St.,



Winona, Minn. Known as the Thern Differential Hoist 31H, this hoist saves up to 25% of the pull necessary to operate because of incorporation of anti-friction needle bearings in the lower sheave. Weighing only 29 lb., it is readily portable and can be transferred from one job to another easily. The high strength aluminum alloy frames have tensile strength of approximately 35,000 psi.

1957 AETCO ripper line

ATECO's heavy-duty tractor mounted rock ripper line for 1957 features improvements in shank design, added ruggedness and greater



protection for the tractor. Manufactured by American Tractor Equipment Corp., ATECO rock rippers will be available for all popular heavy-duty crawler tractors. Exclusive drawbar mounting arrangement lets the drawbar take the pull, protects the tractor transmission case against damage. Optional direct-drive pump permits continuous hydraulic power for ripper control, unaffected by clutch or torque transmission operation. Complete data may be obtained from American Tractor Equipment Corp., 9131 San Leandro Blvd., Oakland 3, Calif.

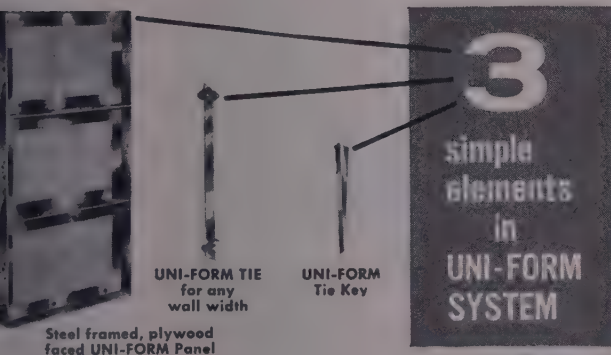
reduce forming costs...

with

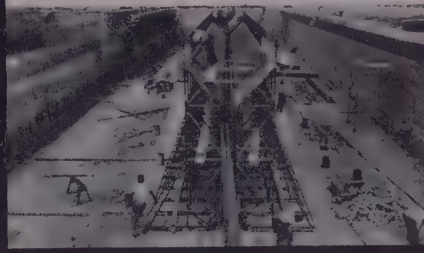
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Whether you're bidding on a sewage treatment plant, industrial building, highway bridges, overpasses or abutments, heavy foundations, circular tanks or a warehouse, UNI-FORM Panels will give you the lowest all around forming costs.

Why? UNI-FORM Panels can be erected faster, using less labor and material because the three basic elements of the UNI-FORM System—Panel, Tie and Tie Key provide simple mechanical assembly into any type of form. Unique system of attaching the minimum aligning lumber required reduces labor by 50% . . . pre-engineered techniques for handling pilasters, corners, stepped footings, columns, battered walls assure fast job progress.



INTERESTED? Get the catalog and complete details on the UNI-FORM System today. Send us a set of plans for our recommendations. You will be money ahead, and there's no obligation.



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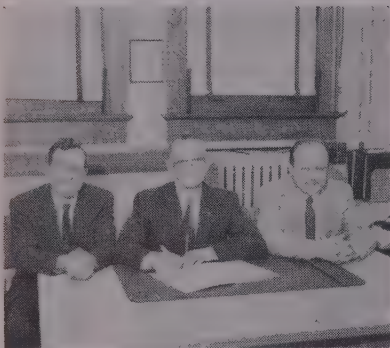
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Trinity 6-8126

News of DISTRIBUTORS



INLAND DIESEL & MACHINERY CO., Spokane, Wash., was recently appointed distributor of LeTourneau-Westinghouse products in eastern Washington and the Idaho panhandle. Present at the signing of the sales and service agreement were (l. to r.) **Dwight "Rosey" Rosengrant**, sales manager for ID&M; **O. P. "Red" Martin**, ID&M secretary and general manager, and **W. M. "Bill" Kind**, northwestern district representative for LeT-WESCO.

Star Machinery promotes two

Star Machinery Co., Seattle, Wash., announces appointment of William T. Francke to the post of manager of the firm's inside sales division, which includes the responsibility for public bidding, AGC and Corps of Engineers take-off bidding. Francke was formerly construction equipment manager and has been engaged in Star sales since 1947. Replacing him in this position is George V. Forsyth. Forsyth has been in construction equipment sales for the past year and formerly managed the company's dealer division for four years.

New Northwest distributor named

Hallidie Machinery Co., with main office at 210 Hudson St., Seattle, and branches in Spokane, Wash., and Portland, Ore., has been named by R. G. LeTourneau, Inc., as distributor for the firm's industrial hoists and jib cranes.

Eimco's Alaskan distribution

H. A. "Cappy" Faroe, owner-operator of Northern Supply Co., Inc., of Anchorage, Alaska, has been named distributor in the Territory of Alaska for Eimco Corporation, Salt Lake City, Utah, manufacturer of heavy-duty tractors for surface construction, and underground mining machinery. Faroe reports he is adding 10,000 sq. ft. of warehouse and showroom space to his supply headquarters at 400 Post Ave. in Anchorage. Northern Supply has been an Eimco dealer for the past two years.

Stepped-up service in No. Calif.

Recently Frank Machado, manager of Sierra Tractor & Equipment Co.'s Red Bluff store, was promoted to assistant manager of the Redding store to assist Grant Thompson, vice president. This and other changes have been made to take care of increased activities in this area resulting from the Trinity River Project now under construction and additional logging activities in this Northern California area. At the same time, John Sekerka, salesman at Gridley, was promoted to manager at Red Bluff. Sierra Tractor, with headquarters at Chico, Calif., also announced plans for construction of a shop in Weaverville to service customers in this area, and for expansion of the Redding store.

Cramer adds to sales force

Cramer Machinery Co., which recently moved into new quarters at 1140 S. E. 7th Ave., Zone 14, Portland, Ore., has taken on the Michigan line manufactured by Clark Equipment Co.; also has added four salesmen: G. W. Brass-

field, Kenneth Griffith, Johnny Johnson, and Max Paisley. Cramer Machinery Co. is now headed by James W. Schriver who became president following the death of his brother George W. Schriver a few months ago.

Wood builds new building

Completion of a new building at N.E. 82nd Ave. and Killingsworth St., Portland, Ore., will enable Wood Tractor Co., distributor for such well known lines as Allis-Chalmers, Broderick & Bascom, Insley, Tractomotive and other construction equipment, to integrate all company activities at one location. The new \$250,000 building doubles present facilities at 1033 S. E. Main St., which will be sold when Wood moves into the new quarters.

New accounts, new salesman

Rasmussen Equipment Co., Salt Lake City, Utah, recently took on two new lines: Westinghouse transit mixers, and Earle M. Jorgenson Co.'s Goldedge cutting edges. The firm, which recently added to its distribution facility a new 65 x 20-ft., all metal, parts warehouse, has appointed Don Johnson as sales representative for the northern section of Utah, Idaho, and western Wyoming.

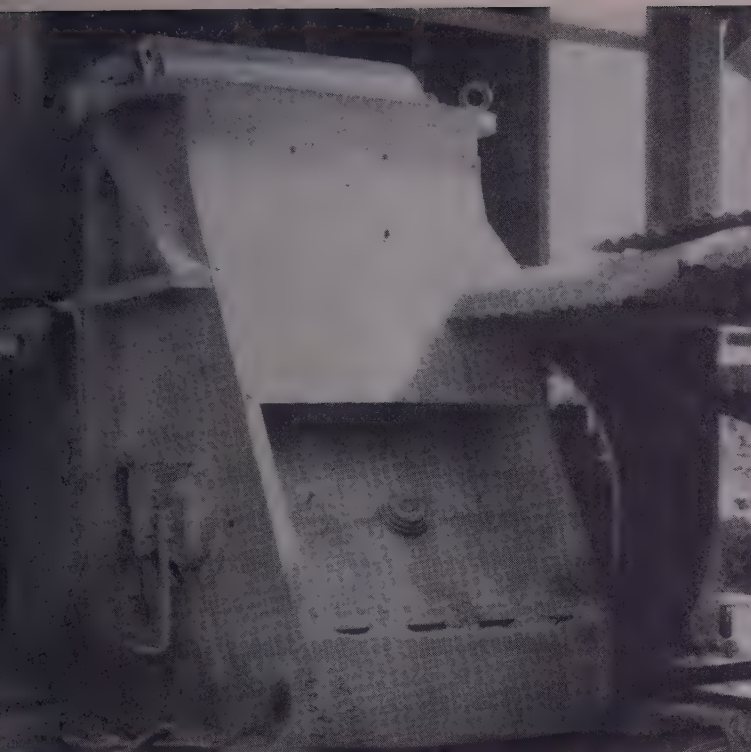
Wallace Machinery expansion

Wallace Machinery Co., Oxnard, Calif., has been named exclusive dealer for the Southwest Welding & Manufacturing Co. line of compaction equipment, sheepsfoot rollers, rippers, spring-



UTILITY TRAILER Manufacturing Co. of Los Angeles, through President **John C. Bennett**, announces the appointment of **Carl W. Auer** as distributor for Utility trailers and equipment in the San Francisco area. Auer's company, Utility Trailer Sales Co. of San Francisco, Inc., will remain at 155 Bay Shore Blvd. Purchase of the San Francisco sales outlet by Auer was the result of **J. N. Baird, Jr.**'s decision to concentrate his efforts on sales of other products. Executives of the new firm: **Carl W. Auer** (right), president-general sales manager; **Joseph P. Massone**, vice president and service manager; **Fred S. Mills**, secretary-treasurer. **Jack Nash** will continue to manage the service department. **George A. Tavenner**, **C. N. "Chuck" Gates**, and **"Scotty" Scott** make up the sales staff.





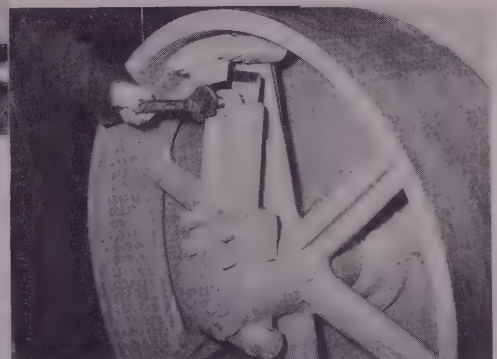
2' x 25" Kue-Ken in quarry crushing plant

Lower cost per ton crushing follows immediately when you switch to a Kue-Ken Crusher. While operating at more crushing strokes per minute for greater capacity, Kue-Ken consumes less horsepower. A crankcase-type lubrication system and the elimination of rubbing between jaw plates provides this superior performance. Kue-Ken is the only crusher with sealed mechanism operating in a bath of clean, filtered oil with dirt and grit sealed out. Crusher runs cool under heaviest crushing conditions. "Crushing without rubbing" principle of Kue-Ken eliminates abrasion, the main cause of jaw plate wear. Kue-Ken jaw plates outlast those of conventional crushers at least 5 times saving replacement costs and downtime. Overload or tramp iron actuates safety device that instantly releases flywheel avoiding damage to crusher. High capacity Kue-Ken will give you the capacity you need with a smaller size crusher. Study the saving you can make in the chart below.

Table of tons per hour that will pass through crusher with jaws set at dimension shown when measured in the closed position.

Table is based on crushing average hard, dry quartz or similar rock weighing at least 100 lbs. per cubic foot when crushed.

Kue-Ken crusher size	$\frac{3}{4}$ "	1"	1 $\frac{1}{2}$ "	2"	2 $\frac{1}{2}$ "	3"	3 $\frac{1}{2}$ "	4"	5"	6"	Horsepower range
24" x 12"	22	26	32	36	43	50	56				15 to 30
30" x 12"	32	35	38	42	55	70	76	85	110		20 to 30
36" x 10"	38	47	57	67	80	91	105				25 to 40
36" x 20"					70	82	90	115	135	160	30 to 50
42" x 25"					90	120	150	165	180	215	40 to 60



No damage on overload or tramp iron

Gone are the broken frames or toggles . . . the costly testimony to so-called safety toggles. Kue-Ken automatic control releases flywheel and permits it to run free without ratcheting. Crusher can be set to stop automatically on release of flywheel or to sound an alarm. On correction of overload or tramp iron, flywheel can be quickly reset and crusher put back into operation without costly delays.

WRITE FOR CATALOG

KUE-KEN® CRUSHERS

'CRUSHING WITHOUT RUBBING'

STRAUB MFG. CO., INC., 8381 Baldwin, Oakland 21, Calif.

Jaw Crushers Gyratory Crushers Overhead Eccentric Crushers Revolving Screens
 Classifiers Feeders Rib Cone Ball Mills Concentrating Tables Vibrating Screens

Pennsylvania Crusher Division, Exclusive Licensed Eastern Manufacturer and Distributor, 323 S. Matlack St., West Chester, Penn.
 Armstrong Whitworth (Metal Industries) Ltd., Authorized Licensed Manufacturer and Distributor, Close Works, Gateshead-upon-Tyne 8, England

DEALERS:

SEATTLE, WASH. Washington Machinery Co.
SALT LAKE CITY, UTAH Lund Machinery Co.
SAN ANTONIO, TEX. Closner Equipment Co.
PORTLAND, ORE. Contractors Equipment Co.
LOS ANGELES, CALIF. Garlinghouse, Fremont Co.
PHOENIX, ARIZ. Stapley's
DENVER, COLO. Union Supply Co.
CASPER, WYO. Moss Equipment & Supply Co.
VANCOUVER, B. C. Universal Equipment Co.



PART OF the extensive offices and display areas in the new building of Cramer Machinery Co., 1140 S. E. 7th Ave., Portland, Ore., as they appeared at special opening festivities held recently. A good part of the 35 lines of construction equipment handled by Cramer were on display, including the Pippin excavator (foreground), one of several pieces of equipment displayed that are made by Pippin Construction Equipment, Inc., represented in the Northwest by Regional Manager Harry Hodges and distributed in this area by R. M. Wade & Co.

kler tanks, for the counties of Ventura, Santa Barbara, and San Luis Obispo. The Viking Swing-A-Way ripper, a product of the Viking Forge & Steel Co., Albany, Calif., is another new account recently acquired by the company.

Wallace Machinery Co., Ventura County Caterpillar and John Deere dealer since 1944, recently expanded its territory to include Santa Barbara and

San Luis Obispo counties. This expansion was effected when Don Wallace completed negotiations with Joseph G. Moore Co. for the purchase of sales franchises and facilities of the dealership in these two counties.

Owen Bucket names So. Calif. firm

The Owen Bucket Co., Cleveland, Ohio, announces appointment of Santa

Fe Equipment Co., Inc., Los Angeles, Calif., as exclusive stocking distributor for Southern California. This distributor carries a complete range of Owen digging buckets, from $\frac{3}{8}$ yd. to 1 yd. for instant delivery from stock. Also available are parts for all popular sizes, plus repair facilities for all sizes of Owen buckets.

George E. Gates appointed sales mg

Road Machinery Co., Phoenix, Arizona, announces the advancement of their sales representative, George A. Gates, to the position of sales manager. Gates has been RMC's sales representative for the southern half of Arizona since the firm was established in 1955. Prior to joining this firm, Gates was associated with other equipment firms in the area and is well known among Arizona's contractors.

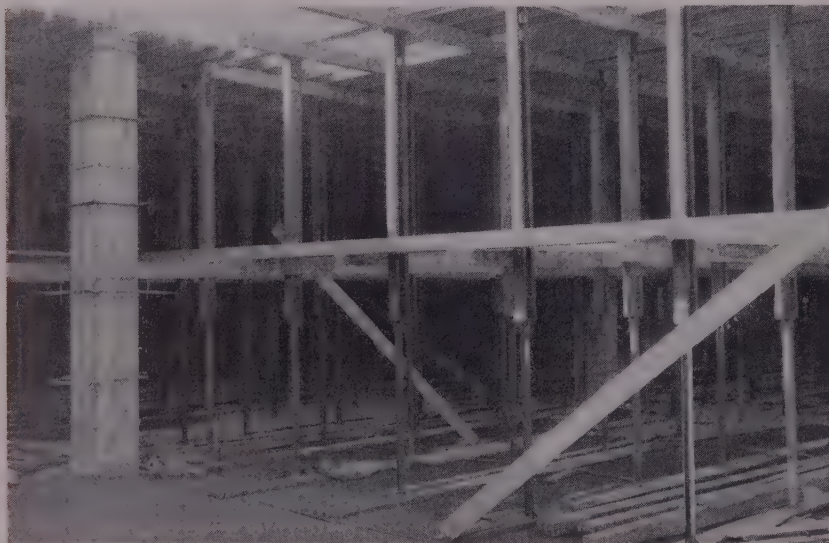
Staff changes at Pacific Tractor

Pacific Tractor & Implement Co., Richmond, Calif., announces personnel changes in its organization. A. D. "Doug" Mercier, advertising and sales promotion manager, has resigned to become an active partner with Lowel Kuckenbecker in the ownership of Kuckenbecker Tractor Co., Madera. Mercier had been associated with Pacific Tractor for 11 yr. Replacing him as advertising and sales promotion manager, is D. E. "Doug" Coggin, former parts and accessories supervisor. M. R. "Mack" Holland succeeds to Coggin's previous position.

Denver firm takes on new account

The Colorado Builders Supply Co., Denver, Colo., through C. E. Berry, manager, announces acquisition of the Trenchliner line manufactured by the Parsons Co.

(Advertisement)



Lighter Weight and Greater Load Capacity of Symons Shores Help Contractor Meet Deadlines

More than 2,000 Symons Safety Shores were used on the addition to the Varian Associates plant, by Howard J. White Construction Company, Palo Alto, California. The shores were used to support the reinforced concrete floor slabs for the second story and remained up for three weeks after pouring to allow sufficient time for the concrete to set and cure permanently.

Symons Safety Shore is a powerful jack working almost as easily as a hydraulic on a steel T iron firmly secured with a built-up wood channel. Although from 10 to 15 lbs. lighter than other shores, Symons Shore has a load capacity up to 6,000 pounds and one man can easily lift 1,500 pounds. The shore head is designed so that tee heads, ell heads and extensions can be installed in a few seconds.

Symons shores, forms and column clamps may be rented with purchase option. FREE literature available upon request. Symons Clamp & Mfg. Company, 634 Williams Street, Dept. E-7, San Leandro, California, Phone: Lockhaven 9-9159.



THREE DAY CONFERENCE on service techniques for blacktop maintenance equipment was held recently one of four plants of Littleford Bros. Inc., in Cincinnati, Ohio. Technical explanations and demonstrations were conducted on the Littleford distributor, Trail-O-Patcher, Heater-Plane, True-Lay paver spreader and Kw Steam generator. Shown here is *Lar A. Bilyeu*, a representative of Feaughy Machinery Co., Portland, Ore., who attended dealer service session.

New SUPERIOR Heavy-Duty SCREED SUPPORTS

Pat. Applied For

For Use with 1 1/4" and 1 1/2" I.D. Pipe Screeds and Vibratory Screeding Equipment

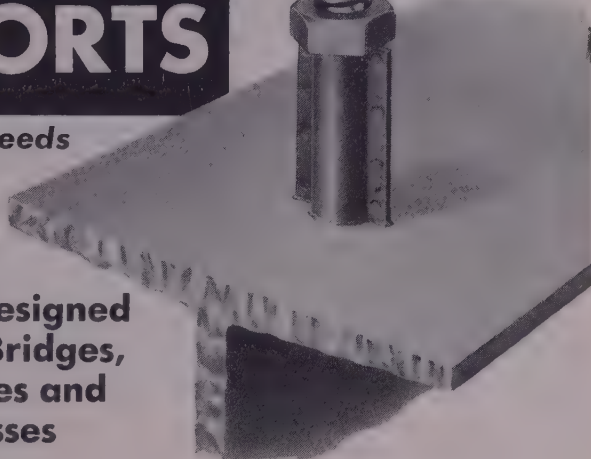
ADJUSTABLE
RE-USABLE



ADJUSTABLE SCREED HOLDER

Consists of a 1" threaded rod to which is welded a cradle to hold the pipe screed. This cradle is slotted as shown so that the arms may be bent over to secure the 1 1/4" or 1 1/2" I.D. pipe screed. Threaded onto the rods is a half nut which provides the adjustment.

Especially Designed for Use on Bridges, Underpasses and Overpasses



These Screed Supports are designed to take the heavy loads imposed by traveling vibrating screeding equipment. The Bases for the screed holders are of two types: (1) The Metal Base for use on structural steel members; (2) the Chair-Type Base for use on a plywood deck.

On Structural Steel: As shown above, the Metal Base is tack-welded to the top flange on approximately four foot centers. The Screed Holder is set into the base, and adjusted to height by turning the nut. The threads are fast, three to the inch, and of a contour type, non-clogging and easily cleaned.

On Wood or Plywood Decks: The Chair Base is set on the deck at approximately four foot centers. It is easily secured to the deck by nailing across the upturned legs. If desired, legs can be supplied of galvanized wire. The Chair Base with holder is shown below.

Adjustable Standard SUPERIOR SCREED CHAIRS

FOR FORMED SLABS 4 1/2" AND GREATER

With re-usable screed holders using 1" I.D. pipe and rectangular bars for screeds.



PERFORMANCE

Superior's Heavy-Duty Adjustable Screed Supports have been used on turn-pike structures and other projects. Results in the field indicate that this method of supporting screeds provides a simple answer to an otherwise expensive and complicated set up. *Write for Bulletin.*

HOLDER INSERTED IN CHAIR BASE

Only the inexpensive bases are left in the concrete. The Adjustable Holders are easily removed, together with the pipe screed, because the holders are set, not screwed into the base. The nut fully covers the base opening and prevents concrete from entering.



FOR SLABS ON FILL

With re-usable screed holders using 1" I.D. pipe and rectangular bars for screeds.



SUPERIOR CONCRETE ACCESSORIES, INC.

9301 King St., Franklin Park, Ill. (A Suburb of Chicago)

New York Office

1775 Broadway, New York 19, N. Y.

Pacific Coast Plant

2100 Williams St., San Leandro, Calif.



1910—Premier Steel Reversible Road Machine



1957-T-700 Grade-O-Matic motor grader

Manufacturer celebrates 50th year

Galion Iron Works reviews 50 years of equipment manufacturing. Emphasis today is on rollers, graders.

In the last five decades highway building has developed into a mighty industry.

A company born at the start of that era was The Galion Iron Works & Mfg. Co., organized in 1907 at Galion, Ohio, by D. C. Boyd. Galion developed a close association with the road construction industry which has continued through the years. Today, Galion is the world's

largest producer of road rollers and one of the leading manufacturers of motor graders, with five plants in the United States and foreign countries. The company celebrated its golden anniversary last January. Galion distributors and other company friends attended the celebration held in Galion's new Sales and Service Training Center, with Ralph E. and C. Findley Boyd, sons of the company's founder, acting as hosts.

Over the years Galion has built horse-drawn scrapers and drags, sprinkling wagons, stone and chip spreaders, screen-

ing plants, rock crushers, unloaders, conveyors, and earth movers—but always the main endeavor was the designing and manufacturing of road rollers and graders. Galion was a pioneer in the development of the steam-driven tandem and three-wheel rollers (and later the gasoline-engine driven roller) as well as pull-type and motor graders. Today, Galion is a company devoted entirely to designing, engineering, and building a complete line of road rollers including twenty-three models or weights from 3 to 20 tons; and eight models or sizes of motor graders ranging in power from 50 to 190 hp.

Typical of Galion's role in the road construction industry, is the recent in-

1,000 Man-hours Saved on Highway Job with GRIPHOIST



When you bid — figure on GRIPHOIST

You too can save. On 12-span bridge job, 8-man gang, using conventional methods, dismantled one set of forms in 14½ hours. Then Super placed three needle beams under forms and installed 6 GRIPHOISTS with cables attached to beams. Six men lowered 45-ton forms in 2½ hours . . . saved 1,000 man-hours.

Write for brochure depicting scores of GRIPHOIST uses

East of Mississippi
Princeton Griphoist 32 GEORGE ST.
 BOSTON 19, MASS.
 West of Mississippi
Griphoist, Inc. 424 BRYANT ST.
 SAN FRANCISCO 7, CALIF.



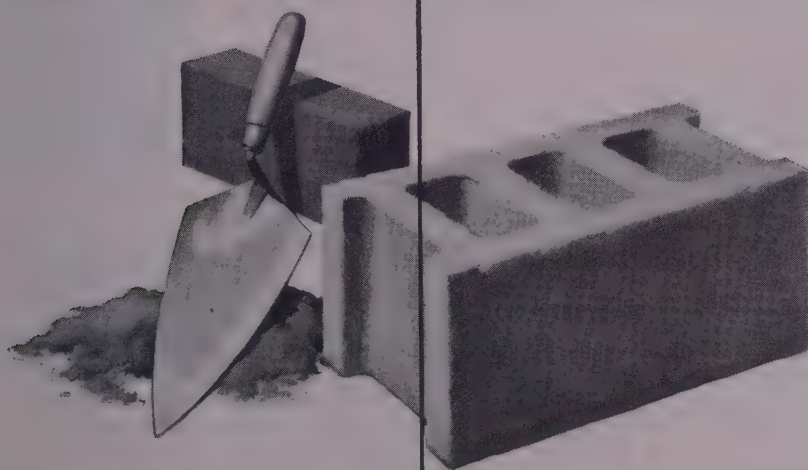
EASY TO DROP 45-TON BRIDGE FORM

Upper—close-up of 3 manually-operated GRIPHOISTS used as lowering device. Lower—start of smooth, simple GRIPHOIST operation that cuts stripping time.

SEAL POROUS WALLS...

MASONRY • BRICK • BLOCK •

STUCCO SURFACES



WATERFOIL KB-55

- Seals porous walls thus minimizing seepage
- Fills rough-textured masonry
- Adds years of life—becomes part of the wall
- Used for interior basements as well as exterior above grade
- 1 gallon covers 100-125 sq. ft.
- Brightens, decorates interiors and exteriors
- Colors: White, Green, Gray, Rose, Buff

Write for folder and quotation

Subsidiary of  Chemical Corporation



A. C. Horn Co., Inc.

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San Francisco, California

BRANCH OFFICES

1318 South Main Street
Los Angeles 15

317 Builders Exchange Bldg.
Portland 4

101 Jones Building
Seattle 1

212 Beason Building
Salt Lake City

965 G. & E. Building
Denver

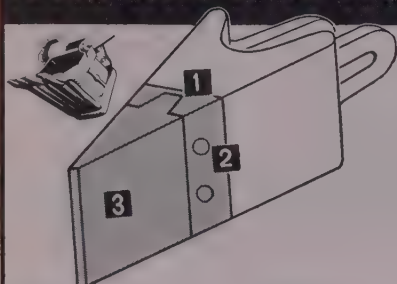
DIVISIONS OF SUN CHEMICAL CORPORATION

ORN (paints, maintenance and construction materials, industrial coatings) • WARWICK (textile and industrial chemicals) • WARWICK WAX (refiners of specialty waxes) • RUTHERFORD (lithographic equipment) • SUN SUPPLY (lithographic supplies) • GENERAL PRINTING INK (Sigmund Ullman • Fuchs & Lang • Eagle • American • Kelly • Chemical Color & Supply Inks) • MORRILL (news inks) • ELECTRO-TECHNICAL PRODUCTS (coatings and plastics) • PIGMENTS DIVISION (pigments for paints, plastics, printing inks of all kinds) • OVERSEAS DIVISION (export) • A. C. HORN COMPANY, LIMITED (Canada) • FUCHS & LANG de MEXICO, S. A. de C. V. • GENERAL PRINTING INK CORPORATION OF CANADA, LIMITED.

NEW!

Bulldog Replaceable Digger Teeth

**CUT INVENTORY
AND REPLACEMENT
TOOTH COSTS UP TO 65%**



Revolutionary Design Has Just 3 Parts

1. Universal Weld-On Adapter uses old tooth as a base. Saves the cost of conventional adapter or new tooth. Same adapter fits on several different types of equipment. Easily welded on worn teeth.



2. Positive Lock Pins that give a tight fit to the replaceable tooth and are easily removed for replacement.



3. Easy Change Replaceable Tooth*, changed with a hammer and punch. Has reversible bevel point. Made of highest quality alloy steel—heat treated to outwear all other teeth. Field tested in taconite mines under toughest abrasive conditions, Bulldog Teeth have consistently shown cost savings up to 65%.



**YOU NEED ONLY A FEW ADAPTER
SIZES TO FIT ALL POPULAR MAKES OF**

Shovel Dippers	Dragline Buckets
Back Hoe Buckets	Clamshell Buckets
Loader Buckets	

For descriptive folder, technical data, prices,
and name of your nearest dealer—

*pat. pending

Write Dept. WE-5

Sales Representative and Distributor
Inquiries Invited

ALLIED

STEEL & TRACTOR PRODUCTS, INC.

7835 Broadway Cleveland 5, O.

ALLIED

roduction of its Grade-O-Matic grader and Roll-O-Matic roller lines. The increased work production, easier operation, higher quality work, and economies said to result from the use of this equipment, could not come at a more opportune time. These machines should be in great demand on the tremendous national road building program just getting under way.

Heading the Galion Grade-O-Matic line is the model T-700, reported to be the world's largest and most productive motor grader. This 190-hp. machine weighs more than 20 tons and is designed for super jobs. A product of Galion's engineering and manufacturing skills, this grader features a torque converter, power-shift transmission with tail-shaft governor, hydraulic controls, manual steering with hydraulic booster, and balanced weight to horsepower.

A torque converter drive with tail-shaft governor also features the Galion Roll-O-Matic line of rollers, which includes both tandem and three-wheel models. The 14-20-ton three-axle tandem heads the Roll-O-Matic line. Galion recently doubled the roller manufacturing and assembling capacity of its Bucyrus, Ohio, plant (11 mi. from the Galion plant) by the purchase of adjoining property. This expansion comprises 7 ac. and buildings which provide 200,000 sq. ft. of additional floor space. The entire roller production is now centered in the Bucyrus plants. This move released much needed space in the



1923—Fordson 5-ton, 3-wheel roller



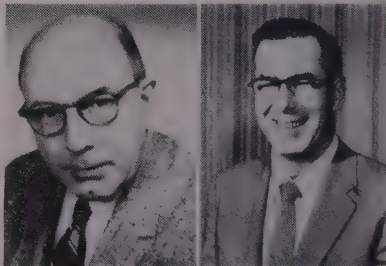
1957—Roll-O-Matic 14-ton roller

Galion, Ohio, plant for equipment so necessary in the large-scale production of motor graders.

Galion's 289 distributors are strategically located in the United States, Canada, and foreign countries. Galion and their distributors are looking forward to another half century of close association with the road building industry.

Jay sales appointments

The Jay Company, Columbus, Ohio, announces appointment of T. T. Mosier as general sales manager in charge of domestic and foreign territories. He is



Mosier

Stentz

widely recognized in sales executive circles for his development and promotional achievements. Appointed assistant general sales manager is Paul O. Stentz, former field representative.



PIPE PILES

Foster offers the fastest service on all types of pipe for foundation piling—Spiralweld, Electricweld, Seamless and Lapweld—in all diameters and wall thicknesses.

Depend on "on-time" delivery of all material required for even the biggest jobs from L. B. Foster Co. Write for catalogs.

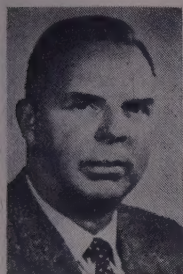
STEEL-SHEET PILING • H-BEARING PILES
LIGHTWEIGHT PILING • STEEL PIPE
RAILS • ALUMINUM PIPE • BRIDGE RAILING

L. B. FOSTER co.

3460 Wilshire Blvd., Los Angeles 5, Cal.
PITTSBURGH • NEW YORK • ATLANTA
CHICAGO • HOUSTON • LOS ANGELES

CIMA elects new officers

The Construction Industry Manufacturers Association at their annual meeting elected Clarence E. Killebrew, president. Killebrew is vice president of Clark Equipment Co. at Benton Harbor and Buchanan, Mich.



Clarence E.
Killebrew

In CIMA he succeeds Kenneth Lindsay of the Iowa Manufacturing Co., Cedar Rapids, Iowa, who completed his second term of office after organizing the tremendous 1957 Road Show. Other officers of the association are: First vice president, Boyd S. Oberlink, vice president, Tractor Group, Allis-Chalmers Manufacturing Co.; Second vice president, Henry Barnhart, vice president, Baldwin-Lima-Hamilton Corp.; Treasurer, P. H. Birkhead, vice president, Bucyrus-Erie Co.

New directors elected to serve with the incumbents for a three-year term are: P. H. Birkhead of Bucyrus-Erie

Co.; C. R. Boll of Cummins Engine Co., Inc.; James Drain of Joy Manufacturing Co.; G. A. Gilbertson of The Frank G. Hough Co.; D. W. Lehti of Link-Belt Speeder Corp.; Ray McLean of The Jaeger Machine Co., and Carl R. Rolf of Pioneer Engineering Works, Inc.

Wm. Kays transfers to Denver

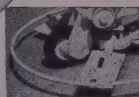
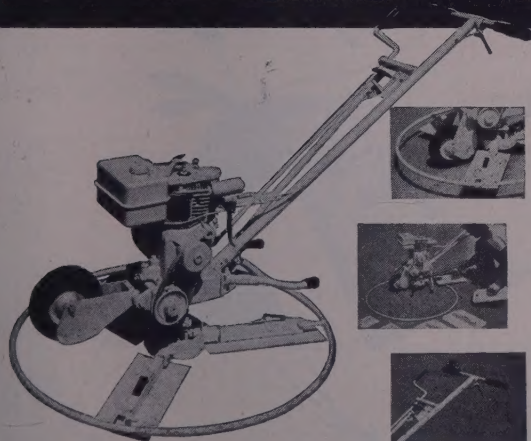
J. A. Fitzenz, sales manager for Austin-Western Works, Construction Equipment Division, Baldwin Lima-Hamilton Corp., announces appointment of William R. Kays as manager of Austin-Western's District 12 which includes New Mexico, Colorado and part of Texas. Kays is directing distributor relations, as well as all sales activities for the entire Austin-Western line of graders, rollers, hydraulic cranes, etc. He is headquartered at Denver, Colo.

Ryerson reinforcing appointments

Announcement of the appointment of Joseph C. Guptill as assistant national product manager for the reinforcing products division of Joseph T. Ryerson & Son, Inc., steel distributor, was recently made by Thomas Z. Hayward, vice president in charge of sales. He will headquarter in the company's general offices in Chicago. Charles E. Nunes is appointed manager of the reinforcing products department at the San Francisco plant. He succeeds Guptill in this post.

INTERCHANGEABLE BLADES ON THE

White TROWELER



Retractable wheel, up to trowel, down to move.



Remove blades and ring in seconds... for cleaning, changing blades, or moving through doorways.

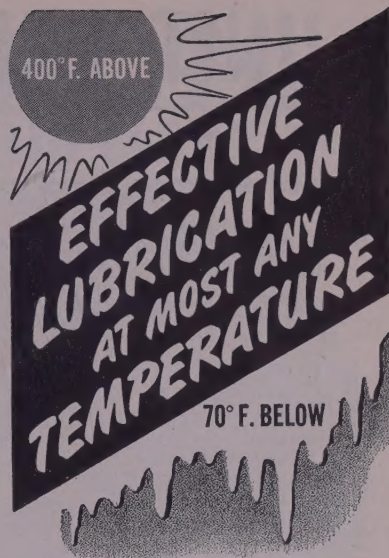


Adjust blade pitch during rotation from handle. Safety throttle control stops rotation if operator lets go handle.

PORTABILITY, patented, exclusive! **PERFORMANCE**, unbeatable!
PRICE, comparable to trowelers *without* these features! Model T-1,
36" diameter, Patent No. 2,621,568.

White MANUFACTURING COMPANY

Elkhart 15, Indiana (Write for folder on all models.)



The fact that LUBRIPLATE Lubricants are able to meet extreme temperature conditions demonstrates the ability of these products to cope with the wide variations found in everyday industry. Besides this feature, LUBRIPLATE Lubricants possess attributes not found in conventional lubricants.

HIGH TEMPERATURES

LUBRIPLATE No. 930-AA.—Provides superior and protective lubrication for all types and sizes of machines operating at temperatures as high as 500°F. Possesses exceptionally high film strength and adhesiveness. Protects all metallic parts against rust and corrosion.

LOW TEMPERATURES

LOW-TEMP LUBRIPLATE—The outstanding multi-purpose grease type lubricant that will remain plastic at 70°F below Zero, yet has a Melting Point of 270°F. Resists water and acids—protects against rust and corrosion even from calcium chloride used on paved roads during winter months.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE



LUBRIPLATE DIVISION, Fiske Brothers Refining Co.
Newark 5, N. J. or Toledo 5, Ohio

DISTRIBUTED BY

Garlinghouse Brothers, Los Angeles, Calif.; Degen-Fiege Co., Los Angeles, Calif.; Hudson Equipment Co., San Diego, Calif.; Miller & Stern Supply Co., San Francisco, Calif.; Hendrie & Bolthoff Co., Denver, Colo.; Sawtooth Company, Boise, Ida.; Paul Roberts Co., Pocatello, Idaho; George Myrmo & Sons, Eugene, Oregon; Flury Supply, Roseburg, Oregon; Moty & Van Dyke, Inc., Klamath Falls, Ore.; Goodyear Rubber & Asbestos Co., Portland, Ore.; Industrial Supply Co., Billings, Mont.; Utah Bit & Steel Service Co., Midvale, Utah; Western Sales Engineering Co., Salt Lake City, Utah; Campbell Industrial Supply Co., Seattle, Wash.; Nott-Atwater Company, Spokane, Wash.; Campbell Industrial Supply Co., Tacoma, Wash.; Dodge-Yakima Supply Co., Yakima, Wash.; Yukon Equipment Co., Seattle, Wash.; Fleck Brothers, Ltd., Vancouver, B. C., Canada; Wilkinson & McClaen, Ltd., Calgary, Alberta, Canada.

LUBRIPLATE

THE MODERN LUBRICANT

UNIT PRICES

Selected abstracts for Western projects

HIGHWAY—Grading and base surfacing in Wyoming

Wyoming—Lincoln County—Bureau of Public Roads. Eagle Construction Co. received a \$678,449 contract for 4.031 mi. of grading and base surfacing in Targhee National Forest, Wyo.

(1) Eagle Construction Co.	\$678,449
(2) Pickett & Nelson	695,403
Peter Kiewit Sons' Co.	723,526
Kiely Construction Co.	728,401

	(1)	(2)
29 ac.	Clearing and grubbing.....	\$ 800.00 \$600.00
3,000 cu. yd.	Stripping and storing topsoil.....	.50 .25
420,000 cu. yd.	Unclassified excavation.....	.81 .84
4,100 cu. yd.	Unclassified excavation for structures.....	4.50 6.00
17,000 cu. yd.	Unclass. excav. for borrow, Case 1.....	.40 .40
1,600,000 sta. yd.	Overhaul.....	.02 .02
40,000 cu. yd.	Overhaul.....	.25 .40
2,000 cu. yd.	Replacing topsoil.....	.60 1.00
Cont. sum	Obliteration of old roadways.....	1,400.00 1,400.00
3,300 unit	Watering of embankment.....	1.00 1.25
450 unit	Watering of base course.....	2.00 1.50
Lump sum	Prov. and maint. water plant cr plants.....	4,500.00 1,000.00
1,700 hr.	Rolling of embankment.....	6.00 10.00
150 hr.	Rolling of base course.....	10.00 9.00
21,000 ton	Subbase material.....	1.00 1.35
15,400 ton	Crushed gravel or crushed stone base course Class 2, Grading D-1.....	1.50 1.50
81,200 sq. yd.	Processing bituminous base.....	.10 .06
85,000 gal.	M.C. cutback asph., Grade 0, 1, 2, or 3.....	.19 .18
10,000 gal.	R.C. cutback asphalt, Grade 1 or 2.....	.20 .18
425 cu. yd.	Conc. Class "A" (air-entrained conc., low-alkali cement).....	79.00 77.50
43,700 lb.	Reinforcing steel.....	.17 .15
2,798 lin. ft.	24 in. CGSM culvert pipe.....	6.50 6.50
200 lin. ft.	24 in. perf. CGSM culvert pipe.....	8.00 10.00
300 lin. ft.	36 in. CGSM culvert pipe.....	16.50 12.00
196 lin. ft.	48 in. CGSM culvert pipe.....	21.00 15.00
300 cu. yd.	Hand-laid rock embankment.....	25.00 10.00
4,600 sq. ft.	Metal cribbing, Design "A".....	7.50 7.50

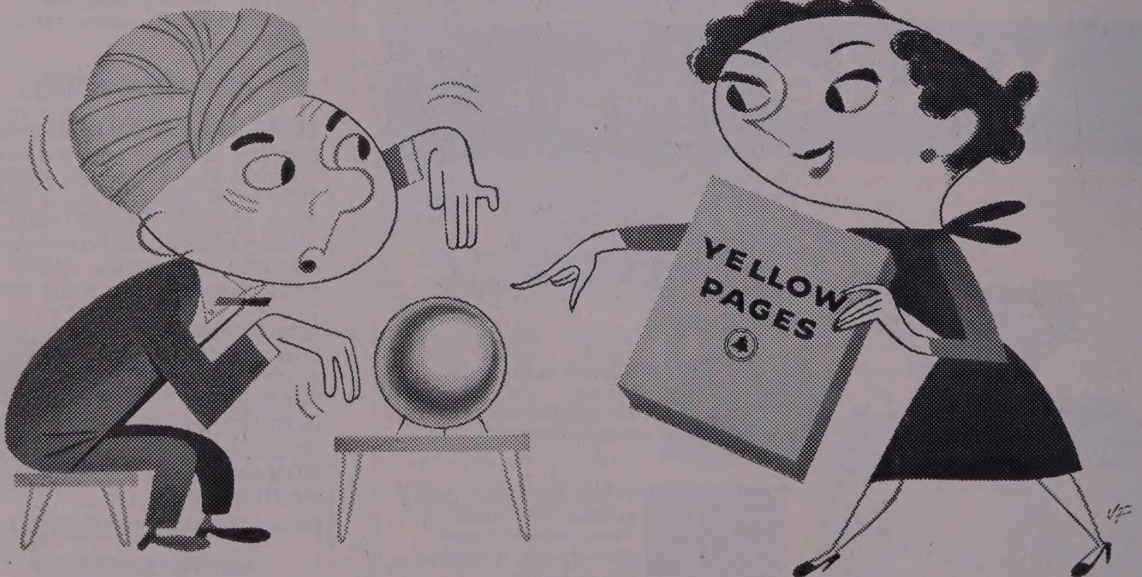
320 sq. ft.	Metal cribbing, Design "B".....	8.00 8.00
380 sq. ft.	Metal cribbing, Design "C".....	8.75 8.60
860 sq. ft.	Metal cribbing, Design "D".....	10.25 9.40
3,000 lin. ft.	6 in. perf. CGSMP underdrain.....	5.00 4.50
23 ea.	Concrete maintenance marker posts.....	12.50 15.00
200 ea.	Timber guide posts with reflector strips (treated), Type 2.....	6.00 11.00
1,850 lin. ft.	Deep beam highway guard.....	4.00 4.50

BRIDGE—Concrete bridge in Washington

Washington—King County—State. A \$396,847 contract was awarded Anderson Bridge Construction Co. for construction of a concrete bridge.

(1) Anderson Bridge Construction Co.	\$396,847
(2) Donald M. Drake Co.	400,212
Kuney-Johnson Co.	402,141
N. Fiorito Co.	404,764

	(1)	(2)
1,500 cu. yd.	Common excavation incl. haul.....	\$ 1.50 \$ 1.10
400 ton	Selected roadway borrow.....	2.50 2.20
110 cu. yd.	Furn. & plac. cr. stone surf. top course.....	5.00 5.70
3,720 cu. yd.	Structure excavation.....	5.00 4.00
234 hr.	Mechanical tamper.....	8.00 7.00
2,255 cu. yd.	Concrete Class "A".....	67.00 76.00
1,058 cu. yd.	Concrete Class "B".....	67.00 47.00
234 lin. ft.	Reinforced concrete bridge railing.....	8.00 13.00
790 lin. ft.	Standard bridge railing Type No. 1.....	10.00 8.20
834,000 lb.	Steel reinforcing bars.....	.13 .14
Lump sum	Structural carbon steel.....	9,000.00 8,200.00
5 ea.	Bridge drains.....	75.00 70.00
174 lin. ft.	Downspouts.....	8.00 5.50
3,120 lin. ft.	Furnishing concrete piling.....	4.50 5.00
72 ea.	Driving concrete piles first 10 ft.....	70.00 75.00
1,860 lin.-ft.	Driving concrete piles over 10 ft.....	.25 .40
2 ea.	Furnishing & driving concrete test piles.....	800.00 700.00
est.	Flagging.....	500.00 500.00



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CANAL—Work on Howard Prairie Delivery Canal and Soda Creek Feeder Canal in Oregon

Oregon—Rogue River Basin Project—Bureau of Reclamation. A \$1,717,528 contract was awarded Chert-Sandkay-Birch for earthwork, concrete canal lining and structures of the Howard Prairie Delivery Canal and Soda Creek Feeder Canal. Unit prices are as follows.

(1)	Chert-Sandkay-Birch.....	\$1,717,528
(2)	Vinson Construction Co.....	2,443,873
	John Delphia.....	2,479,718
	(1)	(2)
62	ac. Clearing and grubbing.....	\$2,300.00
84,600	cu. yd. Excavation, common, for canal.....	\$3,628.00
98,000	cu. yd. Excavation, rock, for canal.....	.90
1,070	cu. yd. Excavation, common, for structures.....	3.50
2,400	cu. yd. Excavation, rock, for structures.....	2.40
800	cu. yd. Excav. com. & b'kfill of siph. pipe trench.....	4.85
7,300	cu. yd. Excav. rock, & b'kfill of siph. pipe trench.....	4.15
23,400	cu. yd. Compacting embankments.....	6.25
1,075	cu. yd. Backfill about structures.....	.60
1,270	cu. yd. Compacting backfill about structures.....	3.00
6,830	cu. yd. Riprap.....	2.03
524	cu. yd. Sand and gravel bedding for riprap.....	4.40
41,000	sq. yd. Trim. earth found, for concrete lining.....	4.80
37,000	sq. yd. Prep. rock found, for concrete lining.....	9.00
1,000	lin. ft. Furnishing and laying 6 in. diameter pipe underdrains for canal.....	.55
280	lin. ft. Furnishing and laying 6 in. diameter pipe outlet drains for canal.....	1.95
970	lin. ft. Furnishing and laying 8 in. diameter pipe outlet drains for canal.....	10.00
200	lin. ft. Furnishing and laying 8 in. diameter pipe for drain for diversion dam.....	4.84
420	cu. yd. Concrete in structures.....	1.75
5,860	cu. yd. Conc. in lin. of trapezoidal sect. of canal.....	2.40
2,280	cu. yd. Concrete in lining of rectangular and cut and cover sections of canal.....	29.50
12,800	bbbl. Furnishing and handling cement.....	170.00
307,000	lb. Furn. and placing reinforcement bars.....	41.75
4,450	sq. ft. Furn. & plac. 1/2 in. elas. fill. mat. in joints.....	154.00
6,180	lin. ft. Furnishing and placing Type "H" rubber waterstops in joints.....	44.23
3.7	mbm. Furn. & erect. untr. timb. in structures.....	95.50
0.6	mbm. Furn. & erect. tr. timb. in structures.....	156.00
64	lin. ft. Furn. & lay. 24 in. dia. noncylinder conc. pipe with Type "R" joints.....	7.50
21	lin. ft. Furn. & lay. 30 in. dia. extra-strth. conc. culvert pipe.....	7.80
2,763	lin. ft. Furn. & lay. 48 in. dia. conc. pipe for siph. slide gates.....	.24
2	gates Furn. & installing 24 in. dia. cast-iron slide gates.....	.25
1	gate Furn. & install. 42 in. by 30 in. cast-iron slide gate.....	2.30
1,350	lb. Furn. & install. misc. metalwork.....	3.51
		1.90
		380.00
		380.00
		22.00
		26.00
		68.00
		210.00
		575.00
		.70

BRIDGE—Prestressed concrete bridge and approaches

California—Los Angeles County—State. Tomei Construction Co. received a \$226,754 contract for construction of a precast, prestressed concrete girder bridge and frontage roads and approaches to be graded and surfaced with plant-mixed surfacing on untreated base.

(1)	Tomei Construction Co.....	\$226,754
(2)	J. E. Haddock Ltd.....	237,852
	George W. Peterson.....	246,611
	Charles MacClosky Co.....	247,502
	(1)	(2)
110	cu. yd. Removing concrete.....	\$ 4.00
Lump sum	Clearing and grubbing.....	6,000.00
Lump sum	Dev. water supply and furn. wat. equip.....	10,000.00
2,700	M gal. Applying water.....	4,000.00
7,900	sq. yd. Compacting original ground.....	1.25
4,100	cu. yd. Roadway excavation.....	.80
825	cu. yd. Struct. excavation.....	.05
515	cu. yd. Struct. backfill.....	.65
40	cu. yd. Ditch and channel excavation.....	2.50
27,000	cu. yd. Imported borrow.....	2.50
1,050	cu. yd. Imported subbase material.....	1.00
6	ton Straw (erosion control).....	1.00
200	lb. Seed (erosion control).....	.35
5,600	ton Untreated base.....	1.00
5	ton Asphaltic emul. (pt. bdr. & fog seal coat).....	2.50
16	ton Liquid asphalt, SC-2 (prime coat).....	45.00
120	ton Paving asphalt (P.M.S.).....	60.00
2,250	ton Mineral aggregate (P.M.S.).....	30.00
2,050	lin. ft. Placing P.M.S. dikes.....	6.00
9	cu. yd. Class "A" concrete (structures).....	5.25
Cont. sum	Class "A" conc. (bridge) (645 cu. yd.).....	.70
5 ea.	Furn. pre. prest. conc. gir. (Type "A").....	75.00
10 ea.	Furn. pre. prest. conc. gir. (Type "B").....	100.00
5 ea.	Furn. pre. prest. conc. gir. (Type "C").....	38,700.00
20 ea.	Erect. precast prestressed conc. girders.....	1,500.00
50	lin. ft. Rubber waterstops.....	3,000.00
800	lb. Bar reinforcing steel.....	2,500.00
Cont. sum	Bar reinforcing steel (bridge) (93,000 lb.).....	100.00
14,000	lb. Miscellaneous iron and steel.....	2.50
230	cu. yd. Class "B" concrete (curbs and gutters).....	.17
80	ea. Curb dowels.....	.15
350	lin. ft. Metal plate guard railing.....	13,000.00
646	lin. ft. Steel railing.....	.35
400	lin. ft. 72 in. chain link fence.....	1.00
1,310	lin. ft. Rem. & reconstruct. 72 in. chain link fen.....	4.00
200	lin. ft. 18 in. R.C.P. (std. str.).....	9.00
230	lin. ft. 24 in. R.C.P. (std. str.).....	2.08
Lump sum	Finishing roadway.....	1.05
88	lin. ft. 4 in. asbestos-cement pipe.....	5.00
	Highway lighting & illum. sign system.....	7.00
		2,000.00
		3.00
		16,300.00

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HIGHWAY—Construction of 2.9 mi. of highway in Washington

Washington—Pacific County—State. Erland & Bickie was successful low bidder at \$1,199,762 for construction of 2.857 mi. of highway requiring extensive excavation work.

(1) Erland & Bickie	\$1,199,762
(2) Stoen Construction Co.	1,302,366
Osberg Construction Co.	1,382,979
Erickson Paving Co.	1,410,747

	(1)	(2)
39 ac. Clearing	\$ 600.00	\$1,200.00
20 ac. Grubbing	1,000.00	800.00
295,400 cu. yd. Unclass. excavation incl. haul of 600 ft.	1.55	1.55
123,200 cu. yd. Common excav. incl. haul of 600 ft.	1.45	1.75
179,000 cu. yd. Solid rock excav. incl. haul of 600 ft.	1.70	1.55
170 cu. yd. Com. trench excav. incl. haul of 600 ft.	3.00	10.00
68,300 cu. yd. Unclass. borrow incl. haul of 600 ft.	1.00	1.15
3,300 cu. yd. Excav. of unsuitable found. mat. incl. haul of 600 ft.	1.60	2.00
108,950 unit Overhaul	.50	.50
103,000 cu. yd. Embankment compaction method B.	.04	.15
115,000 cu. yd. Rock embankment compaction	.04	.10
1,400 cu. yd. Structure excavation	4.00	5.00
100 hr. Smooth wheeled power roller	9.00	10.00
100 hr. Pneumatic tired roller	8.00	10.00
584 hr. Mechanical tamper	6.00	8.00
85 day Furn. & operating heavy duty roofer	72.00	150.00
85 day Furn. & operat. heavy duty power grader & scarifier	56.00	100.00
7,250 lin. ft. Slope treatment Class "B"	.20	.20
162 sta. Finishing roadway	20.00	20.00
1,200 M gal. Water	2.50	3.00
290 cu. yd. Gravel backfill for foundations	7.50	6.00
960 cu. yd. Gravel backfill for drains	8.50	6.00
4,740 ton Furn. & placing cr. stone surf. top course	4.00	4.00
10,860 ton Furnishing & placing ballast	3.60	4.00

TYPE 1-1 ASPHALTIC CONCRETE PAVEMENT

1,540 ton Class "B"	15.00	15.00
7 ton Asphalt cement for tack coat	130.00	75.00
11,675 sq. yd. Preparation of untreated roadway	.15	.10
140 cu. yd. New fine mineral aggregate	10.00	10.00
13 ton Asphalt cement M-C-3 prime coat	76.00	75.00
20 ton Furnishing mineral filler	30.00	50.00

OTHER ITEMS

1,660 lin. ft. Cement concrete curb	1.70	2.75
3 cu. yd. Concrete Class "C"	100.00	150.00
180 lin. ft. Concrete or V.C. drain pipe 4 in. diam.	.80	1.50
550 lin. ft. Concrete or V.C. drain pipe 8 in. diam.	1.20	2.00
1,570 lin. ft. Concrete or V.C. drain pipe 10 in. diam.	1.50	2.25
600 lin. ft. Std. reinf. conc. culvert pipe 12 in. dia.	3.70	3.00
213 lin. ft. Std. reinf. conc. culvert pipe 24 in. dia.	8.00	8.00
111 lin. ft. Std. reinf. conc. culvert pipe 36 in. dia.	13.00	15.00
90 lin. ft. Std. reinf. conc. culvert pipe 48 in. dia.	18.00	25.00
100 lin. ft. Asbestos-bonded corr. metal pipe 24 in. dia. #14 gauge	9.00	15.00
197 lin. ft. Asbestos-bonded corr. metal pipe 36 in. dia. #12 gauge	18.00	30.00
272 lin. ft. Asbestos-bonded corr. metal pipe 60 in. dia. #10 gauge	38.00	54.00
670 lin. ft. Asbestos-bonded corr. metal pipe 72 in. dia. #10 gauge	48.00	66.00
550 lin. ft. Galv. iron water pipe ¾ in. diameter	1.00	1.50
650 lin. ft. Galv. iron water pipe 1½ in. diameter	1.50	2.50
90 lin. ft. Galv. iron water pipe 2 in. diameter	2.00	2.90
360 lin. ft. Galv. iron water pipe 3 in. diameter	2.00	3.10
80 lin. ft. Relay. galv. iron water pipe ¾ in. dia.	1.00	1.00
800 lin. ft. Relay. galv. iron water pipe 1½ in. dia.	1.50	1.50
40 lin. ft. Relay. galv. iron water pipe 2 in. dia.	1.50	2.00
2 ea. Monument cases & covers	75.00	100.00
1,200 lin. ft. Standard beam guard rail	3.00	4.00
2 ea. Double 20 ft. chain link gates	325.00	500.00
68 ea. Reinforced concrete roadway markers	11.00	10.00
2,550 sq. yd. Removing bituminous pavement	.60	.50
Lump sum Removing portions of timber docks (4)	2,800.00	4,000.00
est. Flagging	1,500.00	1,500.00

HIGHWAY—Road construction in Arizona

Arizona—Coconino County—Bureau of Public Roads. A low bid of \$112,478 was submitted by Tom Mulcaire for construction of 2.8 mi. of highway in Coconino National Forest.

(1) Tom Mulcaire	\$112,478
(2) Fisher Contracting Co.	120,355
Peter Kiewit Sons' Co.	129,748
M. R. Mafziger	142,015

	(1)	(2)
26 ac. Clearing and grubbing	\$ 600.00	\$600.00
72,000 cu. yd. Unclassified excavation (other than roadway gutters below subgrade elevation)	.63	.68
300 cu. yd. Unclassified excavation (roadway gutters below subgrade elevation)	3.00	1.70
340 cu. yd. Unclassified excavation for structures	3.50	4.20
2,160 cu. yd. Unclass. excav. for borrow, Case 1	.70	.80
1,330 cu. yd. mi. Special overhaul of borrow and unclassified excavation (1,500 feet free haul)	.04	.30
6,200 lin. ft. Furrow ditches	.20	.10
Cont. sum Obliteration of old roadways	500.00	500.00
520 M gal. Watering of surface course	2.60	6.00
Lump sum Crushed gravel or crushed stone surface course, Class 1, Grading E.	1,352.00	600.00
540 cu. yd. Pit stripping	1.91	2.02
34 lin. ft. 8 in. C.G.S.M. culv. pipe (asph. dipped)	1.00	.35
362 lin. ft. 18 in. C.G.S.M. culvert pipe	3.75	4.00
402 lin. ft. 24 in. C.G.S.M. culvert pipe	4.90	6.00
220 lin. ft. Removing, cleaning and stockpiling or relaying salvaged culvert pipe	7.00	9.50
1 ea. Embankment spillway inlet assembly (Type A, for 8 in. pipe) (asph. dipped)	3.50	5.30
	42.00	80.00

TUNNEL—Construction of Clear Creek tunnel, Trinity River Project

California—Trinity County—Bureau of Reclamation. A \$36,644,556 contract was awarded a syndicate of five California firms for construction of Clear Creek Tunnel, Trinity River Project. Making up the joint venture are The Shea Co., Henry J. Kaiser Co., Morrison-Knudsen Co., Inc., Macco Corp. and Raymond Concrete Pile Co. The following are selected abstracts of bid prices.

(1) The Shea Co.	\$36,644,556
Henry J. Kaiser Co.	
Morrison-Knudsen Co.	
Macco Corp.	
Raymond Concrete Pile Co.	

(2) T. E. Connolly, Inc.	\$37,882,385
Connolly Pacific Co.	
Grafe-Callahan Construction Co.	
Floyd Shofner	

Coker Construction Co.	\$41,517,180
Peter Kiewit Sons' Co.	
L. E. Dixon Co., Inc.	
The Arundel Corp.	
Condon-Cunningham Inc.	
Kemper Construction Co.	

	(1)	(2)
20,000 cu. yd. Open-cut excav. at intake	\$ 4.00	\$31.60
35,000 cu. yd. Open-cut excav. at outlet	2.00	31.60
80,000 cu. yd. Excav. for surge tank basin	1.89	31.60
50,000 cu. yd. Placing surge tank basin fill	1.62	2.00
40,000 cu. yd. Comp. surge tank basin fill	1.05	2.00
1,700 cu. yd. Compacted cushion under surge tank basin lining	2.84	10.00
4,000 cu. yd. Backfill about structures	1.73	1.00
150 cu. yd. Comp. backfill about struct.	7.70	6.00
200 cu. yd. Riprap	15.20	5.00
100 cu. yd. Pit-run grav. bedding for riprap	7.00	5.00
100 cu. yd. Crushed-rock surfacing	5.59	5.00
15,000 cu. yd. Excavation for surge tank	35.65	50.40
675,000 cu. yd. Excavation in tunnel	29.55	30.32
3,500 cu. yd. Excav. for tunnel enlargement	42.40	20.00
6,000 lin. ft. Drilling feeler or pilot holes ahead of tunnel excavation	7.35	4.00
8,000,000 lb. Furn. and install. permanent steel tunnel supports	.48	.30
1,300 Mbm. Furn. and erect. permanent tim. in tunnel	615.75	450.00
12,000 lin. ft. Furn. and install. tunnel roof support bolts	2.20	3.00
3,000 cu. yd. Concrete in structure	118.00	85.00
166,000 cu. yd. Concrete in tunnel lining	33.89	22.00
2,000 cu. yd. Concrete in liner plate section	39.05	60.00
4,000 cu. yd. Concrete in surge tank	60.00	80.00
750 cu. yd. Conc. in surge tank basin lining	67.00	40.00
6,000 sq. yd. Trim. found. for concrete lining in surge tank basin	1.33	10.00
263,000 bbl. Furn. and handling cement	5.20	5.50
2,500,000 lb. Furn. and pl. reinforcement bars	.18	.16
7,000,000 lb. Furn. and placing hoop reinf. bars in tunnel reaches	.18	.20
5,000,000 lb. Furn. and placing hoop reinf. bars in tunnel reaches	.18	.115
12,000 lin. ft. Drill. grout holes in tunnel rock	5.80	10.00
1,800 lb. Furn. and placing pipe and fitt. for grouting of tunnel rock	.60	2.00
12,000 cu. ft. Pressure grouting of tunnel rock	3.50	5.00
1,200 grout holes Hook-up tunnel-rock and shaft-rock grout holes	11.50	20.00
400 sq. ft. Furn. and placing ½ in. elastic filler material in joints	1.60	2.00
65 sq. ft. Furn. and placing 1 in. elastic filler material in joints	2.40	3.00
420 lin. ft. Furn. and placing 9 in. Type "A" rubber waterstop	5.80	8.00
4,600 lin. ft. Placing 6 in. Type "B" rubber waterstop	1.80	8.00
600 lin. ft. Furn. mat. and constr. gravel drain with 6 in. sewer pipe, with uncemented joints	4.35	12.00
2,400 lin. ft. Furn. mat. and constr. sand and grav. dr. without sewer pipe	2.90	10.00
150 lin. ft. Furn. and lay. 8 in. sewer pipe with cemented joints	4.40	15.00
Lump sum Furn. and install. tunnel liner	332,979.00	450,000.00
Lump sum Furn. and install. one motor-driven pumping unit	730.00	1,200.00
36,000 lb. Installing fish screens	5,300.00	20,000.00
8,000 lb. Installing fish screen guides and crane rail	.16	.30
5,000 lb. Installing embedded metalwork and anchor bolts	.18	.50
4,500 lb. Installing nonembedded metalwork	.16	.40
Lump sum Furnishing and install. handrail	.70	1.00
Lump sum Furnishing and installing drains	3,300.00	5,000.00
Lump sum Install. fish screen gantry crane	2,200.00	5,000.00
950 lin. ft. Furn. and erect. chain-link fence	11.20	15.00
Lump sum Installing slide gates, lifts, control cabinets, and anchor bolts	7,290.00	10,000.00
Lump sum Furn. and install. metal pipe, fittings, valves and hose	1,450.00	300.00
400 lin. ft. Furn. and install. elec. metal conduit ¾ in. and less in dia.	2.20	3.00
100 lin. ft. Furn. and install. elec. metal conduit 1 and ½ in. in dia.	7.10	4.00
30 lin. ft. Furn. and install. elec. metal conduit having a prot. coating 1 and ½ in. in dia.	7.40	6.00
400 lb. Furn. and install. insul. elec. conductors and ground. sys.	4.03	4.00
80 lb. Furnishing and installing electrical apparatus	24.00	5.00
5 fixtures Furn. and install. light fixtures	36.00	100.00