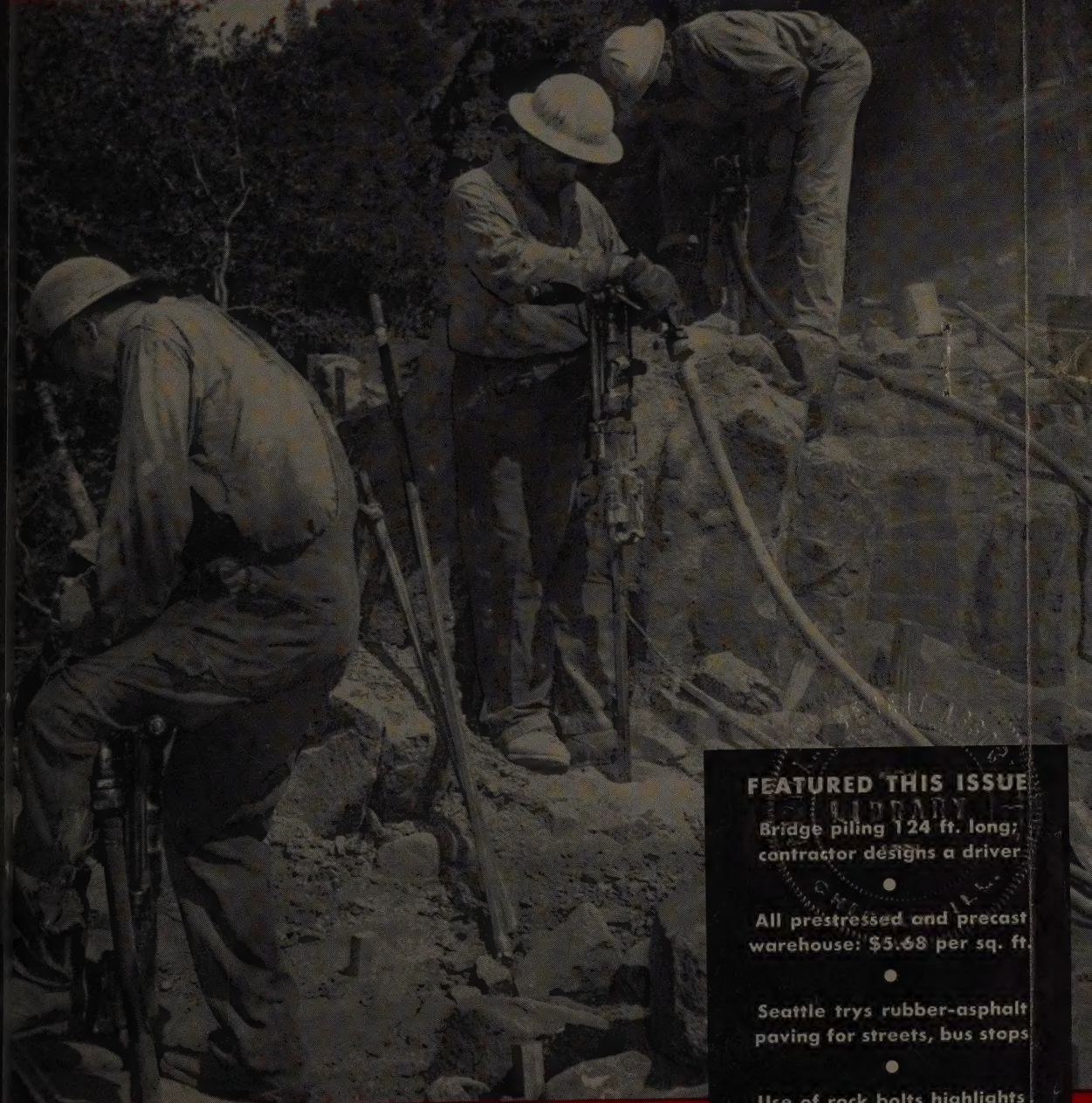


WESTERN CONSTRUCTION

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FEATURED THIS ISSUE

Bridge piling 124 ft. long;
contractor designs a driver

All prestressed and precast
warehouse: \$5.68 per sq. ft.

Seattle tries rubber-asphalt
paving for streets, bus stops

Use of rock bolts highlights
fault treatment at Folsom Dam

Cover Picture . . . See Page

SEPTEMBER 1953

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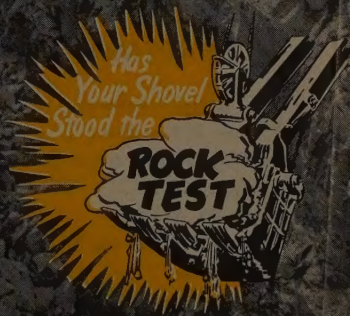
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WESTERN

CONSTRUCTION

Volume 28

SEPTEMBER 1953

Number 9

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FRONT COVER

HYDRAULIC TUNNEL construction isn't all underground. These men are 127 ft. above the alignment of P. G. & E.'s Pit 4 tunnel near its downstream portal, knocking the high spots off some rock as they prepare to sink a surge chamber 63 ft. in diameter. For more pictures and a full story on this Walsh Construction Co. tunnel job, see pp. 82-84.

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AMES I. BALLARD Editorial Director
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An engineer heads the Bureau of Reclamation

An engineer is again directing the Bureau of Reclamation. It has been many years since the office has been occupied by a Commissioner with a background that provides both experience in the building of reclamation works and a thorough knowledge of Bureau personnel and practices.

W. A. Dexheimer is assuming leadership of this organization that has been so important in the development of the West. His record indicates technical knowledge and the quality of leadership that is so important at this time. For the past years this Federal agency has rendered top policy decisions which were often at variance with the studied decisions of its engineers. The new Commissioner will provide an inspirational force which will tend to recreate a unity within this engineering organization and a return to sounder principles.

It is equally significant that the new leadership takes over the Bureau of Reclamation at a time when the Administration has indicated that its engineers are to speak as engineers, and not simply echo political policy. From the Secretary of the Interior comes the statement that members of his agencies are at liberty to express their technical and engineering opinions with reference to project feasibility without regard to what may be considered the expressed policy of the department. This adds stature and dignity to the individuals within the Bureau of Reclamation. It is evidence that they may consider themselves professional men who reflect technical conclusions rather than dogma.

Lastly, it is significant for young engineers who prefer careers in active construction to note that the new Commissioner came up "from the field"! For those young engineers who are considering careers either with contractors or in any construction phase of this broad industry the record of "Dex" Dexheimer should stand as an inspiration.

Money generates more local demands

Any increase in public funds always creates added pressure from groups representing special interests. At the present time this is particularly true in those Western states where an increase in the gas tax has placed new funds at the disposal of administering agencies. It is a signal for all local pressure groups to organize

their attack on the highway department for demanding pet projects in the expanded program.

The situation emphasizes the need for a firm stand on a highway betterment program based on the type of information developed through adequacy surveys and their analysis. These surveys must be the basis for allocating highway funds if Western states are to bring their road systems up to modern standards and expand them with an orderly procedure.

The sufficiency type of survey was developed to meet this particular need. All interests in the construction industry should add their backing to the position of the various state highway departments as opposed to allowing pressure groups to determine where the money will be spent.

Death in the trenches

Unsafe practices for the sake of job economy are never justified. For every fatal or disabling accident on construction jobs such factors as faulty supervision, careless job workmanship, or lack of common sense safety precautions are the usual faults. Along with electrocution by accidental contact with high-voltage power lines, deaths and injuries caused by the collapse of trenches, ditches, and excavations, contribute the major share of fatalities each year on the West's construction jobs. During 1952, in California alone, there were 12 deaths from this latter source, with 190 disabling injuries recorded.

Engineers, contractors and conscientious superintendents are always appalled when a fatal accident occurs on a job with which they are connected. Self-blame and censure live with them for many days after such an accident. But what can be done toward eliminating hazardous situations in trenching and excavation work?

The California Division of Industrial Safety is actively trying to provide a sound answer to that question. Last month, a Northern California construction firm and its job foreman were jointly convicted for safety violations which led to the death of a worker as the result of a collapsed ditch. It was the first such prosecution and conviction recorded in California. Both the company and the foreman were fined \$250 for violation of the California Trench Construction Safety Orders and the California Labor Code. And the complaint against the defendants was signed by staff members of the Division of Industrial Safety. The Division pledges itself to strict enforcement of these provisions during coming months, and this aim is worth applause from the construction industry.

No member of the construction industry can disagree with this aim, which recognizes that every trench should be treated as a potential source of death or injury unless properly shored and braced.

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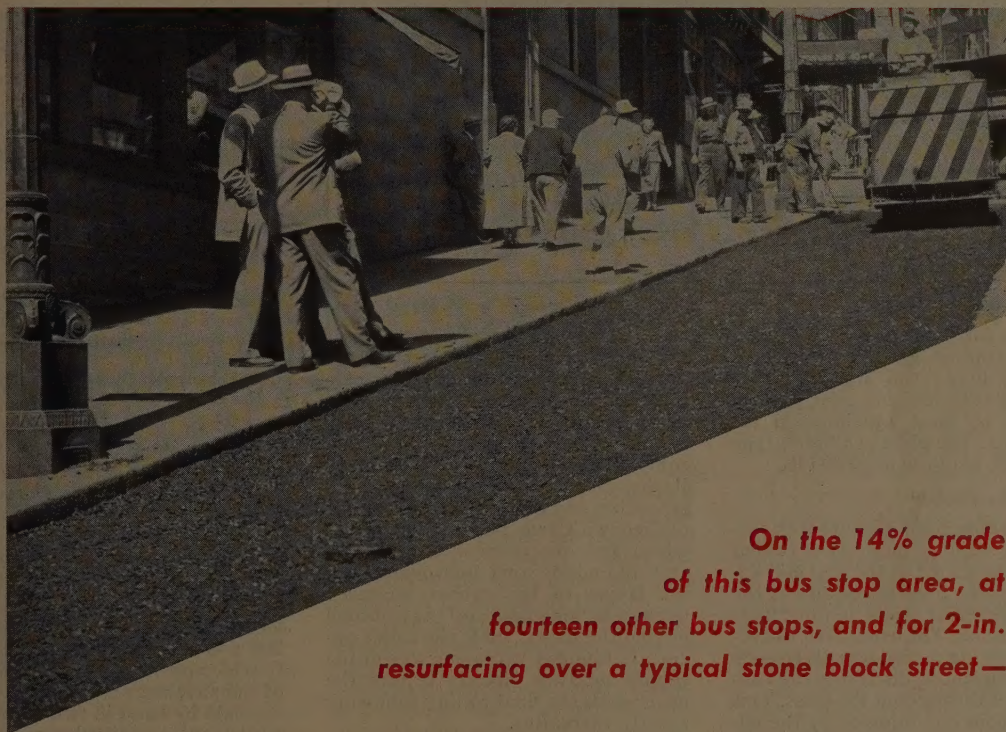
By offsetting the machine, the operator can put front and rear wheels where traction is best, can eliminate all side-thrust at the toe of the blade (which can be utilized to its entire length), and can balance the whole power of the grader against the load.

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SEPTEMBER 1953



**On the 14% grade
of this bus stop area, at
fourteen other bus stops, and for 2-in.
resurfacing over a typical stone block street—**

Seattle tests rubber-asphalt paving

ON JULY 23rd and 24th, the City of Seattle became the first city in the Northwest to install a test section of natural rubber-asphalt pavement. Thus, the pave-a-block campaign of the Natural Rubber Bureau has finally "stretched" across the entire country and for the length of the Pacific Coast. The City of Los Angeles placed a test section, first in the West, in August 1952 (*Western Construction*—October 1952, pp. 68, 69).

Seattle's section was laid on Olive Way, between Bellevue and Harvard Sts. Olive Way is a stone block paved street 42 ft. wide with an average grade of 8%. City Engineer William E. Parker selected this street because it is typical of the type of work required in the city's street rehabilitation program.

Preliminary preparations, prior to paving, consisted of the removal and replacement of all loose block and the raising of the existing utility fixtures

to meet the new grade. A very light tack-coat of RC-cutback was applied to the block at the start of paving operations. This was followed by the spreading of a thin levelling course and rolling. A 2-in. overlay of bituminous concrete was then placed and the street was rolled thoroughly.

Paving pattern

Estimated tonnage for the paving of this street was 900 tons. Because this was an experimental job, the rubber mix was placed in the center portion with Seattle's regular bituminous mix on either end to serve as the control or comparison pavement. One hundred tons of control mix was laid for the full width, starting at Harvard St. and finishing at the Boylston St. intersection. This was followed with 675 tons of city mix to which was added natural rubber powder at the rate of 5 lb. per ton of finished mixture. This tonnage paved

from the Boylston St. intersection to 25 ft. south of the E. Denny St. intersection. The balance of the work was completed to Bellevue St. using the regular city mix without rubber, with the exception of a 10-ft. strip on the east side of the street.

A trolley-bus line uses the street from Bellevue to Melrose, and it was necessary to maintain bus service during paving operations. A 10-ft. strip on the east side of the street was first paved for the entire distance to Bellevue St. Rubber powder was used in this mixture. Within one hour after rolling was completed on this upgrade strip, the busses were allowed to run over it.

What went into the mix

The mixture was prepared at the City's asphalt plant, about one mile from the job. Materials used were crushed stone (basalt) for the coarse aggregate and bank sand for the fine

PRELIMINARY ANALYSES COMPARING MIXES

	Seattle City Mix	City Mix with Rubber	Special Mix with Rubber	Seattle Specifications
% passing 3/4"	100.0	100.0	100.0	100.0
% passing 1/2"	89.0	89.0	94.0	65-90
% passing 3/8"	62.0	65.0	77.0	55-75
% passing 1/4"	51.0	49.0	64.0	45-60
% passing #10	30.0	30.0	40.0	25-30
% passing #20	23.0	25.0	31.0	14-25
% passing #40	20.0	22.0	25.0	6-20
% passing #80	12.0	12.0	14.0	2-12
% passing #200	5.0	4.0	6.0	0-5
Asphalt content	6.2	6.2	6.9	

PLANT FORMULAE, FROM ANALYSES OF JOB SAMPLES

	Seattle City Mix	City Mix with Rubber	Special Mix with Rubber
Bin #4 (3/4")	17.8%	17.8%	15.3%
Bin #3 (3/8")	24.8%	24.8%	21.7%
Bin #2 (3/16")	24.4%	24.4%	21.3%
Bin #1 (Sand)	26.9%	26.65%	35.1%
Natural Rubber	—	0.25%	0.25%
Asphalt Cement	6.1%	6.1%	6.35%

aggregate with an asphalt cement (85-100 penetration grade). No added filler was used; the fine aggregate contained sufficient material passing 200-mesh to meet specification requirements. The plant is a batch-type plant, each batch being 3,000 lb.

Adding the rubber

When rubberized mixture was prepared, the weighed quantity of rubber powder was added to the pug mill between the two lines of paddles as the hot dry aggregates were dumped from the weigh-box. The usual 5- to 10-second dry mixing period was given each batch, sufficient to distribute the rubber powder throughout the mass. This was immediately followed by the addition of the hot asphalt cement and thorough mixing. No additional mixing time was required so there was no loss of time or production when the rubber powder was used. Mixing temperature varied between 260 deg. F.

and 310 deg. F., with an average of 295 deg. F. Listed in the accompanying box are the job mix formulae used, together with laboratory analysis of the various mixes.

The city's own paving crew and equipment were used for the job. A Barber-Greene paver was used for spreading and the rolling was accomplished with two rollers, one three-wheel and one tandem. The paving crew did notice some improvement in the laying of the rubber mixture; negligible "touching up" was needed behind the paver, while the roller operators found it necessary to roll the rubber mixture directly behind the paver with the final rolling following shortly thereafter.

Laboratory tests

Preliminary investigational studies were made by the Natural Rubber Bureau Research Laboratory, located at Rosslyn, Virginia. For this work,

samples of both the coarse and fine aggregates and asphalt cement that were to be used were shipped to the laboratory. Some of the results obtained by the addition of rubber powder to the Seattle city mix are as follows:

Specific Gravity	2.357
Marshall Stability	2,200 lb.
Marshall Flow	0.17 in.
Per Cent Voids	3.51

Another phase of the preliminary work performed in the laboratory was to determine whether the addition of rubber powder would improve the behavior of bituminous mixes when used at bus stops. Pavement distress has occurred at these zones in Seattle particularly where the stops are "d grade." Some deviation from specification requirement was permitted to allow for the addition of more fine aggregate. The following laboratory results were obtained on such a mixture with added rubber powder:

Specific Gravity	2.316
Hveem Stability	46.5
Marshall Stability	2,035 lb.
Marshall Flow	0.14 in.
Cohesimeter Value	225
Per Cent Voids	4.75

It was felt that by reducing the Flow Value as obtained by the Marshall method, the tendency of the mix to rut and push would be materially reduced.

Paving a bus stop

One such bus stop was paved with this special rubberized mix. This is located on University Street between 2nd and 3rd Avenues. The area is 1 ft. wide and 100 ft. long and thickness of the pavement is 3 in. This material was laid by hand in two courses. The grade at this particular point is 14%. There are fifteen such areas to be paved throughout the city.

Personnel

All of the experimental paving was planned by William E. Parker, Seattle City Engineer, and the details were worked out by J. Robertson, Assistant City Engineer. D. A. Anderson, Principal Engineer, directed the field work and B. Mason, Supervising Senior Engineer, was in charge of the testing work. H. Hutchinson was in charge of the field inspection, while the asphalt plant work was under the direction of P. Gallaher. The Natural Rubber Bureau was represented by William J. Ryan of Washington, D. C., Research Engineer.

Several members of the Washington State Highway Department, together with many county engineers and officials from neighboring cities, were interested spectators. The Asphalt Institute and several large asphalt refineries were also represented. Seattle's Mayor Allan Pomerooy very ably "raked" the mixture on University Street with some members of the City Council lending their moral support.

PAVING MACHINE lays rubberized mix down the 8% grade of Olive Way. Adjacent lane to right of machine has already been rolled.



Use of rock bolts
highlights
treatment of —

FAULT at FOLSOM

**Exploratory shafts and drifts and use of a new
bore hole camera also play a part in correcting
fault condition discovered under left abutment
at big Corps of Engineers project**

TREATMENT of the geologic fault discovered last fall beneath the left abutment of Folsom Dam has now been completed and very little visible evidence of the condition remains. It is difficult to evaluate resulting delays in overall progress on the \$29,000,000 contract held by Merritt-Savin, for much of the corrective work was done during a period of time when high river flows prevented extensive concrete work in the channel section of the dam. However, it is certain that progress was delayed on

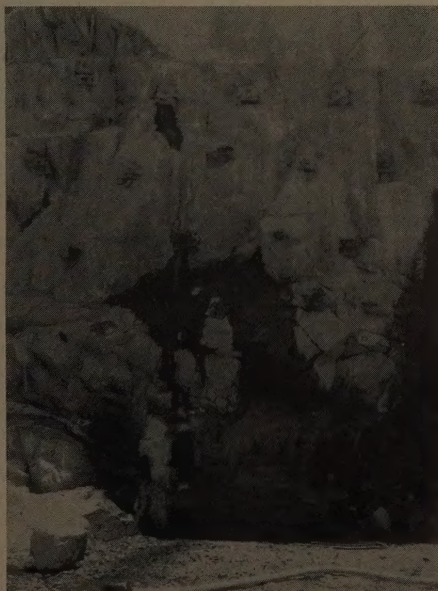
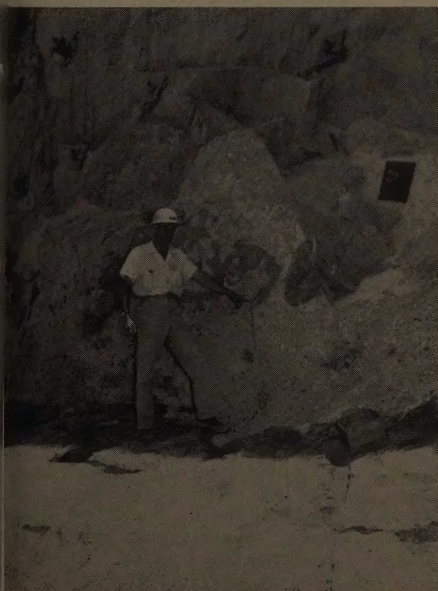
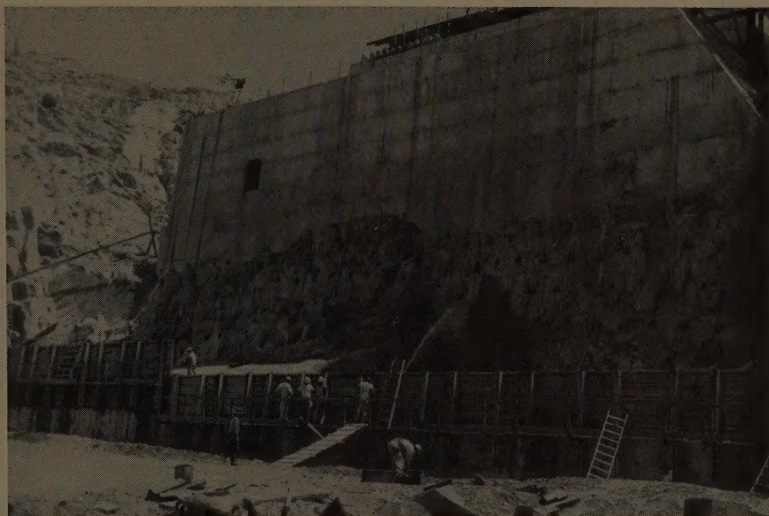
monoliths in the left abutment as 6 exploratory shafts ranging in depth from 20 to 30 ft. and interconnected by about 500 ft. of drifts were excavated in the fault zone and later plugged with a total of 1,700 cu. yd. of concrete. Remedy of the fault condition in areas outside the limits of existing concrete pours included about 80,000 additional yards of stripping foundation rock and required removal of two bents of the contractor's trestle.

The fault vicinity and its occurrence

relative to concrete elements of the dam is shown in the accompanying drawing. First evidence of the fault was found late last fall during excavation for Block 17. At that time it was thought that the fault daylighted under the adjacent Block 18. In any event, however, the need for investigation of the unexpected condition sent Corps of Engineers geologists scurrying to recheck their original exploratory data of dam site investigations. These consisted principally of NX cores taken at various points along the axis of the dam and on both sides of it.

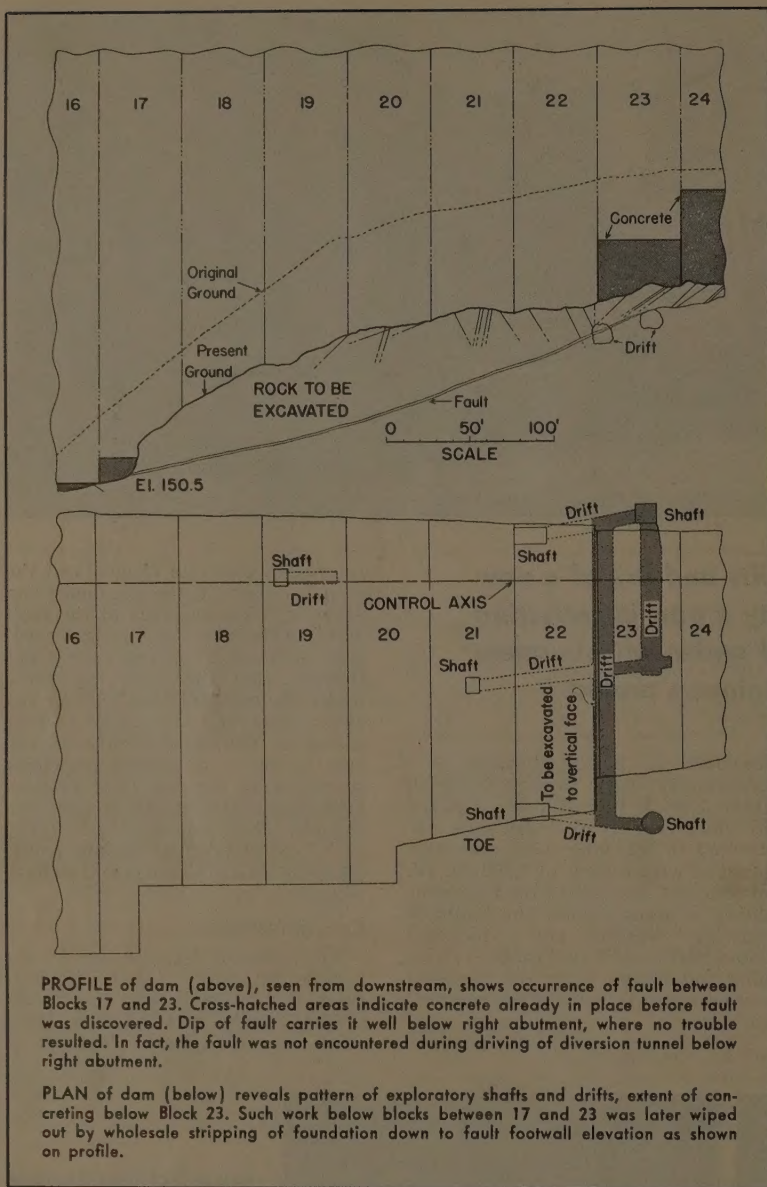
Core limitations

The nature of the technique for obtaining NX cores is such that portions of the core record may be obscure. It had been known from earlier work that the granite bedrock at



SAM BURKS (left), field engineer on the concrete dam for the Corps, indicates upper limit of concrete in drift along joint between Blocks 22 and 23. Burks is standing on footwall of fault where recent excavation has been carried down to new foundation elevation for Block 22, exposing previously placed concrete plug.

CLOSEUP of drift below joint between Blocks 22 and 23 (portion under Block 22 has been daylighted) shows where concrete was bulkheaded off. Thin fault seam shows at left of picture. Rock bolts are drilled in on a sharp angle to tie rock strata together.



Folsom contained many and varied weathered seams. The presence of these seams was substantiated in the expected manner during coring operations; that is, where a seam was encountered, the core would be discontinuous and would not hang together. Unfortunately, fault zones and the gouge associated with them show up in exactly the same way.

Core data checked

Last fall, with the first positive evidence of the fault before them in Block 17, the geologists were provided with some "hindsight" whereby to evaluate their original records. From their core logs, they were able to plot what might be called a locus of points in cores taken between Blocks 17 and 23 which matched the

apparent dip and strike of the fault as it had been observed in Block 17. Under Block 23, the extent of abutment concreting at that time, the fault breaks up and virtually disappears in a pattern of minor planes.

In January exploratory excavations of the fault were begun and were continued through the next four or five months. The extent and pattern of these excavations are shown in a partial plan of Blocks 16 through 25. Generally, the procedure was to sink shafts about 10 ft. square from the existing ground surface some 20 or 30 ft. down into the fault zone. Where necessary, drifts were excavated along the fault to determine its nature and extent. Since concrete had already been poured in Block 23, the shafts for exploration under that block

were sunk outside the block, both upstream and downstream.

Additional information was gained from 3-in. holes into which was lowered a bore hole camera. The camera used at Folsom is a brand new one developed by Engineers Research Associates, a division of Remington Rand, at the request of E. B. Burwell, chief geologist in the office of the Chief of Engineers.

Color film record

Bore hole cameras are not a new development. A type developed for use in the petroleum industry was described in *Western Construction* for November 1951 (p. 79). Of slightly larger diameter (3.12 in.), that camera was adapted for exploratory work in the outlet pipe of a small earthfill dam. The new camera is somewhat more versatile, and doubtless more precise. A big advantage for its use in geologic work is that it accommodates color film. In conjunction with the camera itself, improved means of projecting the photographic record for study have been developed. The frames are projected on the inside of a translucent screen of the same diameter as the drill hole; the effect for the observer is the same as that of looking at a conventional drill core—in full color.

Two fault remedies

Two methods of fault treatment were decided upon, depending on whether or not mass concrete had already been placed in a given area. In the case of the unpoured Blocks 17 through 22, the remedy was clearcut. It was simply to excavate further for the dam foundation. This work has included the removal of some 80,000 cu. yd. of rock down to the footwall of the fault.

This action resulted in an unusual situation at the joint between Blocks 22 and 23, where a sharp drop of about 30 ft. between foundations of the two blocks resulted from the additional excavation. To stabilize the rock face, rock bolts associated with mining were employed as shown in the accompanying photograph. The bolts are spaced approximately on 5-ft. centers in both directions. They are 1½ in. in diameter and 14 ft. long, split at the driven end and fitted with wedges to provide anchorage. These bolts were installed concurrently with excavation alongside Block 23, as line drilling exposed the progressively higher face.

Instrumentation

A sidelight on the conduct of this work was the provision made for observing possible movement in Block 23 during this excavation as well as during the tunnel work directly under the block. An extensometer was rigged between Blocks 23 and 24 and periodic measurements made. No movement was recorded.

Concluded on page 132



Up goes a 73-ft. 4-in. prestressed roof girder. At Long Beach Harbor, a total of 82 such girders (most prestressed concrete in any U. S. building to date), along with 4,160 cu. yd. of precast concrete elements, adds up to—

ALL PRESTRESSED AND PRECAST WAREHOUSE: **\$5.68 PER SQ. FT.**

UTILIZING more cubic yards of prestressed concrete than any other building to date in the country, the most recent addition to the harbor facilities of the Port of Long Beach is a large concrete warehouse located in the outer harbor on Pier A at Berths 6-7-8. The building will be used for the temporary storage of all kinds of cargo, including at times large amounts of baled cotton.

Main portion of the building is 150 ft. wide by 1,200 ft. long. There is a low 24 x 64-ft. office wing at each end of the building. Six crosswalls divide the warehouse into four 150-ft. and three 200-ft. long bays. One row of columns 25 ft. apart on the center line of the building is the only interior roof support.

Except for 1,108 40-ft. long creosoted wood piles, which support the foundation, all structural parts of the building are reinforced concrete, and most of the concrete is precast. A summary of the precast items, totaling 4,160 cu. yd. of concrete, is as follows:

- 1,728 waffle-type thin-shell roof slabs
- 82 identical prestressed roof girders



By
**JAMES R.
BOLE**

Chief Structural
Engineer
J. H. Davies,
Consulting Engineer
Long Beach, Calif.

- 41 identical concrete columns
- 48 vierendeel-type sway frames
- 82 roof monitor frames
- 92 tilt-up wall panels

Poured-in-place concrete totals 3,750 cu. yd. and includes foundations, end and cross walls, exterior columns, continuous longitudinal tie beams at the top of the exterior walls and at the sides of the monitor roof openings, and walls and roof of end office wings.

Low unit cost

Johnson-Western Constructors of San Pedro was the contractor. Their bid of \$1,072,718.00 was the lowest of 13 bids received by the Harbor De-

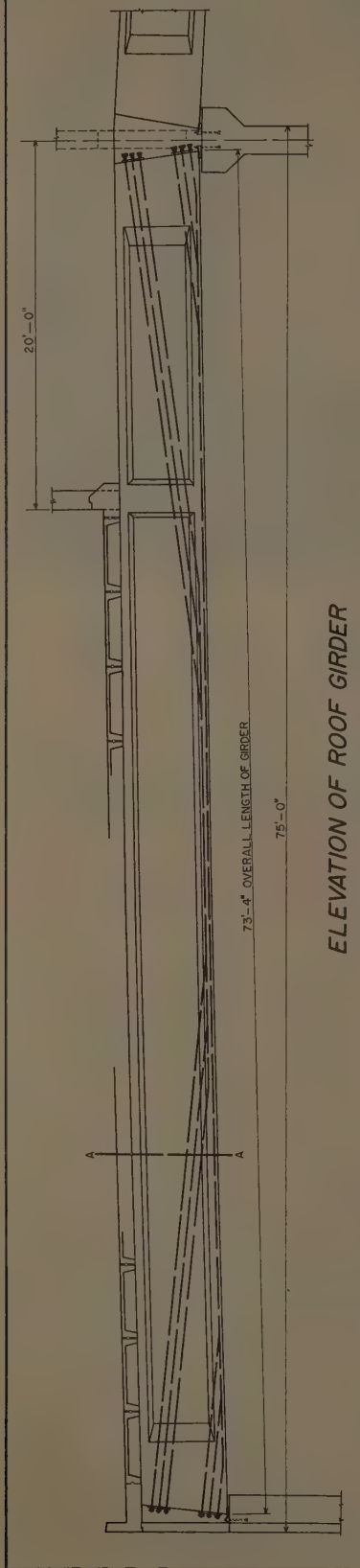
partment. This figure amounts to \$5.68 per sq. ft. of floor area. This cost included the following construction items outside of the building:

- 2,250 lin. ft. of retaining walls at loading platforms
- 1,500 lin. ft. of 15-in. and 21-in. concrete pipe storm drains
- 1,800 lin. ft. of 6-in. V. C. sewer pipe
- 1,350 lin. ft. of 4-in. and 8-in. water service

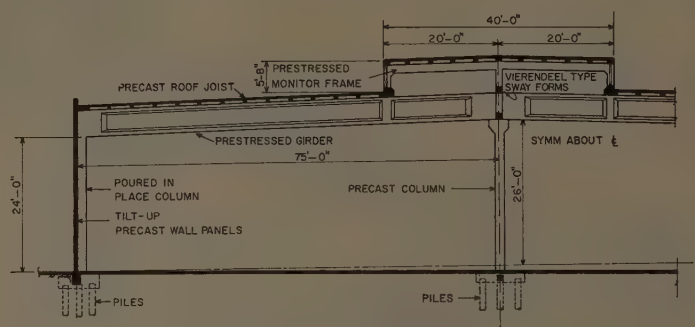
The bid included a complete automatic fire sprinkler system and also an item of \$96,000 for furnishing and driving the wood piling. It did not include the cost of required sand fill under the floor and the 6-in. thick asphaltic concrete floor itself. This work was done by the Harbor Department under separate contract.

Precasting slabs and columns

All precasting was done at the job site, and all concrete was transit mixed. Finished concrete work was sprayed with a curing compound and covered. After forms were removed the various items were carefully stacked until ready for installation in the building.



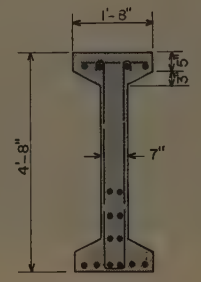
ELEVATION OF ROOF GIRDER



SECTION THRU BUILDING

THE JOB IN DETAIL

Main portion of building, shown in section, is 150 ft. wide and 1,200 ft. long. Only interior roof support is row of columns down center, 25 ft. apart. The 82 prestressed roof girders, shown in elevation at left, are identical. The 12 cables shown toward bottom of Section A-A were tensioned from both ends to a stress of 145,000 psi.



SECTION A A

The roof slabs were 4 ft. wide by 25 ft. long with 4-in. wide x 10-in. deep side ribs, 6-in. deep intermediate cross ribs at 4-ft. centers, and a 1 1/4-in. thick top slab reinforced with mesh. These slabs were cast in metal forms in long rows at the side of the building. After erection on top of the roof girders, steel plate inserts in the end of the slabs were welded to small angles cast in the girders. The joints between the slabs were then filled with cement grout.

The precast interior columns were 18 x 22 in. by 27 ft. high. The tops of the columns were widened to a width of 3 ft., 6 in. to receive the roof girders. These columns were cast outside the building in metal forms on concrete casting beds. As soon as they were cured they were set into position in 4-in. deep recesses in the foundations. Angles cast in the bottom of the columns were bolted to four 1-in. anchor bolts. The recess was then filled with concrete. It was not necessary to guy these columns; some stood by themselves for several months before reef girders were erected.

The sway frames were 5 ft., 7 in. deep by 24 ft. long. Top and bottom chords were 10 x 12 in.; end and center verticals were 12 x 12 in. These also were cast in metal forms outside the building and after erection were welded to columns by means of steel inserts. Short poured-in-place columns extending from the top of the precast columns to the underside of the monitor frames encase reinforcing

dowels from the ends of the sway frames and the roof girders.

The monitor roof frames were L-shaped with 12 x 14-in. x 5 ft. long vertical legs and 14 x 18 in. x 20 ft. long horizontal beams. Cast in metal forms outside the building, inserts in the frame were welded to inserts in the roof girders and in the top of the center columns after erection. Typical roof slabs were then welded to these monitor frames.

Placing wall panels

The precast exterior wall panels were 23 ft., 2 in. wide x 30 ft. high. Alternate panels had 18 x 18-ft. openings for vertical rolling steel doors. Wall panels were 6 in. thick except for the lower part of the door panels which was made 8 in. Wall panels were cast inside the building on top of the first course of the 6 in. thick asphaltic concrete floor.

Panels were cast several high on top of each other. Because a sand rough instead of a smooth exterior surface was required by the specifications the slabs were separated during pouring by a layer of heavy Sisal-kraft paper instead of the usual bond-breaking agent. These panels weighed about 27 tons.

For erection handling a heavy steel H-frame was first bolted to the panel, then the panels were picked up by a crane, tilted into a vertical position and set down into a continuous groove in the foundation. Side and top dowels projecting into poured-in-place wall columns and longitudinal

oof beams secure the panels in the completed structure. Temporarily each wall panel was held in place by four wire guys.

Prestressed girders

The 82 prestressed roof girders are of most interest to engineers and contractors. These girders are 73 ft., 4 in. long and 56 in. deep. Web is 7 in. thick, and flanges are 20 in. wide. At each end of the girder a 4-ft. long section is cast 20 in. thick for full depth. There is one intermediate 18 in. wide solid stiffener, under the base of the monitor frame. Each girder weighs approximately 31 tons.

Each girder is reinforced with 12 cables with 7¼-in. dia. wires in each cable. These wires are prestressed to a stress of 145,000 psi. The prestressing method used was that of the Prestressed Concrete Corp. of Kansas City, Mo. Each wire is cut to length, threaded through an end anchor and buttonheaded. These end anchors have external screws that fit into a hydraulic jack that exerts the prestressing force. Each group of wires was then packed with mastic, wrapped with heavy paper and delivered to the job in large coils ready for installation in the forms.

Except for the first three, all girders were cast inside the building. Metal forms were used on the early girders. Later, additional wood forms were also used, to expedite girder manufacture. Both types of forms gave very good results, even after many reuses.

Prestressing experience

As the cables were laid into their correct position in the forms they were supported by metal spreaders attached to the side forms. In addition to the cables there was a small amount of ordinary reinforcing steel. No trouble was met in obtaining the specified 5,000-lb. concrete. Maximum size aggregate of ¾ in. was used except in the lower girder flanges where ½-in. maximum was used to facilitate placing concrete around the cables. Both internal and external vibration was used.

Prestressing was not permitted until after the concrete had reached a strength of 4,000 psi. Cables were stressed in a planned sequence so that no undue eccentric forces could be introduced into the girders. Hydraulic jacks were fitted over the end anchors and the cable elongated a predetermined length. A check on this elongation was given by the pressures indicated on the gauges. Cables were tensioned from both ends of the girders. After the cables had been given their proper stress they were held in position by steel shims dropped between the end anchors and steel bearing plates cast in the ends of the girders.

Although the cables were not encased in any metal or plastic tube no trouble occurred due to cable bonding



PRECAST WALL PANELS, 23 ft. 2 in. wide and 30 ft. high, were cast inside building area on top of first course of asphaltic concrete floor. For placing, crane picked up 27-ton panels by means of heavy steel H-frame bolted to panel.

with the concrete. And in the 6,888 wires that were stressed not a single failure was observed in either the wire or the buttonheads. After a little experience it was found that two men

could stress the twelve cables in one girder in about four hours.

The girders were erected by means of two cranes, one at each end. Plates cast in the ends of the girders were anchored to bolts cast into the columns. Later the ends of the girders were encased in poured concrete, this covering and protecting the cable anchorages. In spite of the rather narrow width for so long a girder it was not necessary to provide any erection lateral bracing.

The warehouse was designed to resist earthquake forces as set up by the Uniform Building Code. Special attention was also given to the possible effect on this building of the rather extensive land subsidence that has been taking place in the Long Beach Harbor Area. As the ground settles vertically it also moves horizontally, and a building of this length may twist, tilt, shorten or lengthen. To compensate for this expected movement a complete expansion joint through wall and roof construction was provided at each of the six interior cross walls. Each joint allows for a movement of 6 in.

Personnel

This building was designed by the office of J. H. Davies, consulting engineer of Long Beach. The writer was in charge of the design and preparation of plans. Supervision of construction was by the Port of Long Beach, R. R. Shoemaker, Chief Harbor Engineer. For the contractor, Johnson-Western Constructors, Larry Sullivan was area manager and Ray Otti was project superintendent.

CABLES were tensioned from both ends of girders by hydraulic jacks fitted over end anchors. It was found that two men could stress the twelve cables in one girder in about four hours.



"THE PUBLIC BE DAMNED"

... is apparently the attitude of a lot of contractors and engineers, judging from their poor use of common sense "public relations."

But, what is good PR? Is it important to the engineer and builder?

Here are the answers.

By ROBERT F. KAROLEVITZ*, Seattle, Washington

PUBLIC RELATIONS men like to say that their profession goes back to the time Eve first donned a fig leaf in the Garden of Eden. They say it's the first recorded example of anyone doing anything to influence someone else.

Some professions and some companies in all businesses are still in the fig leaf stage with their public relations. This is particularly true of most civil engineers and practically everybody in building and heavy construction.

Recently Prof. H. G. Baity, head of the Department of Sanitary Engineering at the University of North Carolina, said: "Engineers do poor public relations out of a sort of self-conceit. They act as if the truth of the matter always is self-evident to the layman."



"Yeah? Well does it come in a bottle, or do you spread it on with a brush?"

Baity's comment is probably too all-inclusive and too strong, yet men at every convention and get-together in the engineering field and construction trades during the past several years have stressed the need for better public relations. The major trouble, it seems, is that the phrase "public relations" is pitched out into the audience, leaving the engineer to wonder if the stuff comes in a bottle or whether you spread it on with a brush.

What is public relations? Is it important to the engineer and the builder?

This two-part discussion of "PR" (the second section describes the "tools") was written to acquaint engineers and builders with the definition and the scope, the intricacies and the possibilities of public relations. Then the next time a speaker drops the unadorned phrase, it won't

be like dangling a problem in transverse stresses before an unschooled layman.

Public relations offers a field day to those who write definitions. Actually, in this crowded, busy world of ours, nearly everything we do causes someone else to think good, bad or indifferently about us. The sum total of the attitudes of various people toward us or our organization has come to be known as our "public relations." What we do to understand, improve or alter those attitudes then becomes a public relations effort.

There are basically two kinds of PR—"internal" and "external." The internal variety consists primarily of labor relations and the maintenance of good will between the front office and the working force. Under this heading come the house organs, company picnics, suggestion awards, fair play, special benefits, a friendly word from the boss, an occasional extra dollar in the paycheck when that dollar is earned, good working conditions, ad infinitum.

The external form is what we most generally consider to be true public relations. By this we mean our dealings with the myriads of people who come into contact with any given business. Such people for an engineer or builder would include the legislators who are working on a bill which would greatly affect the industry and himself, the stockholders of the firm, the citizens of a community who are being inconvenienced by some construction project, prospective customers, etc. A "public" can be the sum total of all people or it can be a carefully defined segment of the population. Because of a certain product a company makes, one of its publics could be (to stretch a point) "left-handed Scotch-Irish potato-pickers between the ages of 22 and 36."

Public relations not only assumes that the public's opinion is important, but it admits the necessity of educating the public so that its opinion will be based on knowledge and understanding instead of hearsay, rumor and vague generalities.

Parker, Hill and Ingman, Seattle, Wash., consulting engineers, offer an example of education for a specific public so that its opinion would be based on fact and not fancy.

The Seattle firm acts as consultant for some 35 mi. of

*THE AUTHOR, Seattle engineering writer, recently returned from Korea where he was News and Feature Editor for General Van Fleet's Eighth Army. Talking to many engineers and construction men on duty there gave him an insight into the need for public relations within the civil engineering profession. Stateside observations reinforced his thoughts and ideas. This article is the result.—Editor.

vers under construction in the north end of that city. We know, the building of sewers can cause temporary but sometimes severe inconvenience for householders. These householders can, in turn, develop and spread rumors which can often seriously affect the progress of a project. Because this particular sewer program was a large one, the inconveniences, the rumors and the resistance soon mounted.

In time Parker, Hill and Ingman recognized the need for a public relations effort. A phone line was installed to handle calls from unhappy citizens. Soon it was discovered that three phones and a full-time operator were needed to surmount the local difficulties. When an irate home owner learned that certain ditches were being left uncovered a lot longer to save him money, his wrath quickly subsided. When another frothing citizen found that he really wasn't voting the sewer bill for a real estate faction, his indignation vanished.

All that was needed was to get the truth across to the proper public. In handling such a large project, however, Parker, Hill and Ingman have used many other forms of public relations tools. As consulting engineers, they were active in the formation of improvement districts, selling the need for the job, selling the comprehensive plan, obtaining the original backing of the citizenry, securing a bond issue, calling for bids, acting as go-between for the owners and the contractor both in contractual as well as inspection relations. The firm used radio, newspaper and direct mail advertising. Many of the organization's 42 graduate engineers did "after 5 o'clock work," speaking before service clubs, women's groups and civic bodies.

Such an appreciation for public relations is an indication that Professor Baity's indictment of the engineering profession is not entirely true. Engineers do realize the value of a friendly public. "Public be damned" attitudes are disappearing.

Another simple example of this is the type of a road sign used by the Associated Sand & Gravel Company of Seattle on its highway projects. Instead of the impersonal and dictatorial "Men Working," "Detour," "Stop for Trucks" signs, the company posts friendly warnings and instructions with the smiling caricature of a workman in overalls. When a motorist leaves that company's construction zone and sees a cheerful "Thank You" sign, he's inclined to say to himself, "You're welcome"—and, what's more, to remember the Associated Sand & Gravel Co. favorably.

Public relations can be compared to a degree with the medical profession. A good public relations program keeps

the patient healthy. If problems or ills arise, public relations therapy must be applied to eliminate the difficulty (such as adding three phone lines in the case of the Parker, Hill and Ingman sewer project). Like medicine, a diagnosis is sometimes difficult. That's why public opinion polls have been so widely used to help organiza-



Bring the facts to the news man and you'll be sure he has the right ones!

tions find out what certain publics think about them, and why!

It's an accepted axiom that "public relations cannot be written into a product or a project, it must be built into it." With that idea we stress that **advertising, publicity and propaganda are not public relations**. They can be used by a public relations counsel in his role as interpreter of the public to management and management to the public, but they are merely tools of his trade. If you want to tell the world that you built a certain dam, you need publicity; if you want to sell a yard full of used equipment, you need advertising—but if you want to keep your business healthy and on good terms with the citizenry, public relations is what you need.

PR means simply, "**doing a good job and getting credit for it.**" It should be a part of any engineering or building firm—the one part where the mathematically precise slide rule is "off limits." It should signal the death of the "public be damned" era. It should be the beginning of a period in which the customer is always right—because you have helped him to be right! Now let's take a look at...

PR tools to do the job right

A good PR program requires proper amounts of all the ingredients which follow—and more. Most of them are common sense, most can be practiced by the engineer and contractor on the job, and—to wax Biblical—most of them can be based upon "do unto others as thou wouldst have them do unto you."

The written word

This broad designation covers many tools of the public relations trade, just as a "wrench" to a builder can mean anything from pipe to 12-point socket. We'll use it here to cover newspaper releases, magazine articles, advertising brochures, information pamphlets and similar items. We'll use it, too, to introduce our brief discussion of "Press Relations."

Newspapers (there are some 1,700 dailies and 10,000 weeklies in the United States) are usually thought of first when it comes to a publicity effort. The most common method of getting your story into the paper is through the medium of a press release. Such a release need not be a literary gem, but it should contain all the facts.

The news release should be written in accepted news form, if possible. It should tell the story completely but without flourish. Most newspapers and radio commentators will want to handle the story in their own style, so they'll probably rewrite everything you submit. It's your job, then, to supply the facts (repeat) facts.

A release should be typewritten or mimeographed on one side of the sheet only. It should be double or triple spaced for convenience in reading and editing. And it

should clearly indicate the person or organization it comes from. Usually it is advisable to start the release a third or half way down the first sheet, thus allowing the editor room for notations or headline writing. Somewhere in a conspicuous position on the sheet should be a specific statement as to when the information is released for publication.

Now here's a point! A news release is meant to be a news release. It should contain something which is of interest to the newspapers' readers. Progress on a large building project, use of unusual techniques, key staff changes—these are news. The following release is wastebasket material:

The J. J. Hogwash Company, makers of 87 different Hogwash Products, is proud to present the winners of the 1952 Hogwash Better Building contest.

The J. J. Hogwash Company was founded in 1862, making Hogwash steel plate for the Monitor and the Merrimac.

Winner of the 1952 contest, Trig O. Nometry, had this to say: "I build better because I use Hogwash Adobe, Hogwash paint, Hogwash Thumb-protectors, Hogwash . . ."



Irate housewives can slow up a job fast. Effort to keep them happy pays.

Your release can also be in the form of a fact sheet, merely a listing of the pertinent points you have to offer. A release or fact sheet can be mailed or delivered in person to the editorial rooms. If you do hand-carry the item, remember that the editor has more time to talk **after** five o'clock. Make your visit friendly but businesslike and you'll be welcome next time. One newspaper we know even flaunts a sign:

**DON'T GO AWAY MAD—
JUST GO AWAY!**

Study the newspapers' publication times. Then make sure your story or fact sheet reaches them in time for adequate attention. If it arrives during the last-minute rush, it may never see print.

We've stressed the press release since it is the most familiar form of getting your information to the Press. But there are other ways. One is the press conference. Such a conference is called usually for a big story, because a "big name" is on hand, or for some such out-of-the-ordinary circumstance. A press conference is **not** a press party. There is no food and no liquor. The reporters come to get their stories, the photographers their pictures and the radio men their tapes. Then they'll have to dash out and finish the job. Incidentally, it's a good idea to prepare mimeographed fact sheets for distribution at a press conference, particularly if your story involves building figures or involved detail.

To go back to the press party, if you want to give one, arrange it for some evening and provide plenty of refreshments—but forget about a story. A newspaperman likes to work when he's working; and when he's playing, that's all he wants to do.

There is also the "news tip" form of passing on information. If something newsworthy happens on the job and you can't prepare a release, call the city editor or your favorite reporter. If it's good, he'll come out and thank you for it. You can cement your friendship by tipping him off on other stories, too, even though they do not have connection with your business. The reporter will be as grateful as you would be if he tipped you off to a carload of I-beams which you could get for half price.

We've been carrying on, however, as though all news regarding your organization is going to be good news. You may have accidents, strikes, lawsuits and unavoidable reductions of working force. In that case the Press will probably **come to you!** Give out the facts without hedging. If you don't give a reporter the story, he'll get it from somebody else, probably a disgruntled employee—but most likely from someone who will make you look anything but good. A "no comment" statement gives a reporter the feeling that you have something to hide, and you'd be surprised how many skeletons a sleuthing newspaperman can dig up.

Give the Press "straight talk." They understand it. If your company is wrong, admit it and plan to correct the deficiency. One of the axioms of public relations is: "You can't whitewash a black sheep."

Another example of the Printed Word in public relations is the article or feature story. The media involved are magazines, trade journals and feature sections of newspapers. The success of many "popular science and mechanics" magazines, "beautiful homes" magazines and "build-it-yourself" magazines gives evidence of the public interest in various phases of engineering activities. Also the average citizen is interested in the road he drives on, the new bridge he crosses, the dam that will supply him electricity, the new sewage disposal plant in town, etc.

You as an engineer may not be interested in writing an article, but you may well be visited by reporters and freelance writers who want to do the story. Don't shrug them off because their outlets may provide considerable publicity for your organization. Reprints of a good trade journal article make excellent advertising and informal brochures.

If you are writing the article yourself, and not for a trade journal such as *Western Construction*, remember one important thing. Only a small percentage of America's 160,000,000 people have engineering degrees or have learned construction on-the-job. Consequently, translate "engineer talk" into laymen's language. GPCD may mean "gallons per capita per day" to you, but it could mean anything from a New Deal organization to a horrible social disease to Mr. Average American.

A Sunday magazine feature in your local newspaper is a good way to get a story of considerable length and interest over to the public. Trade journal articles help you to share your successes with fellow builders and engineers. And when you finally have that "big story," the national magazines are anxious for it.

Other forms of the Printed Word also enter the picture. They include advertising brochures, information pamphlets, display ads, special handbills, folders, etc. Any and all deserve considerable attention, professional experience and a thorough understanding of the intended goal. A public relations counsel, an advertising man or an editor friend can be a big help on these.

The spoken word

Under this heading we'll include all your daily personal contacts, radio and television appearances, speaking engagements and the use of that all-important gadget, the telephone.

Every time you talk to a customer, an employee, a visiting fireman or even a "sidewalk supt.," you are practicing public relations. You are making an impression on someone. The object, then, is to make that impression a favorable one without being wishy-washy or just plain sickening. Engineers and builders are often inclined to be curt, occupied or unappreciative of a listener's lack of engineering knowledge. There are times when such treatment of a "friend of a friend" may have adverse effects on business.

Radio and television appearances are not to be feared, when opportunity avails itself, here again the engineer could consider his audience. **Talk in a language they can understand.** And prepare a presentation which you can talk instead of "speak." Be natural!

Radio spots and announcements can be vitally important, especially in public utility projects when messages must get to the householder. Radio newsmen, incidentally, will appreciate a copy of the release you make to the local papers. TV, by the way, gives the engineer unlimited opportunities to tell his story, with charts and models and pictures.

Another item to consider is the speaking engagement. You can solve many problems, answer a lot of questions and win friends in the community through the medium of talks to the Rotary, the Kiwanis, the Lions, the PTA and other organizations. Straight-from-the-shoulder chats will go a long way toward eliminating community reaction and passive resistance to projects. Remember that one of the chief traits of an American is his readiness to ask why? When you answer that question for him, he'll have a new appreciation for what you are trying to do.

Now how about the telephone?

Since Alexander Graham Bell patented his talking gadget back in 1876, billions of dollars worth of business has been conducted through that medium. It would be difficult to estimate, though, just how many contracts and sales have been lost by improper use of the same instrument.

It may still be romantic to picture engineers and contractors as the rough, tough customers who spanned the country with transcontinental railroads, who battled the elements, crooks and disease in the mining country of South America, who burrowed under rivers and who scaled towering skyscrapers. But the romance is gone to the prospective customer who hears a bellowing roar from the other end of a telephone wire.

When you pick up a telephone, you are about to make an impression on an unseen and unseen person at the other end of the line. This person can't tell whether you fit the romantic description of engineers, whether your suit is pressed, if your shoes are shined, or even if you've got a secretary sitting on your lap. The caller may be a valued customer, a business associate, a friend of the company. You want him to feel that you are alert, courteous and interested in his problem. Here are some tips which might help:

1. Answer promptly; if you must leave the line and keep the caller waiting, give a reason for the delay.

2. Speak directly into the mouthpiece in a clear voice. (Put down that cigar!)

3. If the person requested or the information desired is not available, say, "May we call you back?" or "May we call you when he comes in?"

4. Whether you are called or calling, identify yourself immediately. The old-fashioned "hello" is on the way out in business calls.

5. Be ready to take messages, notes or make transfers quickly and accurately.

6. Smile when you speak.

The mailed word

Letters and direct mail advertising are important to public relations, too.

The way your organization handles correspondence, like telephone technique, has a bearing on the impression it makes. Prompt replies, good letter form, neatness and briefness are understood and expected. But there are other public relations points. Not the least of these is the correct spelling of the correspondent's name.

There is a trend now to make more use of letters in labor and internal relations. Letters from the boss to employees on their birthdays and anniversaries or when they win some sort of recognition have become standard practice. Some organizations use them to explain intra-company difficulties in lieu of the less personal house organs. It's all based on the idea of making everybody a "member of the team."

Community relations

A discussion of public relations tools wouldn't be complete without considering community efforts. No organization should overlook this important item.

How can an engineer, builder or contractor practice community relations?



If you can't think up good PR schemes, your imagination needs a tonic!

The opportunities are as countless as they are varied. Demonstrate bulldozer operations for the manual arts class of the high school some afternoon. Lend a flatbed truck for the Fourth of July parade. Give a little building help to the struggling neighborhood church. Show those colored movies you took this summer on that job in Alaska to the women's club. Hire a disabled vet or promote a company "blood donor" campaign.

All these things make friends—and that's what public relations means.

The foregoing items are the slide rules and blueprints, the shovels and the dump trucks of the public relations business. Proper use of this equipment and the other tools of the game insure an organization of a good public relations standing.

Only a hermit can get along without good public relations; and without good public relations, you could end up being a business hermit.

BRIDGE PILING 105 FEET LONG

... and, with steel followers between cut-off and base of driver, some piles for new Chehalis River Bridge in Washington have an effective length of 124 ft. MacRae Bros. has designed and built a driver with 75-ft. leads to do the job.

By R. W. FINKE

MacRae Bros., General Contractors
Seattle, Wash.

PILES up to 105 ft. long, with steel followers increasing effective length up to 124 ft., are being driven at the site of the new \$5,000,000 Chehalis River Bridge at Aberdeen, Wash. Because of the long lengths, the large number of piles to be driven, and the special requirements for driving them, the contractor has built a new all-steel pile driver to his own design and specifications.

The new bridge is a double-leaf bascule truss flanked on each side by a series of continuous steel deck plate girders and reinforced concrete approach spans. Width of roadway is 56 ft. between curbs, and there are two pedestrian walkways, each 4½ ft. wide.

Contract for the central section of the bridge, awarded by the Washington Department of Highways, is held by MacRae Brothers, general contractors of Seattle. The central section consists of the bascule truss span having a length of 271 ft. center-to-center of trunnions and three continuous

SKID DRIVER with steel "A" frame and leads picking 105-ft. timber foundation pile. Total of 85 piles was required for pier at this location. On right is temporary timber trestle supported on 4-pile bents, and in left foreground is finger trestle driven alongside location of next pier.

deck plate girder spans of 133 ft., 4 ft. on each side for a total length of 1,140 ft.

Test borings, made by the highway department prior to the design, show layers of clay, silt, peat and fine sand of varying thickness and depth along the entire length of the bridge. Underlying this soft material is a hard bottom of gravel or hardpan having excellent load-bearing capacity. The hard layer is approximately 110 ft. below low water on the south side of the river and 80 ft. below low water on the north side.

Design of the bridge calls for the eight piers in the contract to be supported by untreated timber piles driven to the hard underlying material by "such means as may be necessary." Size of the piers is such that 2,072 piles are required, 642 under each of the two bascule piers.

One of the first operations by the contractor was the driving of test piles to check the test boring data and to determine the exact length of pile to be ordered for each pier. For this purpose, four piles 120 ft. long were trucked to the site by the Pacific Lumber and Shipping Co. of Seattle which is supplying all piling for the project. These piles, driven to refusal with a No. 1 Vulcan steam hammer, verified the test boring data within remarkably close limits.

Under the contractor's method of operation, access to each pier is provided by a temporary pile and timber trestle and a working platform, or finger pier, along one side. The deck of this temporary trestle and the tops of cofferdams are fixed by high water at elevation +14.5. Thus, with the driver on the trestle, the distance to the hard load-carrying foundation material is approximately 124 ft. Be-



use it is virtually impossible to cure piles of this length in the quantity and of the quality required by the contract, the contractor elected to use a steel follower to make up the length between cut-off and the base of the driver. Even with this arrangement, piles 105 ft. long are required on one pier and piles 85 ft. long will be needed in the other three piers on the south side of the river.

Because of the large number of piles to be driven and the special requirements for driving them, the contractor built a new all-steel pile driver to his own design and specifications. A feature of this driver is the design of the leads with completely smooth outside surfaces to minimize wear on jet and steam hoses and to facilitate handling of the steel follower. The leads are 75 ft. high and are arranged to be either fixed to the A-frame or to hang from it and extend below the gun-ales. Also, both the leads and A-frame have a removable section to permit shortening to 55 ft. when the full height is not required.

Procedure for driving the long piles has been to jet a hole approximately 10 ft. deep in which to set the pile. When dropped into the jetted hole the pile has generally penetrated far enough to permit its head to be brought under the hammer. If this did not occur on the first try, the necessary penetration is secured by raising and dropping the pile a time or two. After positioning under the hammer, the pile is driven to within about 20 ft. of the base of the driver. At this point driving is stopped long enough to raise the hammer and set the follower on the pile and under the hammer. This operation generally requires less than three minutes. Driving is then resumed.

At this writing (August 5) a total of 85 piles has been driven, all of them 105 ft. long. The 85-ft. piles for the other three piers on the south side of the river are being delivered and driving is proceeding. As soon as excavation is completed for the main bascule pier, driving of the 642 piles required for it will proceed on a two-shift basis.

The author is construction superintendent for the contractor on this project. For the Washington Department of Highways, William Bugge is Director; George Stevens is Bridge Engineer, and Vern L. Dorsey is resident engineer.



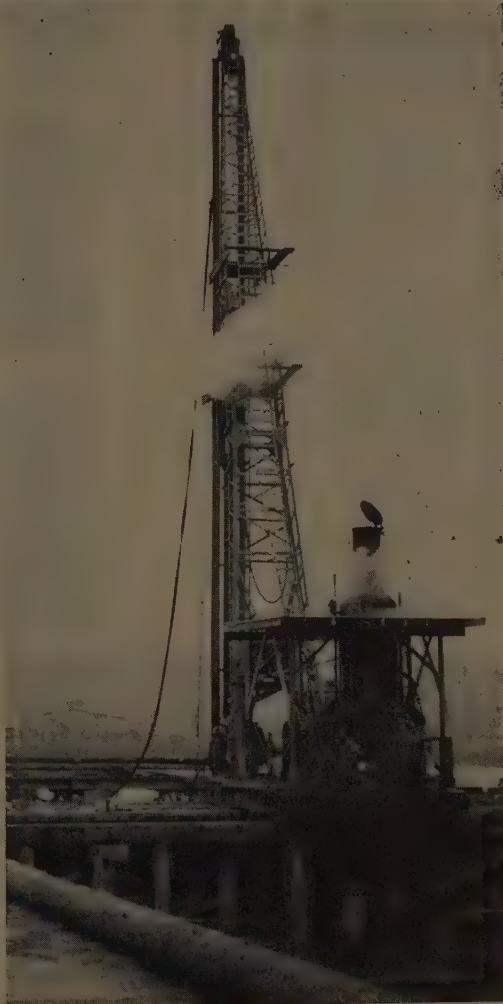
R. W. FINKE, with MacRae Bros. on this project as construction superintendent, was formerly Bridge Engineer, Washington Department of Highways, 1939-1948, and Seattle City Engineer, 1948-1952.



TEMPORARY TRESTLE

(above), viewed to the south. Wood pile driver in foreground is preparing to drive finger pier for pier No. 16. Between drivers are two 120-ft. test piles for piers 17 and 18, in jetted holes ready to be driven by No. 1 Vulcan hammer on steel pile driver in background. Old Chehalis River Bridge is partially visible to right.

SKID DRIVER is viewed at right 180 degrees turned as oriented to picture on page 72. Single acting steam hammer is being used to drive 105-ft. timber foundation pile. Driver is resting partially on finger trestle; back overhang is supported on a temporary timber pile bent. Jet hose for 60-ft. jet is hanging from the left side of the leads.





Down goes a 4-inch lift of asphaltic concrete for slope protection on the upstream face of Glen Anne earthfill dam, the Bureau of Reclamation's first extensive use of this new technique. Rock wasn't locally available, so—

ASPHALT "RIPRAP" EARTH DAM

THE FIRST asphaltic concrete facing for upstream slope protection on an earth dam built by the Bureau of Reclamation has been completed on the Cachuma Project in California. The Dam is Glen Anne Dam, a major project structure, on the west fork of Glen Anne Canyon Creek, about 6 mi. northwest of Goleta, Calif. Begun in November 1951, construction of the dam and appurtenant features was completed in February 1953. Placing of 21,700 sq. yd. of asphaltic concrete facing was started in December 1952, and completed also early this year. Contractor was L. A. & R. S. Crow of El Monte, Calif. [Early work on Glen Anne Dam was described in *Western Construction*—March 1952, pp. 118, 120.]

Rock suitable for riprap, customarily used as slope protection on the upstream face of earth dams and embankments, was not locally available within reasonable haul distance. For this reason asphaltic concrete in lieu of rock riprap was called for in an alternative schedule of the dam construction specifications, because of good results obtained by laboratory experiments and because of its successful application at other dams. On the basis of alternative bids received for building the dam, the cost of placing asphaltic concrete was \$76,000 less than the cost of supplying and placing riprap on the upstream face of the dam. The L. A. and R. S. Crow Construction Company of El Monte, Calif., was the contractor for the construction of the dam and facing.

Glen Anne Reservoir is one of the



By
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Materials Engineer
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Denver



and
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Bureau of Reclamation
Goleta, Calif.

principal regulating reservoirs on the South Coast Conduit (see box on next page), and because of the hydraulic design of the main conduit system, the reservoir will be subject to occasional rapid drawdown and rapid filling for moderate ranges in elevation. Under extreme operating conditions, the reservoir may be completely emptied in about 30 days. This condition would, conceivably, cause considerable uplift on the asphaltic concrete paving should water be permitted to enter under the lining. Accordingly, the design called for a heavy imper-

vious membrane which would also be flexible and not crack under normal settlement of the embankment. Weather in the area is mild. No freezing occurs in the winter and summer temperatures are rarely high. The small size of the reservoir will not permit development of strong waves.

Glen Anne Dam is about 250 ft. long at the crest, about 100 ft. above stream bed, and contains approximately 313,000 cu. yd. of earth fill. The slope of the upstream face of the dam is 4:1. Because of the extremely steep slopes of the abutments, which in places were overhanging, and the narrowness of the ridge forming one of the abutments, earth blankets against the abutments were placed from the dam a distance upstream. Use of the blankets was determined to be more economical than sloping the abutments to provide favorable contact between the earth fill and the abutments. Slopes on the blanket were 2:1 and were warped into the 4:1 slope of the main embankment at their intersections.

The major portion of the embankment section is constructed out of material from the Vaqueros formation—a buff-colored, fine-to-medium grained, friable sandstone, intermixed with fragments of cemented sandstone—compacted in 6-in. layers by tamping rollers. A pervious filter blanket of selected sand and gravel, also compacted, is placed under the downstream portion of the embankment. The impervious upstream zone of the dam, which consists of silty clay alluvium from the reservoir floor,

the base for the asphaltic concrete cing.

The subgrade was prepared by rough grading with bulldozers followed by a grader which performed fine grading. On the 2:1 slopes of the abutment blankets, the grader operated parallel to the contour and was connected by a cable to a bulldozer which moved along the crest pad in unison with the grader. The blade operated unassisted on the 4:1

slope, either up and down or across the slope.

Because of rains early in December, the subgrade contained excess moisture, which made it too spongy for placing the paving. The contractor imported a mobile heating device to accelerate drying of the subgrade. The heating device was a self-propelled unit with seven diesel oil burners which directed a flame longitudinally under a sheet-metal canopy or hood.

This adjustable hood was 8 ft. wide and 15 ft. long. It was lowered until the sides touched the earth, keeping the heat confined to the area under the hood. The intense heat produced by the subgrade heater dried the subgrade at a rate of about 5% per pass based on the original moisture content of the subgrade material before applying the heat. Two passes were made from top to bottom on the 4:1 slope of the embankment. Between

CACHUMA PROJECT VITAL STATISTICS

THE CACHUMA Project, under construction in Santa Barbara County, Calif., is being developed to bring urgently needed irrigation and municipal water to the South Coast Area of the county, including the City of Santa Barbara. The project's principal engineering features comprise Cachuma Dam and Reservoir, Tecolote Tunnel, South Coast Conduit and Regulating Reservoirs, and lateral distribution systems (see map).

Cachuma Dam

Cachuma Dam is on the Santa Ynez River about 10 mi. upstream from the village of Solvang. This 6,500,000-cu. yd. rolled-earth and rock-fill dam is 206 ft. high above stream bed and has a crest length of about 3,000 ft. The dam's spillway has a design outflow capacity of 161,000 cfs. Cachuma Reservoir is more than 6 mi. long, holds 210,000 acre-feet of water at maximum conservation pool level, and covers more than 3,000 acres. Work on Cachuma Dam was started in 1950 and completed in June 1953. Storage of water was begun January 1953. [Cachuma Dam design and construction details were presented in *Western Construction*—June 1948, pp. 105-107; August 1951, pp. 63-65.]

Tecolote Tunnel

Tecolote Tunnel will divert water from Cachuma Reservoir through the Santa Ynez Mountains to the use area along the South Coastal strip of Santa Barbara County. The tunnel is 7 ft. in diameter, part of the length being circular and part horseshoe in shape. The total length is 6.4 mi. and the capacity 100 cfs. Work on Tecolote Tunnel was started by holing in at the inlet portal March 1950, and excavation has progressed from both portals. As of June 1953, the inlet end had been excavated 14,919 ft. and the outlet end 13,750 ft. Concrete lining of the inlet end is in progress. [Tecolote Tunnel in *Western Construction*—August 1950, pp. 67-68; September 1951, pp. 78, 79, 150.]

South Coast Conduit

The 28-mi. long South Coast Conduit will carry water from Tecolote Tunnel outlet portal, which is located about 5 mi. northwest of the town of Goleta, easterly along the foothills to Carpinteria Regulating Reservoir, 3 mi. northeast of the town of Carpinteria to Santa Barbara and Goleta, Montecito, Summerland and Carpinteria Water Districts. Four regulating reservoirs are located at strategic places along the conduit to equate the inflow to the instantaneous draft on the conduit. These reservoirs proceeding downstream are, respectively, Glen Anne, located a short distance from the outlet portal of the tunnel; Lauro, in the westerly edge of Santa Barbara and about 10 mi. from the tunnel portal; Ortega, north of Summerland and 18 mi. from the portal; and Carpinteria. The conduit for the first 10 mi. is 48-in. diameter precast concrete pipe operating at heads up to 550 ft. This section was completed in July 1951, and has been in constant use since that time.

Except for 6,000 ft., the next 18 mi. of the conduit is being constructed of pipe, of 36- and 30-in. diameter, to Ortega Reservoir, and

27-in. between Ortega and Carpinteria Reservoirs. Sheffield Tunnel, on the conduit, about 1½ mi. downstream from Lauro Reservoir, is virtually completed. This tunnel is 6 ft. in diameter, horseshoe shaped, and 6,000 ft. long. The entire conduit was completed last month.

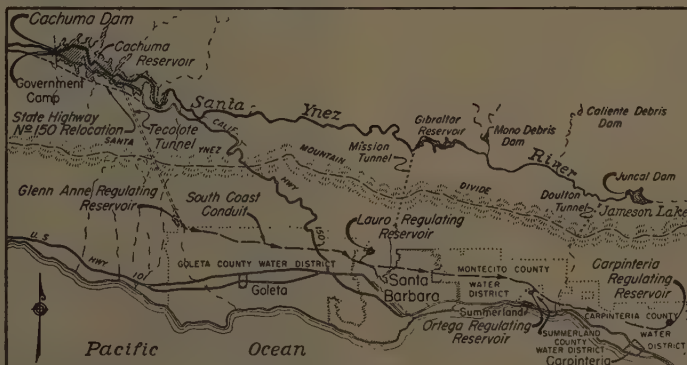
Storage and distribution

Lauro Reservoir holds 642 acre-feet of water behind an earth- and rock-fill dam nearly 100 ft. high. This dam was completed in October 1952.

Ortega and Carpinteria Reservoirs, of 60 and 30 acre-foot capacity, respectively, are expected to be complete early in 1954. These reservoirs are cut-and-fill and have reinforced concrete linings.

Pressure pipe line distribution systems to deliver water to points of use are to be constructed for Goleta, Summerland, and Carpinteria County Water Districts. The first section of the Goleta system is under construction, and a second contract has been awarded. The other two are planned to be under contract soon. Final design work has just begun on the Summerland system. Bids for the first section of the Carpinteria system were opened in July. All work on the distribution systems should be completed by late 1954.

MAJOR FEATURES of Cachuma Project are shown. Chief purpose is to deliver supplemental water supply from Santa Ynez River to Santa Barbara and adjacent irrigation districts. Carryover storage provided by Cachuma Dam flows through Tecolote Tunnel to Glen Anne regulating reservoir and South Coast Conduit.





SPONGY SUBGRADE, threatening to slow paving operations, yielded its moisture to this mobile heating device. Flames from diesel oil burners, with heat confined by hood, dried subgrade at rate of 5% per pass. Two passes usually did the trick.

each of the passes, the subgrade was lightly scarified, a light ripper being used to increase the penetration of the heat into the subgrade surface. After the subgrade was sufficiently dry, it was rolled using a 6- to 8-ton tandem roller.

Because of the delays caused by rains wetting the subgrade and causing erosion of the slopes which required considerable work to repair, the contractor used an asphalt emulsion penetration coat on a part of the subgrade area after it had been dried. This was only partially effective because of two primary situations: one was that rain occurred when a part of the emulsion had been applied for an insufficient time to properly set; the other was lack of uniformity of application. A third and minor cause was variability of penetration caused from variable fineness of the subgrade soil and the degree of hardness of the surface crust.

Asphalt mix design

The aggregate used in the manufacture of the asphaltic concrete facing is composed of the Vaqueros sandstone. Under the specification requirements, the material was required to pass the No. 4 sieve. A bulldozer scarified the material as it was moved to the plant feeder, where the material was screened to meet this specification requirement. The average washed gradation of the aggregate material after drying was as follows:

Screen size	% passing
4	100.0
10	100.0
40	88.6
200	12.0

Investigations conducted in the Bituminous Laboratory of the Bureau's Engineering Laboratories in Denver, Colorado, indicated that a satisfactory asphaltic concrete was obtained by combining 85% of the Vaqueros material with 15% of steam refined, 50-60 penetration asphalt cement. In these proportions, the standard laboratory density for specimens manufactured under a compressive force of 3,000 psi. applied for 2 min. at a temperature of 265 deg. F. was

125 lb. per cu. ft. The asphalt requirement of these uniform sand aggregates is quite critical—at 14% asphalt or less, the mixture exhibits swell immersed in water, and at about 16% asphalt, the asphaltic concrete loses stability at elevated temperature (140 deg. F.).

As excavation in the Vaqueros deposit increased in depth, the percentage of fines increased as determined by the material passing the 200-mesh screen. Accordingly, to accommodate these changes, the actual proportions used in the mix were 15% asphalt, based on the dry weight of aggregate, or to each 1,000 lb. of dried Vaqueros material the quantity of asphalt added was 150 lb.

FOUR LIFTS, all visible here, built up the required 12 in. of facing. In short time available, no method could be devised for placing entire thickness in one lift. Slope is 4:1.



A 1,000-lb. batch-type asphalt plant was erected in the borrow area adjacent to the right abutment of the dam. The Vaqueros material was fed by bulldozer into a bucket conveyor through an adjustable gate, hopped the bucket conveyor feeding the material to a rotary dryer which dried and heated the sand to the mixing temperature of approximately 325 deg. F. After heating, the material was conveyed to a vibrating No. 4 screen which rejected the over-size and allowed the passing material to fall into a storage bin. Scales of the springless dial type were used to determine the batch weight of the aggregate and asphalt. A platform scale for truck use was also erected by the contractor and checked by State inspectors.

All asphalt lines from storage tanks located adjacent to the batching plant were steam jacketed and insulated to prevent heat loss. Three 5,000-gal. capacity storage tanks were set up; two contained asphalt and one contained fuel oil. A standard 50-60 penetration AP-6 asphalt for use in the asphaltic concrete was supplied in insulated transport trucks by the Five-C Refining Company from Santa Maria, Calif.

Placing with slip-form

Starting at the bottom of the dam embankment, the contractor placed the asphaltic mix up the slope by use of a slip-form. Each lift was placed in a lane approximately 8½ ft. wide. The joints and the surface of each lift were cleaned where required and "tacked" by a light application of asphalt emulsion. Because of the urgency of completing the slope protection before the start of the winter rainy season, the contractor was unable to develop methods for placing the 12-in. thickness of facing in one lift. As a result, four lifts were used to obtain the required total 12-in. thickness. The average compacted thickness of each lift was 3¾ in.

A materials spreader was modified and used as a slip-form paver. A hinged, adjustable steel plate 14 in. wide and 8½ ft. long was attached to the trailing edge of the hopper box and functioned as an ironing screed. Adjustable turnbuckles at the back edge of the screed controlled the angle of attack, or slope, of the iron plate. The spreader had adjustments for a loose strike-off of the asphaltic concrete mix immediately in front of the ironing screed. The ironing screed was weighted with ripper teeth, a total dead weight of 2,000 lb. being used on the screed to obtain initial compaction.

Dump trucks loaded with asphaltic mix from the batching plant were lowered down the 2:1 slope by a cable connected to a winch on a tractor located on the crest of the embankment. On the 4:1 slope trucks drove down the slope to position a short distance above the spreader box and then tied to the cable and lowered to



he spreader box. The dump truck was connected to the paver by a hook provided on the spreader so that the truck and paver were pulled as a single unit allowing the truck to discharge material into the slip-form paver as required. The winch pulled the dump truck up the slope. Each truck load contained approximately 5 tons and spread the 8½-ft. wide lane for a distance of about 30 ft.

Compaction

Compaction was obtained by the use of a 1½- to 2-ton roller. Later, after partial cooling, the surface was rolled by a 6- to 8-ton tandem roller. Initial rolling was done when the asphaltic material was at a temperature from 150 to 200 deg. F. The best densities were obtained when the temperature range of initial rolling was about 180 deg. F. To minimize the possibility of a surface crack existing from the upper surface to the subgrade, each succeeding lift was offset, thereby staggering the vertical joints.

A total of 11,600 tons of hot-mix was required to place the 21,700 sq. yd. of facing for the dam embankment. The toe of the embankment was on natural soils for most of the distance. On the right abutment contact in the range of elevations through which the water surface will generally fluctuate, the embankment is against the Vaqueros formation, and on the left abutment the contact is against natural soils. To strengthen the paving along the contacts, trenches were dug and asphaltic concrete placed in them to act as a cut-off against undercutting by beaching action of the water against natural soils. At the Vaqueros formation contacts, the lining was thickened below the level of the subgrade, the abutment treated with a "tack coat" of asphaltic emulsion throughout the area covered by the thickened section and for a short distance above. The asphaltic concrete was also sloped up above the level of the normal surface beginning about a foot from the abutment, to provide added thickness.

COMPLETED upstream face viewed from haul road. Cars can easily maneuver the breadth and length of the smooth surface. Water partially filling reservoir was delivered through Tecolote Tunnel via Glen Anne Creek.

Crest paved too

After completion of the slope protection, the crest surface was covered with 4 in. of asphaltic concrete. Curbs were formed from the asphaltic concrete along the crest of the main embankment to divert surface flows from rainfall into the reservoir and away from the downstream slope of the dam which is stabilized by grass seeding. Controlling equipment on slopes was difficult but handled well.

Observations

Some concern was expressed at the beginning of the work about the stability of the "fat" mix when gauged by highway paving standards on the steep slopes. At no time did the freshly placed asphaltic concrete tend to creep or flow down the slopes.

A nonstripping agent was placed on an experimental basis as some of the asphaltic concrete in the top layer of the paving. The areas in which this additive was used have been identified and marked so that observations can be made from time to time to study the relative performances of the treated and untreated asphaltic concrete under actual field conditions. Laboratory tests indicated a slight increase in densities with use of the additive.

Materials for production of the asphaltic concrete were sampled and tested continually. Aggregate samples were obtained from the batching plant after drying and screening to give at least one representative test for every 100 tons of asphaltic concrete that were batched. The asphalt was sampled as required from the loads as delivered to the storage tanks. Numerous specimens of the completed facing were obtained and their densities determined. Samples of the asphaltic mix were taken directly from the batching plant and used in the lab-

oratory to obtain density-control cylinders.

Tested in miniature

The development of the asphaltic concrete facing for Glen Anne Dam is the result of a Bureau of Reclamation research program begun several years ago to investigate the suitability of various types of materials for use as upstream slope protection in areas where rock riprap is not economically available. In the Bureau's engineering laboratories, various asphaltic mixtures were tested for stability and resistance to immersion using standard methods. In addition, asphaltic concrete specimens were subjected to prolonged tests in a Bureau-designed wave action machine. In this machine the specimens were rapidly immersed and retracted from water, inducing high air and hydrostatic pressures on the surfaces of the specimens. Test specimens composed of Vaqueros formation sands, mixed with a 50-60 penetration asphalt cement, withstood satisfactorily more than 7,500 hours of continuous testing, at a rate of 40 cycles per minute in the wave action machine.

Tests indicated that if the air void content was below 5%, the facing would be impervious (laboratory standard densities of the field mix averaged about 1½% of air voids). One of the most important requirements for the slope protection is durability under the operating field condition, and although some lightly compacted specimens were pervious they remained durable in the wave action test.

The placing of the asphaltic concrete facing was under the supervision of E. R. Crocker, Project Manager for the Bureau on the Cachuma Project. R. E. Burnett and M. T. Hedges are Construction Division Chief and Field Engineer, respectively, on the project. J. J. Welsh was Chief Inspector for the work. L. E. Garst was in charge of the project laboratory which performed the necessary control testing.



30,500 TONS of all-welded steel, with plate thicknesses to $2\frac{1}{2}$ in., required techniques that push forward the frontiers of welding science.

The "why" and "how" of the world's

SETTING new records in volume of structural steel welding for highway viaduct construction, the freeway project that extends the Bayshore Freeway into San Francisco is of equal interest to bridge designers and contractors. To date the work has involved 21,000 tons of structural steel—all-welded in shop and field—with plate thicknesses up to $2\frac{1}{2}$ in. About 30,500 tons will be required for the entire project. The viaduct project has been designed and its construction directed by the Bridge Department of the California Division of Highways.

The first section of the total job, which will provide a network of freeways enabling through traffic to bypass San Francisco, was built by Charles L. Harney, Inc., general contractor, on a \$3,000,000 contract. This first section is the subject of this article. The entire job will cost almost \$11,000,000.

Design considerations

Because of the size of the structure and its location in the center of a city, much time was spent on preliminary design studies. The factors of economy, aesthetics and clearances were all considered. It was estimated that between 90,000 and 100,000 cars per day would be using the structure; therefore safety and public convenience were also important considerations. Two extensive railroad reloca-

tions were required, along with various street realignments. Long spans for portions of the viaduct, and skew angle crossings at several streets, are features of the design.

Completed plans were divided into several projects, chiefly to meet availability of funds. First unit of construction was awarded in 1951, four additional units were awarded during 1952, and work on the final unit began in June of this year.

Choice of welded design

Preliminary studies by the Bridge Department of the California Division of Highways indicated that structural steel design would be most satisfactory because (1) its light weight would lessen the cost of the foundations, supported on piles up to 90 ft. long, (2) concrete construction would include more expense in forms and falsework, (3) the presence of falsework in the city streets would constitute a traffic hazard, and (4) because concrete columns would be more massive than steel, less visibility for motorists on local streets would result.

The next choice was between the use of riveted or welded design. Welded design was chosen for both economical and aesthetic reasons. From the standpoint of economy, an appreciable overall saving could be made in the weight of steel by using

welded construction. It was felt that even if the welded steel cost more than the riveted, the difference would not be enough to offset the weight saving for this particular project.

A saving of structural steel was noted in the design of the column caps amounting to more than 20% of this detail item and to more than 12% in the columns. It was also found that using composite rolled beam stringers instead of the ordinary beam stringer without composite action resulted in substantial weight saving.

Estimated saving in weight of steel was about 300 tons, resulting in general from the use of composite steel stringers, elimination of detail on column caps and more effective placement of material for the columns.

Problems

However, the selection of welding for a structure of this size was made realizing that steel thicknesses in excess of $1\frac{1}{2}$ in. presented problems that demanded special consideration.

Welding specifications had long cautioned that in the welding of built-up members of heavy section, particularly those of "I"-shape when the flanges are considerably heavier than the webs, and in any case where the component parts are $1\frac{1}{2}$ in. or greater in thickness, special care must be exercised during welding. Particularly, weld crack may occur from the de-

development of excessive forces set up by (1) undue chilling of the weld metal due to the welding in a constant environment of cold base metal, (2) uneven temperatures of contiguous parts of a welded joint during welding, due to the different sizes and shapes, and (3) possible weaknesses in fit, assembly and welding procedures. It will be seen later in this article that these items have been well considered by the California bridge engineers.

The structure was designed for H20-S16 loading. Work stresses were 1,000 psi. for concrete, 20,000 psi. for intermediate grade reinforcing steel and 18,000 psi. for tension in structural steel.

The longitudinal spans, all simply supported, are made composite with the reinforced concrete roadway slab. The composite action in addition to the weight saving considerably increased the stiffness of the member against live load deflections. This was an important factor: it was necessary to keep the longitudinal members as shallow as possible for clearance purposes.

Steel specifications

A series of discussions was held with metallurgical and mill authorities of major steel companies, and

with members of the welding industry, to work out satisfactory specifications for the chemical and physical properties of the steel for thicknesses $1\frac{1}{2}$ in. and over, and also to decide on the proper amount of pre-heating.

Study of the specifications was continued after the award of the first major unit. R. W. Binder, Chief Engineer, Bethlehem Pacific Coast Steel Corporation, cooperated with the California engineers to the end that through subsequent conferences with leading engineers and metallurgists a satisfactory specification is now in the making. In general the intent was to obtain at a practical cost a semi-killed or killed steel, to assure fine grain practice for materials in excess of one inch by controlling carbon and manganese proportions without sacrificing the physical properties of ASTM A7 steel.

It was decided that ASTM, A7-49T steel would be satisfactory under local conditions for plates up to $1\frac{1}{2}$ in., but that thicker plates would require special specification requirements along the lines previously outlined.

It was agreed that fabrication tolerances for built-up girders and caps should not be more than 50% greater than the AISC tolerances for wide-flange shapes and that tolerances for built-up columns should not be more

than 50% greater than the AISC tolerances for wide-flange shapes specified for columns.

Welding procedures

The specifications provided that all welding should be performed by either the submerged-arc process or with low-hydrogen electrodes, with the exception that when welding material that was less than one inch in thickness to other material less than one inch in thickness, electrodes conforming to specifications of the American Welding Society E60 series could be used in lieu of low-hydrogen electrodes.

It was further specified that care should be exercised to prevent the absorption of moisture by the low-hydrogen coatings. To maintain a minimum moisture content, ovens at 300 degrees were provided, and rods were stored for a period of approximately 2 hours before being removed.

It was added that all welding should be performed in such a manner that the Brinell hardness of the welded area did not exceed 190. All welds during fabrication were subject to non-destructive testing by the engineer, including gamma ray for certain principal welds. Such non-destructive testing was performed without cost to the contractor. Prior to fabrica-

foremost all-welded steel viaduct

HERE'S THE VIEW of the San Francisco skyline that will lift the eyes of Bayshore Freeway motorists as they enter the city from the south.



tion, welder qualification and procedure qualification were established by the usual test procedures.

Shop fabrication

The structural steel framework for the first section of the viaduct was fabricated and erected by the Bethlehem Pacific Coast Steel Corporation. All possible welding on the individual sections was done in the shops at Bethlehem's Alameda Works before they were brought out to the job. Welding of caps to the columns is practically the only field welding specified in the design. Because welding conditions in the shop are so much more favorable for reliable welds, a definite attempt was made throughout the design to avoid the necessity of field welding.

The general method of shop fabrication is more or less conventional in that flanges and web sections were assembled by tack welds and held in place by fixtures for automatic or semi-automatic welding along the web flange joints.

Web stiffeners are rectangular plates welded to the webs with continuous fillet welds to the web, fitted to the tension flange and seal welded to the compression flange. Stiffeners are omitted from the outside of exterior girders so that the welded girder spans present the same appearance as the rolled beam spans.

Spans up to 85 ft. long are composed of 36-in. wide-flange beams with 1 x 4-in. plate shear keys welded to the upper flange. Cover plates are welded to the lower flanges of girders in the 70- to 85-ft. range.

The longest span was 106 ft. Its

girders are made up of 48 x 3/8-in. web plate with 18 x 1 1/2-in. flange plate on top and 18 x 2 1/2-in. flange plate on the bottom. Thus, this span is only 1 ft. deeper than the 36-in. rolled beams of other spans and maintains the same smooth appearance, without rivet heads, as the rolled beams.

Columns and girders

Columns and transverse cap girders were built up in the shops before being taken to the job. Transverse cap girders are similar in make-up to longitudinal girders, except that the cantilever sections have sloping bottom flanges.

Shop welding for the cap girders started with the bottom flange plates. Plates were beveled to make a 60-deg. double vee with a 3/8-in. edge, which is just thick enough to prevent burn-through although permitting complete penetration by the root passes of semi-automatic welders. The weld is filled in on one side before turning the plate over and completing the other side. Flange-to-web fillets are made by two semi-automatic welders working simultaneously on opposite sides of the web, starting at the center of the girder and proceeding together toward the same end for each pass. The beam-seat assemblies were built up as separate pieces, fitted to the girder along with other detail and web stiffeners, and welded last by manual methods.

Make-up of the column sections varied according to requirements but, in general, each column consists of two base members, two flange members, and a web piece. The web plates are reinforced with beams or tees and

flange members of considerable width with flat bars welded along their edges to form a channel-shaped member. These flat bars, which extend above the girder seat, are welded to cap girders at bearing stiffeners.

The highest columns are in connection with the on-and-off ramps which have single column bents and extend as high as 60 ft. For the utmost economy and suitability, the bent spacing, insofar as practical, was held to under 60 ft. to take advantage of rolled beam construction.

Column welding sequence

Welding sequence for a typical built-up column follows: Base assemblies are fitted and manually welded as separate pieces. Web assembly, consisting of one relatively wide web plate and two split tees, is fitted and tack-welded to make up one sub-assembly. Four longitudinal welds are made with automatic submerged-arc welders running full length, tying the split tees to the web. The top of the web has been milled previously to provide a good bearing surface under the column cap girder.

The flange assemblies, consisting of a wide web plate and two flange bars, are fitted up into a channel-shaped section, tack-welded securely, and placed in a holding fixture for welding by automatic machines. Because the 6-, 8-, and 12-in. side plates of the columns were welded off center, they warped. The plates, therefore, are cambered the correct amount before welding or straightened after welding. Built-up welded design should maintain as much symmetry as possible in welding about each piece, but it is realized that this is not always possible.

The subassemblies are then fitted together, tack welded, and held in a fixture of pipe jacks for a subsequent final welding. Stiffeners are placed and welded, the base assembly and structural detail are added to the column, and the final welds completed by manual methods.

Shop handling of long and relatively limber pieces was often troublesome and slow. It was necessary that edge preparation insure proper fit-up as well as provide surfaces which were clean, smooth, uniform, and free from fins and other defects so that sound welds of the proper contour could be obtained. This type of preparation made necessary the use of large floor areas and considerable time for layout, setting up, machine burning, cleaning, handling, and burning the pieces. Standard jigs were of little use on this project, so special jigs and fixtures were built to suit the fabricating requirements. Breathing space had to be provided for the weld during shrinkage to avoid cracking.

Of particular interest on this project is the almost complete use of continuous fillet welds of minimum size, consistent with the maximum thick-

COLUMNS are set by crane as first step in erection. Anchor bolts with levelling nuts guide column subassembly, and guy wires hold columns until tack welds are made. With structure steady after permanent welding, anchor bolts are grouted and subassembly covered with concrete.



ness of material to which the weld was applied.

Erection and field welding

Actual erection of the structure started with the columns, which were set by truck cranes and later covered with concrete for several feet above the base. Cap and transverse girders were lifted into place by the cranes, and guy wires held them up while tack welds were being made. This kept the structure steady until the permanent welds could be made.

X-ray pictures were used to control quality on the field welds. When they showed up cracks or slag in the welds it was necessary to have a re-weld made. The welding was found to be quite satisfactory.

The welds were made by 10-man crews on each of ten welding machines furnished by Bethlehem Pacific. Low-hydrogen rod was used, kept in electric ovens at temperatures of 300 deg. to avoid moisture. Anything over $\frac{3}{4}$ in. thick was pre-heated before the weld was made.

After the initial erection and field welding had taken place, it was decided that the 36 x $\frac{3}{8}$ -in. web plates of the two-column bents, although satisfactory from a design standpoint, could have been heavier or had additional stiffener bars to impart greater stiffness for handling during fabrication and erection.

The upper end of the column was found to be somewhat vulnerable to damage during shipping. So the shop provided temporary diaphragms and blocking to protect the top extended bars of the columns.

To appreciate the complexity of this structure, it has been pointed out that more than three hundred 24 x 36-in. sheets of detailed drawings and calculations had to be made by the fabricator in excess of the number of design drawings supplied by the state.

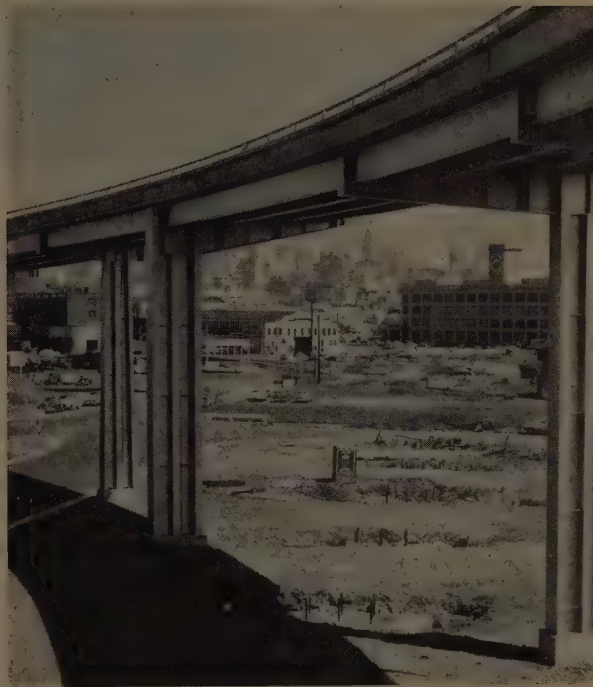
Personnel

State of California personnel on this project is under the direction of G. T. McCoy, State Highway Engineer. Bridge design and construction are under the direction of F. W. Panhorst, assistant state highway engineer; Stewart Mitchell, principal bridge engineer; I. O. Jahlstrom, principal bridge engineer; G. W. Thompson, resident engineer, and Robert McCullough, office engineer. Leonard G. Hollister was in charge of design for this project.

Bethlehem Pacific Coast Steel Corp., which fabricated and erected the structural steel for this first unit, operated under the direction of I. F. Kurtz, works manager at the Alameda Works; R. E. Gauthier, district engineer; J. A. Cheely, superintendent of erection; Lloyd A. Lee, field engineer; C. L. Upton, labor foreman; Phil E. Carol, welding foreman; M. H. Frincke, manager of erection, and H. M. Pitney, assistant manager of erection.

VARIATIONS IN BENT DESIGN

2- OR 3-COLUMN BENTS support ramps having four or more traffic lanes.



"C"-BENTS where ramps cross other parts of structure obviated bents with heavy outriggers or single column bents with eccentrically loaded columns.



"T"-BENT reduced total number of columns and "forest" effect; is effective for ramps which cross streets and other ramps at various angles.



One record, 2 headings, 3 shifts, Pit Four!

This season's record breaker is a smooth tunneling operation—All-hydraulic jumbos and a crew of veteran miners bid to keep Walsh Construction Co. out in front on latest Pit River hydro development by Pacific Gas & Electric Co.

LES HUNTINGTON brought most of his miners, as well as his key supervisory personnel, with him from tunnel work on the Bear River Project of Pacific Gas & Electric Co. That's why Walsh Construction Co. has made such a good showing so far in its work, again for PG&E, on the Pit 4 Project northeast of Redding, California. This is the job where a new tunnel record was set last winter, and another one only last month—see box on this page.

Until the strike in June, which halted all heavy construction in Northern California, Walsh was 'way ahead. Now, they reckon that they are about even. But now, also, they have opened up an adit at the upstream end of the tunnel and are driving a connection back to the existing intake structure adjacent to Pit 4 dam. When this 2,300 ft. of work is completed, a new heading will be opened up running downhill to meet the main heading which has already been pushed 6,730 ft. into the hill along its eventual 21,500-ft. length.

The addition of hydroelectric gen-

erating facilities at Pit 4 is a \$25,000,000 continuation of PG&E's long-term program for development of power at some seven or eight locations along the Pit River and its tributary, Hat Creek. Pit 4 diversion dam was built in 1926. And at that time an intake structure was built, together with 150 ft. of hydro tunnel. These

facilities were effectively sealed off from the current work in mid-July when an intake gate fabricated by Moore Dry Dock Co. was installed by Bigge Crane & Rigging Co. Since then the tunnel stub has been dried up, and connection of the new tunnel to it, in theory at least, offers no unusual problems.

When completed and concretelined to a finished diameter of 19 ft., the main tunnel will pass 3,600 cfs. to the new Pit 4 powerhouse, excavation for which is now proceeding on a flat carved out of the right bank of the Pit River just above Pit 5 dam. Effective head at the new powerhouse will be 338 ft., the water dropping through a pair of 780-ft. penstocks 12 ft. in diameter to a scroll case elevation of 2,065 ft. and passing through a pair of 50,000-kva. turbogenerators. Walsh also has the contract for construction of the powerhouse building proper, and has subcontracted structural excavation for this work to W. B. Jones of Redding. This report, however, is restricted to a review of tunnel driving operations.

Walsh came on the job in May 1952, set up his operations and portaled in at the west end of the tunnel late in September. The work was conducted from this single heading until April of this year when, with a construction

NEW RECORD for advance in one week of driving fully-supported tunnel of comparable dimensions was set by Walsh Construction Co. last month on the Pit 4 work. The 314-ft. total was logged in the course of driving a connection from the upstream adit to an existing intake structure at Pit 4 dam. (A previous record of 296 ft. had been hung up last February by miners in the main heading.) The tunnel is a modified horseshoe section being driven to a width of 23 ft. in volcanic rock of varying hardness. The new record was established during the six days beginning August 10. Daily footages, including a duplication of a previous "best day" of 56 ft. are: 51, 51, 53, 53, 56, and 50.

had completed along the river between ends of the tunnel, a 380-ft. adit was begun about 2,000 ft. below the 4 Dam. The adit was completed at the end of May and work since then, curtailed by the 40-day strike in June and July, amounts only to about 300 ft. of the main tunnel toward the intake structure. Actual progress figures for both headings as of the end of July are, for the main heading, 1,730 ft., and for the adit, 290 ft.

Tunnel supports

The tunnel section, as driven, is a modified horseshoe 23 ft. wide with nearly vertical sidewalls. According to expectations, it is fully timbered. Heavy and large, support is composed of 10 x 10-in. plumb posts surmounted by five arch segments. Spacing for the timber sets has so far ranged from 1 1/2 ft. to 6 ft., with the support beefed up by installation of 12 x 12-in. timbering in a few bad spots. Sets are connected by conventional collar bracing and are backed by lagging and crown bars and blocking to an average extent of about 50%.

The rock changes character fast but the tunnel men roughly classify all of it merely as volcanic—as one PG&E engineer put it, "Some of it's just harder than the rest." A geologist might define it more precisely:

The tunnel traverses a high mountain consisting primarily of a thick series of relatively thin and approximately horizontal flows of andesitic lava, with volcanic breccia formation along the upstream mile of the tunnel line and some agglomeratic material near the downstream portal. This last seems to have preceded the viscous lava flows seen higher up on the mountain slopes. Underlying the Neogene volcanics are Tuscan tuffs resting on top of older Potem shales. Both of these formations may be encountered in the tunnel since the contact

between the shales and the overlying lavas may well be traversed by the original ridges and canyons.

Being so close to the contact between the lava and underlying sediments accounts for the blocky and brecciated conditions of the lava rock and for the flows of ground water encountered in the tunnel. This water, though, is another story.

In common with other tunnel jobs, this one's had its water problems right along. The water in most places has been warm, as hot as 80 deg. F., and it has come in at pressures up to 100 psi. Quantities have not varied too much—a maximum of about 1,800 gpm., as against the 1,600 gpm. that is now being ditched alongside the tunnel tracks. Where large flows under pressure have been encountered, water has been grouted off in the conventional manner. Generally, the pattern is to drill about 4 or 5 holes 20 ft. deep and pump in grout to refusal. Pressures of as much as 500 psi. have been used, and in one particularly bad spot continuous grouting used up 3,700 sacks of cement.

This is one job along the Pit where going into the heading provides no relief from the mid-summer temperatures on the outside. Temperatures at the face range as high as 85 deg. F., and it's humid. For the relief of the miners, a circulating blower system has been installed (supplementing the regular ventilation) and is carried forward with the work. It has no cooling equipment, but, directed as needed through a canvas pipe, its high velocity blast helps a lot.

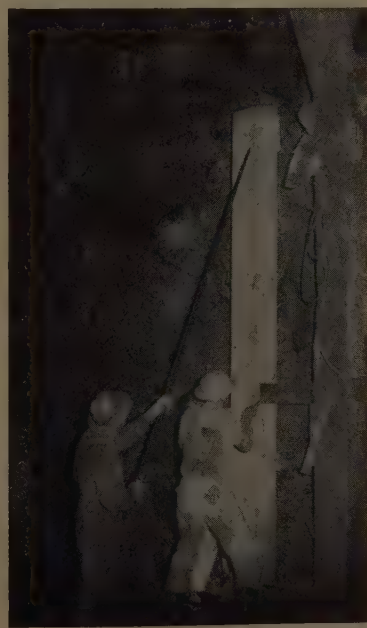
Typical driving procedure until the latter part of July could be observed only in the main heading. Cross-sectional dimensions of the upstream adit and the presence of only a short stub of permanent tunnel there precluded the use of the all-hydraulic-equipped jumbo which Walsh designed for the

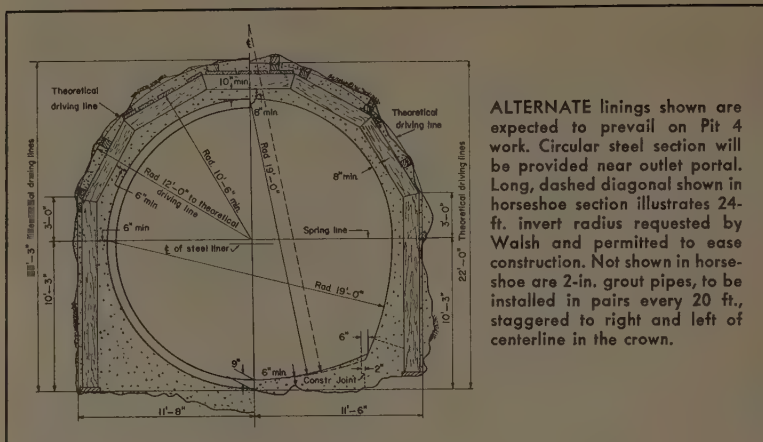


STRADDLING between rails 10 ft. apart, the jumbo gives plenty of clearance for carloads of material or for the mucker. The second deck of the jumbo (background) can be hoisted clear when the mucker works, but the remaining jumbo facilities—light, topside work space—are available at the same time to speed the cycle of necessary operations.

job. Operations in the adit heading are described only briefly and principally to strike a comparison in rock conditions encountered. As work in the adit heading got under way, 4-ft. rounds and support were the rule. The rock looked like coal and needed only light shooting to pull down a full round. About 65 to 80 holes, using

SUPPORT WORK after each round goes fast. The jumbo is held back while plumb posts are set, then moves in against the face so that miners setting arch support can work from the top deck. Timber segments, crown bars, bracing and blocking are all hoisted topside by the cherry picker, a whole carload at a time.





ALTERNATE linings shown are expected to prevail on Pit 4 work. Circular steel section will be provided near outlet portal. Long, dashed diagonal shown in horseshoe section illustrates 24-ft. invert radius requested by Walsh and permitted to ease construction. Not shown in horseshoe are 2-in. grout pipes, to be installed in pairs every 20 ft., staggered to right and left of centerline in the crown.

a V-pattern, did the trick. It is interesting to note that this heading, vacated for 40 days during the strike, did not slake appreciably. When work got under way again the face still stood vertical with very little rock having accumulated atop the remnants of the previous round, which had been incompletely mucked at the time of the strike.

In the main heading in mid-July, under exceptionally good conditions, the contractor was completing about 6 rounds on each day of 3-shift operation. This meant a daily footage of between 40 and 43, as compared to a best day of 54 ft. recorded some months ago. Overall average for the job, computed in July, amounted to over 30 ft. per day. A typical round in the light-timbered sections of the main heading was drilled 8 ft., with from $6\frac{1}{2}$ to $7\frac{1}{2}$ ft. being pulled. A V-pattern was the standard here too, but it took about 90 to 100 holes to do the job.

Drill jumbo operation

The drill jumbo, key to the progress, does everything but talk. It's a 3-deck affair riding on gantry rails of 10-ft. gauge. It mounts 9 hydraulic jibs that can be adjusted to drill any kind of a hole anywhere on the face. There are no columns. The second deck at the forward end can be raised by a hoist mechanism to give clearance for the mucker as it moves forward right under the jumbo. An additional hoist farther aft makes it possible to pick up an entire mine car loaded with support timber and blocking for installation of support segments in the tunnel arch. This same hoist acts as the cherry picker, incorporated into the jumbo on this job. The rear end of the jumbo is equipped with a gate which can be swung horizontally across the jumbo, and on which is mounted a standard coupling for hooking on a mine locomotive.

Holes drilled from this versatile jumbo are loaded with 45% Hercules powder and fitted with 1- to 10-ms. delays. Powder factor in mid-July was

about 3.75 lb. per cu. yd., with a round amounting to about 160 cu. yd. when mucked. Typically, each round is loaded out into a succession of about 7 trains totaling 38 cars. Passing these trains in and out of the tunnel is no problem. The tunnel section provides plenty of width, and the contractor's installation includes a couple of passing tracks and a California switch in addition to the cherry picker.

A typical shift crew underground, in exceptionally good conditions, is

Major Equipment, Pit 4 Project

DRILLING

- 20 $3\frac{1}{2}$ -in. Gardner-Denver drills
- 18 Gardner-Denver hydraulic jibs
- Timken, Ingersoll-Rand, Joy and Rock bits
- Gardner-Denver sharpeners
- Toledo threaders

MUCKING

- 2 Model 100 Goodman muckers (main heading)
- 1 Model 100 Goodman mucker (adit)
- 1 Model 75 Goodman mucker (adit)
- 8 Goodman electric storage battery locomotives
- 49 6-yd. side-dump "Steelcars"
- 20 Miscellaneous material cars

AIR SUPPLY

- 1 2,700-cfm. Ingersoll-Rand 2-stage electric-powered compressor (main)
- 5 500-cfm. Gardner-Denver compressors (adit)
- 2 16,000 cfm. Joy Axivan blowers on 26-in. fan line (main)
- 2 16,000-cfm. Joy Axivan blowers (main, 3,000 ft. inside)

MISCELLANEOUS

- 2 Gardner-Denver grout pumps
- Chicago-Pneumatic vibrators
- Comet and DeWalt power saws
- 1 Northwest Model 6 shovel
- 1 Northwest Model 80D shovel
- 4 10-yd. Euclid end-dump trucks
- 1 Caterpillar D8 tractor with bulldozer
- 1 International TD24 tractor with bulldozer
- 1 Lorain truck crane
- 1 Bay City truck crane



SURGE CHAMBER excavation to full section started like this in July, after a pilot raise from the tunnel had been brought almost to the surface. This annular trench was being dug to place forms for concreting an initial ring of the 63-ft. chamber diameter. Plan then was to shoot the material remaining at the center, daylight the raise at the same time, and dispose of the muck down below.

about 32 men, which does not include shop mechanics and electricians, timber framing crew, and miscellaneous other workmen. The bull gang is additional too: about 12 men, working days only. Here's how a shift breaks down:

- 1 walker
- 1 shifter
- 10 miners
- 10 chuck tenders
- 1 nipper
- 1 brakeman
- 4 motormen
- 1 dump man
- 1 compressor operator
- 1 heavy-duty mechanic
- 1 shift electrician.

Muck disposal differs between main heading and adit. From the main heading, the method is conventional—outside the portal there is plenty of room for the usual dump. Upstream, however, things are a little more cramped. A limited dump is bounded by a timber retaining wall against which dump trucks may be conveniently positioned for loading by power shovel. It is expected that a Northwest Model 6 shovel and four 10-yd. end-dump Euclids will adequately balance the speed of mining operations, and the muck will be hauled upstream for disposal in the Pit River channel at a point where concrete aggregates were produced 30 years ago during the original construction of Pit 4 Dam.

Concluded on page 124

MORE COMMENT ON SPECS FOR BETTER CONCRETE

Specs can't satisfy everybody; let's seek out the middle ground

THE ARTICLES expressing two viewpoints on this subject and the pertinent editorial in the July issue of *Western Construction* have opened up a subject on which frank discussion would help to bring about a better understanding. From the expression of many opinions it may be possible to find a common denominator that will recognize the areas of agreement and reconcile the areas of disagreement in this field.

The writer's interest is partly due to the fact that he has participated in the "traveling circus" mentioned editorially, both as acrobatic performer and as ringmaster. The acrobat, of course, is a panel member whose aim is to land on his feet as the finale of his act.

Where's the middle ground?

It probably never will be possible to write a specification which will appear entirely satisfactory from all viewpoints. There is no purpose in such extreme brevity as to render the specifications meaningless. On the other hand a specification in which every conceivable detail is elaborated is both unnecessary and undesirable. Either of the extremes presents a likely source of argument. The extreme of detail is likely to place the contractor in the position of inadvertently violating a specified requirement though in fact he may be following accepted methods practicable in the work. The extreme of brevity tends to introduce too many elements of uncertainty and a probability of frequent conflicts of viewpoint over interpretation.

As in most situations, there appears to be a middle ground of compromise that will most nearly satisfy all viewpoints. This middle ground may not be the same for all types of work. It may reasonably approach the detailed specification for major construction involving complex operations and may be greatly abbreviated for unimportant work of small volume.

By SAMUEL HOBBS

Engineer of Structures
Portland Cement Association
Los Angeles, Calif.

How to use "canned specs"

The use of "canned specifications" has been discussed with emphasis on the undesirable features. However, an analogy might be drawn to the use of canned fruit. The fruit or specification items should be selected and sorted for canning, properly labeled and used before any deterioration occurs.

In fact, the intelligent use of canned specifications, kept up to date, selected section by section to cover the requirements of the particular work, put together in logical sequence, should result in the framework of an acceptable job specification. Around this framework a complete and concise final specification can be readily built by the addition of special provisions which seem necessary as spe-

cific job requirements.

In writing fundamental specifications for concrete building construction, brevity can be accomplished by reference, wherever possible to such accepted standards as the A. C. I. Building Code. The quality of concrete may be determined on a basis of assumed strength based on water-cement ratio, known as Method 1; or on the basis of strengths obtained in prior tests of the materials selected for the job, known as Method 2. Either of these methods can be readily included by reference and all major building codes recognize and approve them.

Similarly, basic requirements for handling and placing of concrete and allowable limits of slump appropriate to the type of work may be selected from applicable provisions found in the A. C. I. Building Code and the 1940 Report on Recommended Practice of the Joint Committee. The bulletin "Design and Control of Concrete Mixtures" of the Portland Cement Association also contains information that would be helpful to the specification writer. Fundamental requirements for curing and form removal may be obtained from the same sources, and may be readily selected to fit the conditions of the job. Above

NOW WHAT DO YOU THINK?

CAN—AND SHOULD—many provisions of building concrete specifications be changed?

Two viewpoints, the designer's and the builder's, were presented by C. M. Schrepferman and K. R. White on pp. 62-64 of the July issue, based on papers originally presented at the Better Concrete Conference held early this year at the University of Colorado.

Two men, speaking again from two different standpoints, join discussion this month. Their thoughtful comments, along with the original articles, should be read by all de-

signers and builders who are anxious and willing to solve cooperatively the problems presented by current specifications. It is hoped that space devoted to this discussion by *Western Construction* will provide some impulse toward action on these problems.

Comments received from other builders, superintendents and engineers will be presented in *Western Construction* during coming months. Your comment is invited. Address Editor, *Western Construction*, 609 Mission Street, San Francisco 5, California.

all other considerations, the writer believes that specifications should stress and inspectors should demand that concrete should be so handled and placed that it remains uniform and that segregation is prevented. In the case of architectural concrete specifications, the P. C. A. information sheet on that subject would serve as a helpful guide with reference to special provisions for limitations of aggregate grading, rate and method of placing and technique of patching and finishing exposed surfaces.

To the extent that such a selection of statements of accepted good practice may be considered "canned specifications," the use of such material appears to be entirely justified and, in fact, highly desirable. However, the writer can agree with Mr. Schrepferman that the casual transfer of specification items from one job to another without regard to applicability to existing conditions is likely to be a source of confusion and a hardship on the contractor, and may result in unsatisfactory construction. It may be dangerous to give the field inspector final authority to make radical changes conflicting with written specifications, but there should be no hesitation on the part of engineers and architects to promptly approve changes when specifications inadvertently violate the principle of intent to secure good construction in an economical and feasible manner.

Field control

There are some obvious errors and inconsistencies which are too commonly present in attempts to control the use of concrete mixtures. Sometimes the specification of a strength requirement is a sufficient indication of quality. This may be true in some structural work where concrete will be protected from exposure and hence a strength proportioned to working stresses is of principal importance. However, when climatic and exposure conditions are principal criteria, a maximum allowable water/cement ratio should be specified, even though desired strength levels may be readily obtained with higher ratios.

Other factors may be of sufficient importance in a particular job to require safeguards or clarifying provisions in the specifications. For example, it may be necessary to call for Type II or even Type V cement for the production of concrete resistant to moderate or severe exposures to sulfate soils or waters. The P. C. A. bulletin on mixtures discusses the various conditions indicating the use of or need for particular cement types.

If air-entrainment is employed, and it offers many benefits for many types of work, specifications should concisely state the limits of air content and require checks by field tests to determine that specified air contents are obtained. The use of air entrainment may require slightly richer

mixes to produce equal strength, if maintenance of concrete strength is the criterion. However, reduction of slump may be possible with air entrainment due to the better workability, in which case there would be little or no increase in cement content. For important work, such factors may be recognized and outlined in the specifications, with provision for adjustment based on test data.

Ready-mixed concrete, when specified on a strength basis, should also be specified on a basis of slump limits required. Too frequently, a producer is given an order to deliver 3,000-lb. concrete. Let us say that the instructions are vague and he quotes on a 3-in. slump concrete. A job foreman insists that it is too stiff and water must be added. Job cylinders fail to come up to the required strength. To deliver 3,000-lb. concrete at 6-in. slump the producer must increase the cement content. Such a situation results in conflicts over responsibility for increased cost and may disrupt the work. A full understanding of the requirements, a clear statement of them in the specifications, and an

effort by all parties to carry out the intent, will obviate a major part of the job problems.

If every conceivable problem were dealt with in specifications as in the cases outlined, a specification document could be printed only in the Congressional Record. Fortunately only a certain number of such conditions apply forcibly to a single job and only a few are important in the ordinary job. As a general principle specifications will be most useful when general requirements are briefly stated and when special conditions involved in the work are concisely and specifically formulated.

A good specification defined

A specification is most valuable when it conveys to the bidder a clear picture of the requirements that affect his methods and costs of construction, and when it assists the contractor, the designer and the inspector to solve cooperatively the problems that arise in the progress of the job on the basis of good standards of practice without the sacrifice of economy or efficiency.

Recipe for good concrete: realistic specs, practical control, hard work

By W. E. NAUMANN

Vice President

M. M. Sundt Construction Co.

Tucson, Arizona

(President, Arizona Chapter,
Associated General Contractors)

IT IS APPARENT from the information contained in the two articles that both contractors and design engineers throughout the country are faced with the same problems that we are faced with in this area, and we feel that the views expressed both by Mr. Schrepferman as a contractor, and by Mr. White as a structural engineer responsible for design, all have a great deal of merit.

My personal ideas regarding the solution of most of our concrete problems are contained in either one or the other of the articles and without going into a great deal of detail, can be summed up very briefly as follows:

Dangers of "canned specs"

It is my opinion that the greatest evil that exists in the specifications for concrete that we come in contact with is the use of canned specifications without a great deal of thought being given the general structural design and details for the final end use of the concrete.

I feel that any concrete structure worthy of good design should certainly be worthy of a set of specifica-

tions tailored to meet properly the requirements of the particular structure, taking into account the structural details as regards forms, reinforcing steel, whether the concrete is to be exposed or protected, and any requirement of water tightness. If these items are taken into account in the preparation of the specifications, then the contractor's problems as regards practical methods of mixing, placing, vibration, and those having to do with slump range will be greatly lessened.

I also feel that the matter of specifications providing an arbitrary slump range without proper regard for the structural detail and the contractor's problems of placing arising therefrom, has long been a serious fault of concrete specifications, and the fact that this condition can be corrected without any sacrifice of quality, durability, structural strength, and water tightness by the simple use of an established water/cement ratio indicates that there has been very little thought given to the contractor's problems in this regard. I am heartily in accord with the opinion that the person preparing the concrete specifications for a given structure should be entirely conversant and familiar with every structural detail so that the problems that will later arise in the actual construction can be provided for, in a large measure, in the actual preparations of the specifications.

Continued on page 137

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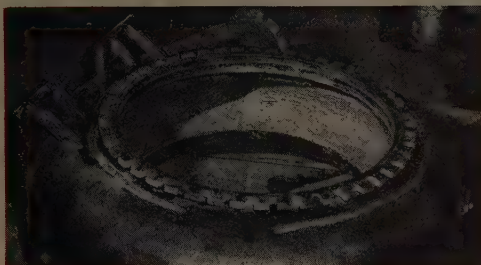
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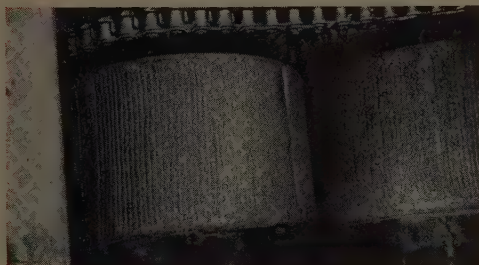
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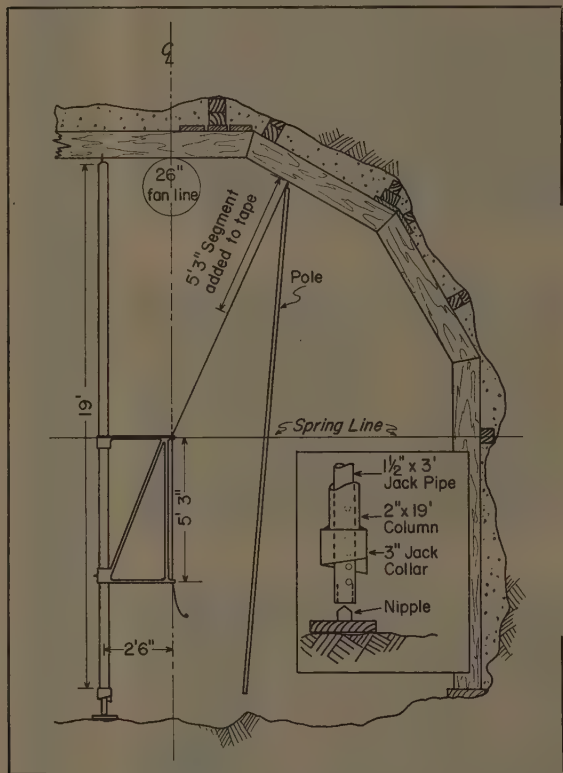
HOW IT WAS DONE...

Plumbing provides plumb for tunnel surveys

THERE ISN'T a tunnel job anywhere these days for which the engineers haven't figured out a new trick in surveys. On PG&E's Pit 4 tunnel, being driven by Walsh Construction Co., the "goon" machine was dreamed up by PG&E's field engineer, Forest Sorenson. His idea was to simplify the chore of cross-sectioning timber, when a fan line makes it impossible for him to establish his instruments directly on the tunnel centerline.

Knowing from previous tunnel surveys the "soffit" elevation of any given crown segment, and knowing what the crown elevation of the tunnel should be at that point according to design, it is a simple matter to determine how far down the pipe from the crown segment is spring line elevation. Using a tape, the sliding framework can be accurately positioned with its upper arm at spring line elevation and the assembly pinned in that position to the pipe. Then the machine gets complicated!

Sorenson has fastened one end of a piece of survey tape to a long pole. The other end of the tape passes through rollers at the end of the upper arm on the framework (which is the intersection of spring line and centerline when the machine is in position) and then down through similar rollers in the lower arm exactly 5 ft., 3 in. below. The tape has an extra piece spliced in, also just 5 ft., 3 in. long.



HERE IS HOW the "goon machine" is set up for operation, the sliding framework in position after the 2-in. pipe column alone has been plumbed. Inset shows detail of jack. The framework is 1/2-in. electrical conduit pipe. It is positioned as described in the text, assisted by graduations, in tenths of feet, along the 2-in. column. The graduations are punched, and a poor man's vernier is provided by having 2 punched holes in the lower collar of the framework. These holes are one-half tenth apart; so the framework can be positioned to that accuracy on the column and pinned. The upper collar of the framework has a spring catch to take all play out of the machine.

To do the job, Sorenson started out with something that looks like an adjustable steel shore. It's a 19-ft. piece of 2-in. electrical conduit pipe with a jack arrangement at one end and tipped at the other end with a stout wood screw. This wood screw is restrained from turning, so that the entire length of pipe acts as a handle on a screwdriver, but there is a ball joint arrangement so that when the screw is driven into the crown segment of the timber, the pipe section can hang plumb. With the vertical established in this manner, the assembly is made rigid by setting the jack down on the tunnel invert.

Surveys in the tunnel generally, on account of the fan line, have been carried forward on an offset line 2 1/2 ft. from centerline. It is this offset line to which the goon machine is set. Riding up and down freely on the main pipe (after plumbing) is a framework just 2 1/2 ft. wide: the ends of its arms are therefore on centerline at any given time.

Now, the pole is raised to hold one end of the tape against any given point on a timber segment—for practical purposes the center of that segment, which is its closest point to the inside diameter of the tunnel. The free end of the tape, below the goon machine, is then stretched tight. A direct reading where the tape passes through the lower arm of the machine gives the distance from the upper arm to the point on the timber segment. In actuality, this measurement is the distance from the timber segment to the point where centerline and spring line intersect.

Sorenson takes these measurements at the center of each timber segment and also at spring line on each plumb post. Thus, he is up-to-date on whether or not timber support is being set in a manner which will provide for free clearance of tunnel lining forms as well as for the prescribed clear thickness of concrete lining.

With the goon machine, it's easy to find out whether a little shaving of this or that timber may be necessary, or whether an entire set must be moved to give the necessary clearance. Sorenson doesn't take too much credit for the machine, but his assistants, Jack McIntyre and Jerry Gubert, vouch for the fact that it removes an awful lot of the dog work from tunnel surveys!

PRODUCTION: **BIG**
DOWN TIME: **SMALL**

REASON: **CAT*** DW20s



Major earthmovers on this 1,800,000 cu. yd. contract at Des Moines Municipal Airport are high-speed, high-capacity Caterpillar DW20 Tractors with No. 20 Scrapers. John P. Abramson Construction Co., Des Moines, Iowa, assembled a line-up of big yellow equipment including dozers, DW10s and motor graders to build the 2,800-ft. extension on the northwest runway. It calls for two fills—one of 51 ft., the other of 35 ft. Superintendent Jay A. Scott reports: "Caterpillar equipment is the most standard there is—down time is small with it. We get very good service from our dealer."

Jobs like this need big producers that stay in there working—and you're looking at one in the DW20. It has a travel speed of 26.6 m.p.h., a capacity of 20 cu. yd. heaped and 15 struck, and plenty of power—225 HP at the drawbar. Cable-controlled, it loads and unloads quickly, with positive action for handling sticky materials that foul up ordinary units. Big tires float it over muddy or sandy terrain. Three-point suspension allows

the DW20 to move over bumpy going with four wheels on the ground. Power-packed traction licks adverse grades. And it's a *safe* rig—operators handle it with the confidence that spells output. All these—and many other advantages—contribute to *fast cycle times*.

Make it *prove* its performance to you *on your job*. Your Caterpillar Dealer will be glad to demonstrate. Remember, he's always available for on-the-spot service. Call him today!

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

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks — ®

**NAME THE DATE...
YOUR DEALER
WILL DEMONSTRATE**

HOW IT WAS DONE...

Rake attachment speeds brush clearing job

ANOTHER set of gear from the versatile bulldozer's quick-change repertoire is speeding the right-of-way clearing on a 124-mi., 69-kv. line being constructed by Walco Engineering & Construction Co., Tulsa, for an electric cooperative. This time-and-money saving device is a brush rake attachment for the blade of an International TD-14A crawler tractor. Made of five 90-lb. rails reinforced on the hollow sides and extending 18 in. below the dozer edge, the rake is fastened to the top edge of the blade by a hinge. With this arrangement, when the TD-14A backs up, the rake swings up to dump the collected trunks, limbs, and most of the smaller twigs. The hinge also permits the rake to be mounted or detached in a matter of minutes.



INVENTOR J. V. Wilson demonstrates land rake to tractor operator Allen Jones of Walco Engineering and Construction Co. Simply designed and simple to operate, the rake is hinge-mounted to dump its load of brush in a pile when the tractor backs up.

Before inventor J. V. Wilson leased his TD-14A and rake to Walco, a large clean-up crew did all the work by hand. Now only two men have taken over. One man operates the tractor while the other serves as helper by opening fences and removing small brush missed by the chain-saw cutting gang.

It's easy to sharpen carbide drills (when you know how)

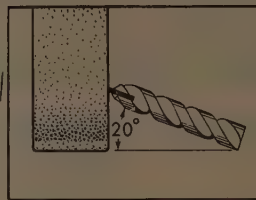


FIG. 1

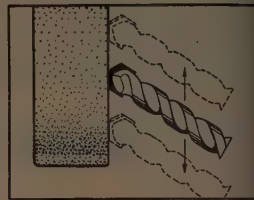


FIG. 2



FIG. 3

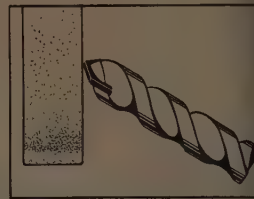


FIG. 4

FOUR STEPS in sharpening carbide tipped masonry drills have been outlined by the Carbology Department of General Electric Co.

The Department recommends using a silicon carbide wheel for use in resharpening the drills and restoring the original 118-deg. included angle. The drills should be sharpened when a 1/64 in. or more flat develops on the cutting edge. The steps:

(1) Bring the drill against the side of the grinding wheel at a 20-deg. angle as shown in Fig. 1. This 20-deg. angle should be maintained, otherwise the drill will not cut properly.

(2) Using moderate pressure, move the drill back and forth across the wheel to avoid overheating (Fig. 2). (If overheating should occur, do not drop the drill into liquids to cool.)

(3) Keep the two cutting edges of the drill of equal length while sharpening (Fig. 3). If one edge varies in size, the drill will make oversized cuts.

(4) Repeated resharpening of the drill will reduce the clearance between the carbide tip and the steel shank. When necessary, grind away the steel from behind the carbide tip so the steel is nowhere closer than 1/32 in. to the working surface of the carbide blank (Fig. 4).

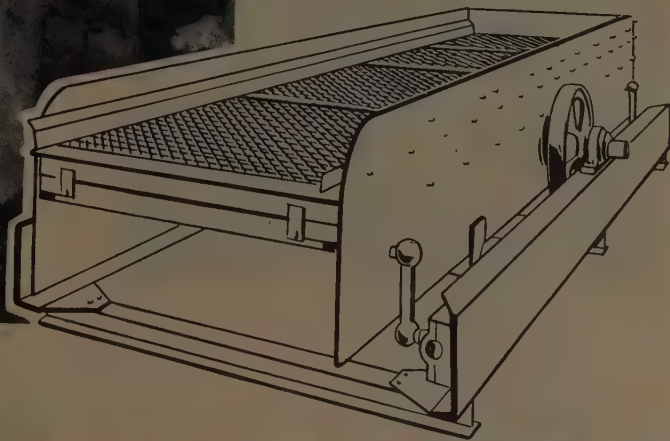
The drills can be sharpened on either a pedestal or bench type grinder. If the drill must be sharpened while on the job, a portable drill can be mounted on a stand and a small silicon carbide wheel used.



Thrills, chills, but no spills

... is the 23-yr. record of the world's steepest railway at Colorado's Royal Gorge, which descends 1/3 mi. at a 45-deg. angle to the canyon's bottom. It has just been completely overhauled and fitted with a new set of specially-made wire rope, furnished by the Wickwire Spencer Steel Division of the Colorado Fuel and Iron Corp. The funicular railway was built in 1931 at a cost of \$200,000. Each beam supporting the tracks was laid on concrete pillars, which were poured into the solid granite walls of the canyon.

PROOF

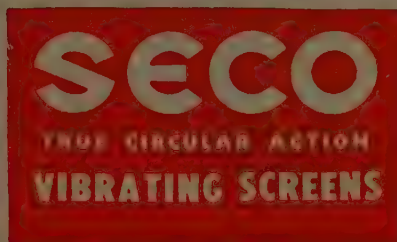


SECO DRY SCREENS SAND

at W. F. Saunders and Son, Syracuse, N. Y.

SAVES 25% BANK RUN SAND NORMALLY WASHED AWAY

Here's sand right from the bank being dry screened with a 4 x 12' single deck Seco at the Syracuse, New York plant of W. F. Saunders and Son. And here's the on-the-job story of the success of this operation. First, a better product because, while this Seco screen efficiently removes the clay balls and stones they don't lose the fines usually washed away in a wet screening operation. Second, a more economical operation because no pipes, pumps or special equipment is needed and they eliminate the approximately 25% loss of material usually associated with wet screening. (Think of the savings in trucking from the pit to the screening plant alone.) Third, a trouble-free operation because Seco vibrating screens require so little maintenance as proven on this and thousands of other installations throughout the country. How about your dry screening problems? Sand, Ag-lime, etc. Why not consult Seco screening specialists right now. Be assured of prompt, interested help. Our whole organization is devoted to one purpose . . . to build the finest vibrating screens for every job requirements. Write, phone, wire!



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Patented construction gives Seco Vibrating Screen better, sharper, whip in action . . . Keeps all the vibration in the live screen body. Over 300 models tailored to your specific requirements.

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WESTERN MACHINERY CO. Spokane, Washington

SCREEN EQUIPMENT CO., INC.

1750 Walden Avenue, Buffalo 25, New York

HOW IT WAS DONE

City refuses to waste refuse

TWO PURPOSES are attained by the City of Burbank, Calif., in its handling of refuse disposal. Waste, brought out from city in garbage truck, is covered to 1-ft. depth by the Caterpillar D8 tractor with No. 8 S bulldozer blades shown here, watered, and rolled with a sheepfoot tamper every day. This is part of a combination land-fill and reclamation program. Estimated yearly saving is \$100,000 compared to incinerator disposal.



Clay pipe answers acid problem

MORE THAN 2,200 ft. of 8- and 12-in. vitrified clay pipe draws fumes from hydrochloric and nitric acids and radioactive isotopes from experimental work at the University of Washington, Seattle. Clay is used for the ducts because it is completely immune to disintegrating chemical action.

Now you see it, now you don't

DIFFICULT job clearing brush from this canal bank was facilitated by use of this special 5,100-lb. attachment for a crawler tractor. Known as the Briscoe Sloper, the attachment was designed to give the operator all the visibility he needs for maximum control and easy handling. It can be used with crawlers having about 80 or more hp.



12-story catwalk to penthouse

MAINTAINING a corresponding working level between the rising stories of a penthouse project and delivery height of 12-story material hoist was solved with tiered catwalks of sectional steel scaffolding by Naugle-Leck, Inc., general contractor. A basic one-story catwalk was erected when the first floor was completed; then, as subsequent floors were added, additional tiers of scaffolding brought the working level even with the material dumping station. Erection was expedited by Speedlocks and floating coupling pins, features of the Waco equipment.

Why "breathing space" between each wire?

- To provide maximum flexibility—tiny, precise amounts of "breathing space" are engineered between each of these wires.
- There are 295 wires in this particular construction . . . 9 different sizes of wire.
- All wires are drawn in Macwhyte's plant to assure uniform quality.
- Heavy, tenacious lubricants fill the spaces between wires. This *Internal Lubrication* guards against corrosion and friction, and also increases flexibility.
- Macwhyte's PREforming process forms the wires and strands into a spiral so they lie naturally in place with a minimum of internal stress.
- From a thousand and one wire ropes, Macwhyte engineers are ready to recommend the right rope for your particular needs. For best, lowest cost wire rope service, write today for recommendations of the best constructions of rope to use on all your equipment.



This Macwhyte Rope is 6 x 41 Filler Wire PREformed Lang Lay Monarch Whyte Strand with IWRC, just one of the thousand and one wire ropes made by Macwhyte.

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THE RIGHT ROPE

FOR YOUR EQUIPMENT

Ask for G-15
Wire Rope Handbook



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PORTLAND 9 . . 1603-N. W. 14th Ave., Ph: BRoadway 1661
SEATTLE 4 87 Holgate Street, Ph: MAin 1715

1044L

REPORTS

FROM THE COURTS

Contractor's Duty Toward Subcontractor's Employees

It is not often that we have such a clear and concise summary of the law as may be found in the opinion reported here. The subject of this case is the duty of a general contractor to look after the safety of the subcontractor's employees. The opinion of the court states the law in simple language and is quoted at length. Citations of authority have been deleted to facilitate reading. While this is a California case, the author ventures the opinion that this is a fair statement of the law of negligence that would apply in most places. Some differences must be anticipated however in the various jurisdictions.

"The complaint alleged that defendants with full knowledge of the fact that the wires were uninsulated and carried electrical voltages of over 750 volts, negligently directed . . . Chase to perform work and carry materials within 6 ft. of said wires without taking the proper precautions to prevent injury to him, and without warning him that the wires were uninsulated and carried high voltage.

"Plaintiff urges that defendants, as general contractors, were under a duty to provide Chase, an employee of a subcontractor (for reinforcing steel), with a reasonably safe place to work . . ."

Chase was placing reinforcing steel. A companion testified that Chase was on the roof handling a 15-ft. length of steel rod which had to be tilted upward for insertion into a stirrup. "Suddenly there was a dull roar; Turner looked up to see a flame covering Chase's body. The top of the rod . . . had contacted the high voltage wire which hung over the roof directly over the two men. The rod had grounded at the bottom end on a piece of steel which was sticking up through the roof. Chase died the next day."

"We use the term 'general contractor' to indicate one who contracts directly with the owner to do the work; and the term 'subcontractor' to indicate one who contracts with the general contractor to do part of the work.

"An employee of a subcontractor doing work contracted to be done by the latter is an invitee of the general contractor, and the duty owed by the general contractor to such employee is that owed to invited persons . . ."

"The general rule is that a general contractor on a construction job who

is in control of the premises is burdened with the duty to use ordinary care to provide a safe place for employees of a subcontractor to work, including the duty to warn such employees of a danger, either known to the general contractor, or discoverable by the exercise of ordinary care, or otherwise to protect the employees from injury, and to avoid exposing them to injury on account of dangerous conditions. He is bound to take reasonable measures to protect the employees of a subcontractor from injuries likely to arise from places of danger about the building. If he neglects this duty by failing to give adequate notice or warning of the existence of a place of danger, he may be found liable to an employee of a subcontractor for resulting injury . . .

"As a part of supervising the work, it is the duty of the general contractor to oversee conditions in the work of each subcontractor so far as they affect the safety of the employees of the subcontractor. Although the oversight of the work of an employee of a subcontractor is properly the function of the subcontractor who employs him, if the general contractor's superintendent directs such employee in a particular matter, the superintendent may be found to have assumed control of the work of the subcontractor to that extent, and the general contractor may be held responsible for his resulting injury,—as where the superintendent of the contractor directs a carpenter to go on planks not properly supported by the superintendent's employer . . . or sends an employee into a dangerous place and fails to warn him when danger develops . . . or tells a stevedore to load a derrick sling with bags of sugar from the side of the pile rather than from the top as he had been doing. While a general contractor is not under a duty to warn an employee of a subcontractor of obvious danger, the question whether the danger was obvious is a question for the jury. If defendants had reasonable grounds to apprehend that Chase might come in contact with the electricity in pursuit of his work, reasonable care required to warn him or guard the wires.

"We hold it was the duty of defendants, as general contractor, to exercise ordinary care to provide Chase with a reasonably safe place to work . . ."

¹ *Revels v. So. Calif. Edison Co.* 248 P. 2d 986.

By
HOWARD S. BURNSIDE
Attorney at Law
Registered
Professional Engineer



Conditional Acceptance Held Not a Final Acceptance

State of Washington statutes provide that laborers, materialmen, and subcontractors shall have a right to sue on the bond of a contractor who has done work for the state or some public body. However, they must file a claim with the governing body such as the counsel, board, etc., within 30 days after completion of the work and acceptance of it by affirmative action of the board or other governing body.

In the case of *National Blower v. American Surety Co.*¹ the Board of Directors of the Edgemont School voted to accept the contract of the general contractor as complete "subject to the completion of certain items" to be done during the 30-day waiting period. There were three items: 2 door closers; 7 soap dispensers; non-skid tile boys entrance. This vote occurred on November 13. Thirty days passed. Then over a period of several months claims were filed. The plaintiff was one of these claimants.

The sole question was whether the foregoing acceptance was final and absolute, thus barring a recovery by plaintiff. The court held it to be a conditional acceptance and not final. The plaintiff filed his claim in time therefore and could recover against the contractors bonding company.

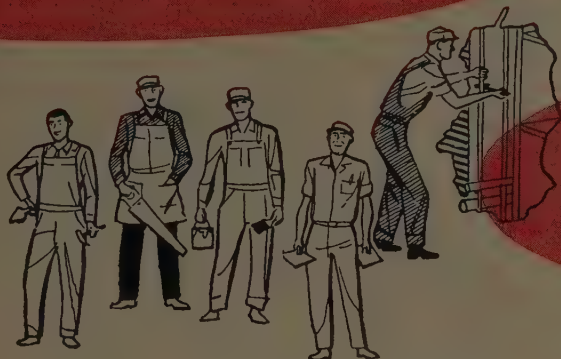
In its opinion the court cited another case holding that "even where a small amount of work remains to be done on a contract after the date of an acceptance of the work . . . absolute and final in its terms, the period for the filing of claims against the bond begins to run from the date of such acceptance . . ." Why then would the court here say there was no final acceptance when there were such a few items to be done? The difference is this. The board specifically made its acceptance subject to the completion of the several items. The inference is that had the board made an unqualified acceptance with an understanding that a small amount of work remained, the acceptance would be final. A few words made the difference in this case.

The reader should note particularly that this statute is somewhat similar to the familiar mechanics lien laws but is different in many respects and the two should not be confused.

¹ *National Blower and Sheet Metal Co. v. American Surety Co.* 248 P. 2d 547.

Here's why CORROSION COSTS YOU MORE than WROUGHT IRON

**IT TAKES ONLY ONE
TO INSTALL PIPE...**



**BUT FIVE
TO REPAIR IT!**

One of the most convincing demonstrations of the economy of using *durable* material is a pipe repair job where low-first-cost material has failed—and is being replaced.

The original installation had been quickly made by plumbers. But the replacement calls for hours of work by as many as five crafts: plumber, mason, plasterer, carpenter, painter. Often, maintenance is billed at overtime rates. And this is only part of the cost story. Production slow-down, disrupted routine may amount to far more than the maintenance charges.

Fortunately there's an answer to pipe durability in corrosive

services—Byers Wrought Iron pipe. In literally thousands of applications where corrosion is a threat, the use of this material has proved the soundest kind of economy move.

The next time you specify or approve pipe, you'll find it profitable to investigate the durability records of wrought iron.

Our bulletin, "The ABC's of Wrought Iron," gives the what, why and where of this material. Write for a copy.

A. M. Byers Company, Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, San Francisco. Export Division: New York, New York.

*Remember —
the pipe that lasts
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SEPTEMBER 1953

Test boring starts for another floating bridge

TEST BORING for the \$19,000,000 proposed floating bridge across Washington's Hood Canal was expected to be under way in the middle of August. Public hearing of the Washington Toll Bridge Authority's preliminary plans already has been held, and the Corps of Engineers is at present studying feasibility of the project. According to Charles E. Andrew, chief engineer of the Toll Bridge Authority, financing probably will be by sale of a 20-year revenue bond issue. He has estimated a \$1,-200,000 annual income resulting from tolls, on the basis of at least a 75% increase in traffic over the existing ferry which serves the spot. Three clearance spans on concrete piers will be constructed on the Lofall (south) side and the remaining 6,200 ft. of the bridge will be a floating structure similar to that crossing Lake Washington.

\$40,000,000 trans-Sierra highway urged and pushed

AT LEAST the half-way mark has been reached toward realization of legislation for the proposed trans-Sierra highway from the Nevada state line to the San Francisco Bay. In the middle of July California's Governor Earl Warren signed a bill authorizing \$20,000,000 of special State funds for the project to be spent in periodical allotments for the next 5 fiscal years. The next task, matching that sum with Federal funds, was immediately undertaken by U. S. Senator Thomas H. Kuchel who pledged his efforts towards advancing the necessary legislation in Washington. Several weeks later Congressmen Clair Engle and John E. Moss introduced the highway bill in the House of Representatives.

Leader in the drive for the trans-Sierra highway has been the Placer County Chamber of Commerce, headed by D. H. Dobbas, which urged the 4-laning of Highway 40 rather than construction of an entirely new route. Action taken by the State Highway Commission after the law went into effect did designate Highway 40 as the trans-Sierra route.

The results of a report made last

year by an Automotive Safety Foundation survey found about 110 mi. of the overburdened U. S. 40 in need of improvement. Critical needs were set at \$42,091,000 and further needs over a 15-year period were set at an additional \$31,431,000. These figures include 90 mi. in Placer County and the remainder of the highway extending eastward into Nevada County and Reno. Average cost per mile for 2-lane improvements has been estimated at \$207,000 per mile; for 4-lane sections \$1,135,000 per mile, and \$2,730,000 per mile for 6- or more lane sections.

WASHO plans convention at Santa Fe in October

A COMPREHENSIVE technical program, along with many recreational and social events, is planned for the 32nd annual conference of the Western Society of State Highway Officials in Santa Fe, New Mexico, October 7-10. Presiding will be Mark U. Watrous, President of WASHO and Colorado Chief Highway Engineer. Registration begins the afternoon of Tuesday, October 6, with the first general assembly the following morning. Attendance of 120 official delegates is expected from the 11 Western states and Texas, Hawaii, and Alaska.

MARK U. WATROUS
Colorado Chief
Highway Engineer
and President of
WASHO,
will preside at
October convention



Features of the convention will be reports of WASHO test road activities, panel discussions on technical subjects of high current interest, and presentation of the \$500 annual Dr. L. I. Hewes Award to an engineer from the West who has made a significant contribution toward the betterment of highway engineering techniques. A series of tours in and around Santa Fe have been arranged for the entertainment of WASHO visitors, and various activities are offered for ladies.

Personnel-shy Bureau keeps program rolling

DURING the month of June the Bureau of Reclamation experienced the second highest month of construction activity in the last fiscal year while simultaneously its personnel was being reduced 1,511, with an annual saving of nearly \$7,400,000 in salaries. According to a report from Assistant Secretary of Interior Fred G. Aandahl, who supervises Bureau activities, the sum of \$22,200,000 spent in June was exceeded in the fiscal year only by last September. The fiscal year 1953 also turned out to be the best of post World War II with respect to program accomplishment with \$203,800,000, 84.6% of the program goal of \$240,900,000. The 1952 program accomplished 78.6% of its goal and 73.8% was realized in 1951. As of June 30 Bureau personnel totaled 11,573.

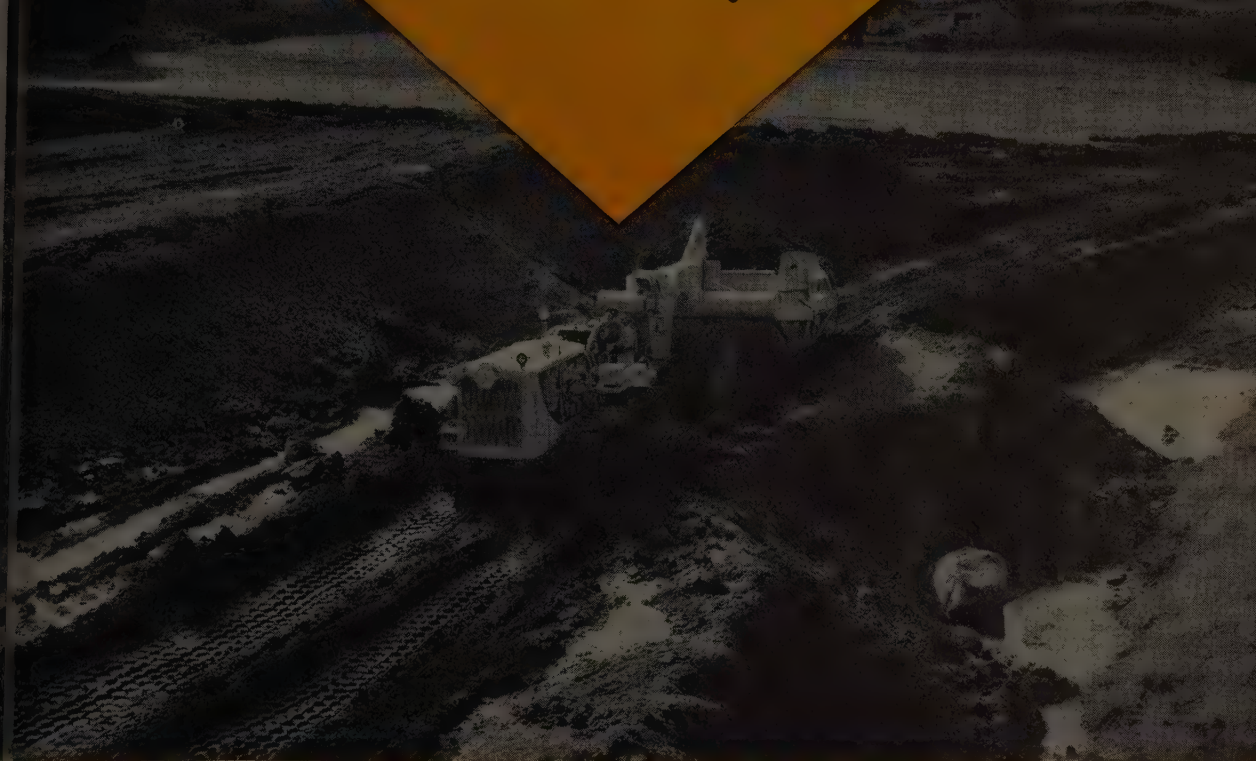
Bond troubles force Tri-Dam bids rejection

DUE TO complications rising out of higher interest rates and an unstable bond market, directors of the Oakdale and South San Joaquin Irrigation Districts were forced to reject bids on the Tri-Dam Project though all low bids were below the engineer's estimates. Invitations for this project were issued in February and received in April but by the time work was scheduled to begin in May, at the same time revenue bond bids were to be asked, interest rates had risen to about 4% to 4½% as compared to 3% a few months earlier. This factor means that the 1% increase would so augment the cost of the entire project over the original estimate that bids on bonds were consequently postponed to a later date.

At present, plans include both new construction bids and selling the bonds so that work may begin in the spring of next year. It is hoped that interest rates will move lower by then so that the work may be financed more nearly according to original estimates.

A complete summary of unit bid prices on this multi-million dollar project was published in *Western Construction*, June, pp. 170-182.

This scraper makes tough earthmoving jobs look easy



WORKING on a contract that called for moving 395,000 cubic yards of rock and clay and grading a 70-acre industrial site in 5 months' time, J. O. Archibald of Redwood City, California, needed rugged equipment with plenty of power and capacity. The terrain was half hill and half swamp. Fourteen Caterpillar Diesel Tractors, with Bulldozers and Scrapers, were used in completing the contract, for Mr. Archibald believes in standardizing on big yellow equipment. But he found one of the most efficient units for this type of job was the Cat* D8 Tractor-No. 80 Scraper combination.

The flat-bottom No. 80 is a brute for work. It handles 20 cubic yards heaped on every swing. Positive cable controls permit easy, accurate con-

trol of digging and spreading. Big tires give ample flotation in soft ground, and make hauling smooth. The push-plate, extending well back of the tires, allows in-line power for the pusher.

The surest way to *prove* what the No. 80 Scraper can do for you is to see it in action on your own job. Your Caterpillar Dealer will gladly arrange a demonstration. Call him today.

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

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**NAME THE DATE...
YOUR DEALER
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Folsom Dam project survives cofferdam and flood troubles

A PLAY-BY-PLAY description of cofferdam and flood troubles provides the necessary background for a report on progress in the construction of Folsom Dam on the American River in California. Geologic fault troubles enter the picture too. For that story, see pages 63-64 of this issue.

As reported and pictured in *Western Construction* in February and June of this year, the anticipated loss of the upstream cofferdam occurred on January 9th. A river flow estimated at 25,000 cfs. backed up behind the

cofferdam, saturated it, and finally carried half of it away within a 20-min. period after the first breaching. The bed load of the river at that time, supplemented by previously settled material behind the cofferdam as well as earth and rock in the cofferdam itself, was destructive to an extent greater than anticipated. Two bents of the contractor's trestle were carried away and steel forms still in place on channel concrete were ruined.

This same flood breached 5 cells of the powerhouse cofferdam erected by

Guy F. Atkinson Co., flooding that work out. During the ensuing four months these cells were replaced and powerhouse work was able to proceed.

First attempt by the prime contractor to rebuild the upstream cofferdam in the river channel was begun on May 11. Unfortunately, however, a flow of 10,000 cfs. on May 20 carried away the uncompleted work. (The diversion tunnel capacity is 9,000 cfs.) This same flood overtopped but did not destroy the powerhouse cofferdam.

By the latter part of June the river flow had fallen to a volume of 6,500 cfs. and reconstruction of the upstream cofferdam was commenced once again on June 24. It was completed and the channel section of the dam site dried up by the first of July. Then began the chore of uncovering the buried concrete which had been poured the previous season.

Concrete had been poured in 1952 in Blocks 13 through 17. Highest of these were Blocks 13 and 15, which stood to an elevation of about 180 ft. It was found this summer that gravel had been carried into the site to an elevation of 210 ft. This extensive deposit was further evidence of the fury of the January flooding.

Because of the excavation required to uncover this work, and also because of the necessity for correcting the fault condition encountered in the left abutment, major concreting so far this season has been carried out only in the upper blocks of the left abutment. Some concrete also has been poured in retaining wall "B" on the right abutment, encircling the end of the earth dam section there. Concrete for this operation has been trucked in 4-yd. air-operated buckets from the batch plant across the upstream cofferdam to the pour sites. A similar technique for concreting has governed early pours in Blocks 1 through 8, also on the right abutment.

This work commenced June 29 and since then has been carried out at an average rate of 860 cu. yd. per shift (The work is on a 3-shift, 6-day basis). The best achievement in concrete pouring since June, for 1 shift, has been 1,306 cu. yd.



TAKEN from the upstream cofferdam at mid-channel, this view of Folsom Dam site shows the situation in the latter part of July. The truck crane is resting on gravel which buries Block 14 to a depth of 30 ft. Two Northwest shovels are in evidence, one of them above Block 15, and the other about at the toe of Block 15. The Marion shovel at the left is doing rock excavation for the left training wall downstream from Block 17. Just below it are concrete footings from which the January flood swept a trestle bent.

GUY F. ATKINSON CO. has a fair-sized job at Folsom too. Behind this training wall and cellular cofferdam, the firm is excavating and concreting Folsom powerhouse on a \$5,773,000 contract with the Bureau of Reclamation. Atkinson's batch plant is at right. The long snaky object in the background is Merritt-Savin's aggregate conveyor leading from bunkers on the right bank downstream to the batch plant out of picture at left.



It's wind-up time at Hungry Horse Dam

EVERYTHING but a few final cleanings has been completed on Montana's Hungry Horse Dam. In the middle of July all work was terminated by General-Shea-Morrison, prime contractors. And the \$48,000,000 contract which was awarded on April 21, 1948 was well ahead of its November 27 deadline. This, the third highest and fourth largest concrete dam in the United States, once had as many as 2,500 men employed in its construction.

DIGGING — Contractor Del Balso of Bronx, N.Y., keeps his Model HM profitably busy. Here it's lowering grade for a new pavement . . . easily cutting the many tree roots encountered.



LOADING — Model HM doing a fast loading job on a dirt pile for Davis Construction Corp., Long Island. Fast reverse speeds and power boosted steering give this "PAYLOADER" high production on loading work.



BACKFILLING — A very popular "PAYLOADER" use is trench work — loading excess dirt and backfilling the trench. Tires do not injure pavements and the bucket can backfill over the top of sheeting or other obstructions.



SPREADING — On the Penn-Lincoln Parkway near Pittsburgh, Frank Mashuda's Model HM spreads shoulder material while concrete pouring goes on beside it. Good tire flotation and maneuverability is an important HM asset here.

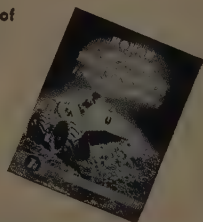
MASTER OF MANY JOBS

Big 4 wheel drive "PAYLOADER" tractor-shovels are capable *and* versatile — able to do *many* jobs and drive quickly from one job to another at speeds of 17 m.p.h. Big tires, plus 4-wheel-drive, gives them catlike traction and flotation to surmount poor ground conditions. Power boosted rear wheel steer makes them maneuverable and easy to handle . . . 4 gear ratios in each direction provide the right speeds to fit each task.

The powerful $1\frac{1}{2}$ cu. yd. "PAYLOADER" is the flagship of the "PAYLOADER" fleet, which includes 7 sizes down to 12 cu. ft. bucket capacity. Also a choice of 4 wheel drive, rear wheel drive and

front wheel drive to best fit your needs. Your Hough Distributor, one of 200 in the U.S. and Canada, is ready to serve you *right* — with extensive application experience and complete parts and service facilities. The Frank G. Hough Co., 707 Sunnyside Ave., Libertyville, Ill.

for full information on any of the "PAYLOADER" models: FourWheel Drive HM — $1\frac{1}{2}$ yd. and HR — 1 yd.; Rear Wheel Drive Models HY — $1\frac{1}{4}$ yd., HF — $\frac{3}{4}$ yd., HE — $\frac{1}{2}$ yd.; Front wheel drive Models HAH — 15 cu. ft., HA — 12 cu. ft.



PAYLOADER

THE FRANK G. HOUGH CO.

SINCE 1920



P. G. & E. busy on hydro projects in Pit and Feather river basins

THE PACIFIC Gas & Electric Co. recently filed an application with the Federal Power Commission requesting a permit for construction of Pit No. 7, another new hydroelectric project on the busy Pit River Basin in Northern California. This latest project, which would consist of a diversion dam, a 54,000-kw. powerhouse, and a small afterbay regulating dam, will cost an estimated \$16,250,000. P. G. & E. already has three powerhouses operating in that area, Pit 1, Pit 3 and Pit 5 on the river and Hat Creek 1 and Hat Creek 2 on a tributary.

At present the utility company is building Pit 4 powerhouse and a 4-mile diversion tunnel (see pages 82 to 84 of this issue) in the area, and at an earlier date license was filed to construct Pit 6. Together with Pit 6 the new project would utilize the power potential from the last undeveloped stretch of the lower Pit River above Shasta Reservoir. The three projects,

Pits 4, 6 and 7, would boost P. G. & E.'s generating capacity on the stream to 494,000 kw.

The new plant will be constructed at the base of a concrete gravity-type dam about 180 ft. high and 580 ft. in crest length. The reservoir created by the dam will have a capacity of 15,500 ac. ft., and will extend upstream to the site of Pit 6 powerhouse. Two 160-ft. long steel penstock pipes will extend through the dam to the powerhouse turbines. Downstream the low, slotted, concrete afterbay dam will be built to smooth out irregularities in water flow caused by operation of the plant. License application says that the company desires to build the project in time for operation two years after completion of Pit 6.

P. G. & E.'s recent plans for expansion did not stop with requesting a permit to build Pit 7. The firm has also filed an application requesting a 36-month preliminary permit for a hydroelectric project on the Middle

Fork of the Feather River and its tributaries and on French Creek in Butte, Plumas and Sierra counties, Calif. Tentatively designated as the "Middle Fork of Feather River Development," the project would have a total installed capacity of about 265,000 hp. It would include five dams, varying in height from about 20 to 380 ft., forming five reservoirs which would have a total gross storage capacity of about 415,000 ac. ft. The project also would include four diversion dams, a system of tunnels about 23 mi. long, and four powerhouses.

However, request for the project is reported to conflict with applications made by the Richvale Irrigation District of Richvale, Calif., and Robert P. Wilson of Taylorsville, Calif. If the preliminary permit is granted it would give the holder priority while conducting surveys and investigations necessary in preparation of an application for an FPC license.

Colorado truss bridge has perennial collapse

A STEEL TRUSS bridge over the Platte River near Brighton, Colorado, has collapsed for the second time within a year, but not without provocation. Clearance for the collapsed bridge was an inch shy of 14 ft. Clearance for a truck-tractor unit with an earthmover as its load was 14 ft., according to permit. The inch made the difference when the earthmover caught on overhead cross members and the bridge pulled loose from its west abutments, two 75-ft. spans failed, and floor stringers dropped into the water.

The same bridge was ruined last fall when a truck failed to clear. Seven weeks and \$15,000 were required for repair. Several weeks will also be required for the current repair job.

Westerner fourth in GM essay contest

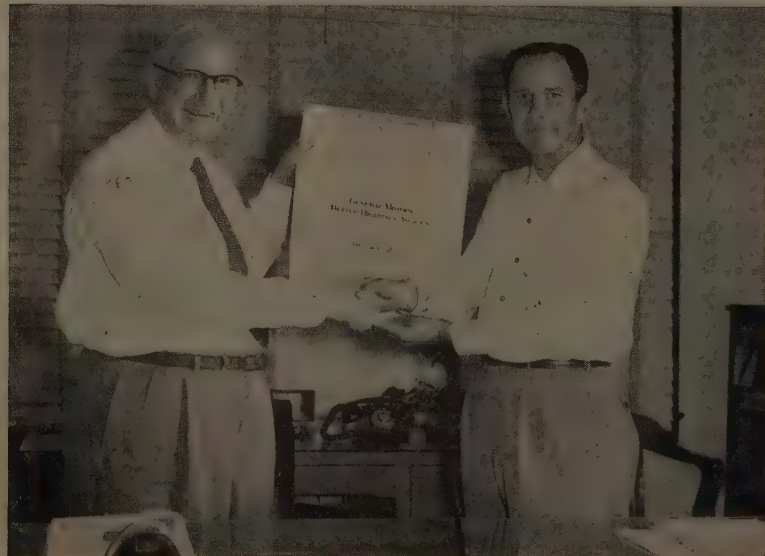
THE RETURNS are finally in on the General Motors better highway essay contest (*Western Construction*—January 1953, p. 118) with experience counting most in carrying off the top prizes.

Robert Moses, a highway administrator for 25 yr. in New York City and State, won the \$25,000 jackpot. Brig. Gen. Lacey V. Murrow, former Washington state highway engineer placed for \$10,000. Third prize of

\$5,000 went to Claude A. Rothrock, chief of the Planning Division of the West Virginia Roads Commission.

Westerners who came through for \$3,000 national honorable mentions are William E. Willey, highway economist, of Phoenix, Ariz., and David C. Guilbert, auto executive, Spokane, Wash. Regional awards of \$2,500 went to Albert Erickson, newspaper publisher, Helena, Mont., and Bryant Hall, city planner, San Francisco.

WM. E. WILLEY (right) congratulated by "Cye" Perkins, Arizona highway engineer



Monticello Dam bids in; Kiewit and Parish take it

AS A RESULT of bid openings on Monticello Dam (*Western Construction*—August 1953, pp. 82-83) the Bureau of Reclamation awarded the contract to Peter Kiewit Sons' Co. and Parish Bros., joint venturers who submitted a low bid of \$7,628,991. Engineer's estimate for cost of the dam was \$8,155,667. But there's a big green fly in the ointment: So far Congress has appropriated only \$3,000,000 for the Solano Project of which Monticello Dam is the central item. Cost of the entire job has been estimated at \$47,111,000. However, the Kiewit-Parish contract is protected by an escape clause which permits the contractors to halt construction at any time if Congress refuses to put up the necessary additional funds.

Busy at Brigham Young U.

BRIGHAM YOUNG University at Provo, Utah, will have a new look when about \$10,000,000 is spent on new academic classroom and living accommodation buildings. First to go will be 21 apartment and dormitory buildings where 960 women and 800 men students will live.

CALENDAR OF MEETINGS

Sept. 14-16—Associated General Contractors, mid-year board meeting at Edgewater Beach Hotel, Chicago.

Sept. 18-19—Concrete Products Association of Washington, fall meeting at Cascadian Hotel, Wenatchee, Washington.

Sept. 24-25—American Road Builders' Association, County and Local Roads Division, national highway conference at Dell View Hotel on Lake Delton, Wisconsin.

Oct. 6-9—Pacific Coast Building Officials Conference, annual business meeting at Hotel Huntington, Pasadena, California.

Oct. 7-9—Western Association of State Highway Officials, annual meeting at La Fonda Hotel, Santa Fe, New Mexico.

Oct. 7-9—Advanced Base Water Supply and Sanitation Symposium, meeting at U. S. Naval Civil Engineering Research and Evaluation Laboratory, Port Hueneme, California.

Oct. 8-10—Region 11, Associated Equipment Distributors, annual meeting at Pebble Beach, Calif.

Oct. 8-10—American Concrete Pressure Pipe Association, annual convention at Ponte Vedra Inn, Ponte Vedra, Florida.

Oct. 8-10—Structural Engineers Association of California, fall convention at Ahwahnee Hotel, Yosemite National Park, Calif.

Oct. 14-16—National Reclamation Association, annual meeting at Mapes Hotel, Reno, Nevada.

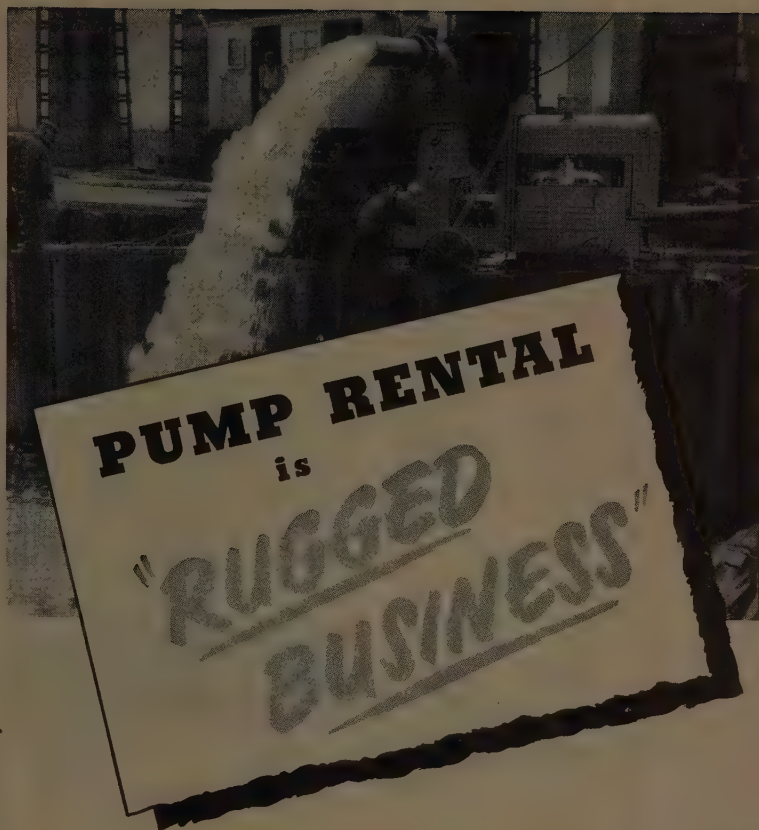
Oct. 15-18—Region 12, Associated Equipment Distributors, annual conference at Gearhart Hotel, Gearhart, Oregon.

Oct. 19-23—American Society of Civil Engineers, annual meeting at Statler Hotel, New York City.

Oct. 29-30—Southwest Regional Meeting, American Concrete Institute, at Rice Hotel, Houston, Texas.

1954

March 1-4—Associated General Contractors, 35th annual convention at Statler Hotel, Los Angeles.



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Washington toys with tolls, network of freeways

COVERDALE & Colpitts, New York engineering firm, has been authorized by the Washington State Toll Bridge Authority to begin studying a proposed toll freeway (for which they will review information already collected by the State) from Tacoma to Everett via Seattle. According to William Bugge, Director of Highways, if Coverdale & Colpitts fail to find that such a route is feasible from a toll standpoint the highway department will not stand a loss by making further expensive studies of its own.

Another indication of what the State of Washington has on the agenda was revealed in an announcement of plans which will provide a network of limited access roads connecting major cities in the State, thus promoting traffic safety and preventing present highways from becoming obsolete. If realized, the State Highway Commission could control the points at which motorists enter about 1,655 miles of the State highway system. Included is a plan to make a limited access highway out of U. S. 99 during its entire run through Washington, and likewise U. S. 10 from Seattle to Spokane. At present various business establishments are located at access points adjacent to busy highways and as such reduce the effective capacity of the highways and present serious traffic hazards by the way they cause conflicting traffic movements. Although each case will be treated individually, officials have reported that most of the free access points now held by private businesses will be eliminated and other means of connection will be established. The State already has made over 200 miles of its highways into limited access, chiefly on U. S. 99.

USBR floods gravel pit, contractor goes to court

AS A RESULT of a damage suit filed against the Bureau of Reclamation by Contractor J. D. Shotwell of Bridgeport, Wash., the Federal court in Spokane issued an order restraining the Bureau from using 9,000 cu. yd. of processed sand and gravel near Moses Lake, Wash. Shotwell explained that he had been authorized by the Bureau to process the material into aggregate to be sold to various cement contractors who were selling to the Government. He claimed that in January 1953 a construction project under way by the Bureau caused the pit to be flooded at a time when he had an available customer, and furthermore he alleged that he had been informed by the defendants that they are now using gravel from the pit for purposes of their own. Co-defendants in the suit are Douglas Mc-

Kay, three assistant commissioners of the Bureau of Reclamation, and P. R. Nalder, manager of the Bureau's Columbia Basin district.

Big Ford assembly plant going up at Milpitas

LATE IN JULY a year-long construction job began on a Ford Motor Co. auto and truck assembly plant at Milpitas, Calif. When complete, the new industrial development will consist of the assembly plant, an administration building, and an employee facilities building, with a total of 1,500,000 sq. ft. of floor space. Preparation on the 160-acre site had been under way for several months before general contractor J. H. Pomeroy & Co., Inc., took over. Total costs of the project have been estimated at \$35,000,000 to \$50,000,000. Steel fabrication should be completed by Feb. 15, 1954.



Job accidents take their toll

THESE were the accidents that resulted in death or serious injury on the West's construction jobs during the last reported month:

Francis W. Matteson, 48, construction worker, was killed July 22 at Rawlins, Wyo., when he was struck by a ricocheting piece of metal ejected from his own welding gun with which he was firing hanger bolts in a concrete ceiling. The bolt failed to penetrate, bounced off the ceiling and struck him on the head.

On June 26 in a vain attempt to point out to his brother how a co-employee on a San Diego building project died, Christian K. Shade, 36, a steel worker, plunged to his death at the exact spot from the 50-ft. top level of the building's framework.

Earl McBride, 45, repairman for a tractor company, was killed when a tractor which he was testing by driving up a bank of Lake Coeur d'Alene, Idaho, overturned and crushed him.

Eugene Myers, 39, was killed July 7 when he fell under the front wheels of a grader on a cemetery development project on the Tonopah highway in Nevada.

ACCIDENTAL DEATHS and serious injuries on the West's construction jobs are reported each month in the interest of promoting safety-on-the-job.

Colorado highway work in high gear this year

FROM JANUARY to July 1953 the Colorado Department of Highways achieved the greatest record in its road building history ever accomplished in a similar period, according to Chief Engineer Mark U. Watrous. As of July 31 this total construction program consisted of 117 projects covering more than 840 mi. and amounting to more than \$16,300,000. \$14,700,000 is represented in 57 major construction projects covering about 300 miles on virtually every Federal aid primary and secondary highway. A further breakdown shows a \$1,215,000 expenditure on 41 projects covering 440 miles of improvement work accomplished through agreements between the Department and various counties and by State forces. Twelve oiling projects cover 109 mi. and cost \$327,000.

Mervyn A. Howard, 28, was crushed to death on June 15 when he put his head under the box of his dump truck to investigate why it failed to drop when he worked the controls. Howard was employed moving earth for a fill at the Berkeley, Calif., yacht harbor.

The body of Francis A. Hendricks, 38, was discovered sprawled over his tractor on June 19 at South Bend, Wash. He apparently had become entangled in the gears of the machine.

Arthur C. Lovinger, 38, was electrocuted at Seattle on June 8 when a metal cable which he was pulling from a crane touched a 26,000-v. power cable. Lovinger was employed on a building construction job.

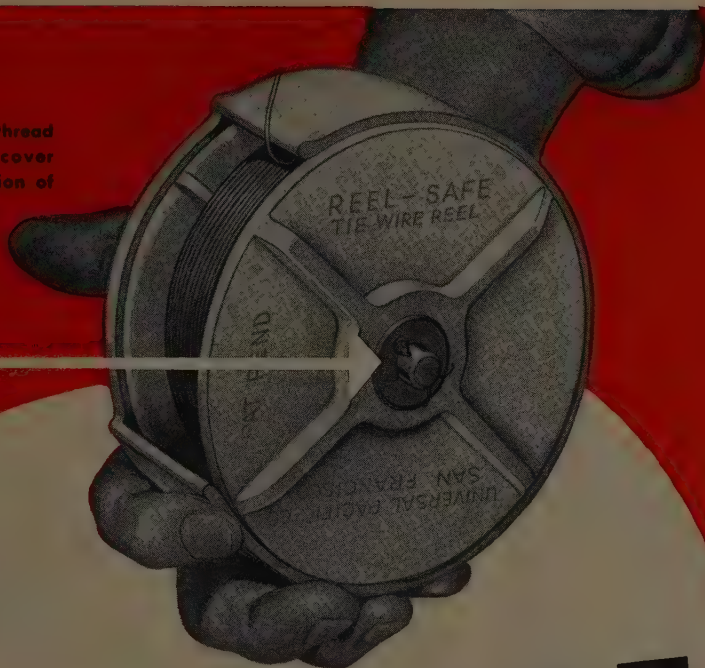
Delbert N. Cromwell, 26, recently was instantly crushed to death by a 20-ton tractor and earth mover at Palisades Dam. Cromwell, an employee of Palisades Contractors, apparently was on his hands and knees checking the angle of grade when the accident occurred.

Robert Elmer Williams, 25, an electrician, was killed July 17 when he fell 30 ft. from the top of a building going up in Albuquerque, N. Mex.

Mahlon E. Montgomery, 43, an employee of J. H. Trisdale Construction Co., was seriously injured July 21 at Redding, Calif., when he fell between the side and track of a bulldozer on which he was checking the engine.

Jerry Post, 61, a carpenter's helper, was electrocuted on July 22 at a copper mine at Bingham, Utah. According to witnesses he had been assisting a repair crew working on an electric shovel. He entered the shovel housing to put a bolt in the housing roof and apparently reached out to steady himself when he touched a primary 5,000-v. switch which caused his death.

New type of durable thread makes removal of cover plate easy for insertion of coil of Cal-Tie Wire.



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IMPROVED reel-safe

Speed up tying jobs with Cal-Tie Wire in the new, improved Universal Reel-Safe dispenser. You'll find it's a sound safety measure too, eliminates loose pieces underfoot... and the savings in wire will surprise you. In the handy pack that hangs on a man's belt, Cal-Tie Wire is always in reach yet always out of the way. Cal-Tie wire can be furnished for other types of wire reel dispensers in annealed or galvanized finish. Gauges 12 and lighter.

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THE COLORADO FUEL AND IRON CORPORATION—Denver, Colorado
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CAL-TIE WIRE

THE COLORADO FUEL AND IRON CORPORATION



By CLIFFORD S. CERNICK, Anchorage

PORT OF WHITTIER is hub of seacoast construction activity in Alaska. Not long ago, \$6,000,000 composite bachelor quarters building was turned over to port authorities. Building is unique Alaskan "city under one roof" and contains, among other things, a two-story 350-seat theater, a bowling alley, a radio station, enlisted men's day rooms, NCO club, officers' club, bank, barber shop, cafeteria and a complete hospital. . . the Port of Whittier might soon be construction site of Alaska's tallest building. Col. L. E. Foote, Alaska District Engineer, says a sixteen-story apartment building is in the immediate military construction plan for the port. Construction crews are beginning work at Whittier to replace docks destroyed in a recent fire; appropriation approved by the House armed services subcommittee for this job amounts to \$6,000,000.

EMPLOYMENT SLACKENING: Construction season in Alaska is "over the hump" and cold breath of oncoming winter's being felt in the northland. Contractors are pushing work on vital projects to beat imminent freeze-up. Meanwhile, the "no help wanted" sign is out on most construction jobs which have adequate crews, recruited mostly from large "army" of job-seekers that poured into Alaska in early spring and summer. In Anchorage, all unions report a surplus of members still not employed. Virtually same situation exists in Fairbanks, Ketchikan and Juneau. Outlook for next sixty days is gradual decrease in employment, drastic cuts with the onset of winter freeze-up conditions in late September, early October.

FILLING THE GAP between defense construction, now dropping off because of cutbacks in appropriations, is work projected by municipalities in Alaska. City projects planned include: **Juneau:** \$600,000 for streets, sidewalks and sewers. **Anchorage:** \$1,525,000 for city water and sewer system and \$400,000 for city hall. Projects in Juneau and Anchorage are contingent on decision of voters at special election.

HOUSING projects in Alaska completed or near completion include a 400-house development and a \$2,500,000 apartment project in Anchorage. The apartment job calls for 26 buildings having eight two-bedroom apartments in each. A shopping center is included in the apartment development, something unique for such projects in Alaska. Although housing shortage has been virtually eliminated

by heavy volume of construction during past three years in Anchorage area, Fairbanks still remains a critical defense housing area. Office of Defense Mobilization has decided that rent controls are to continue in Fairbanks. Only other Alaskan city still having rent control is Kodiak.

LOW-COST INSULATION for Alaskan homes is being demonstrated by the Soil Conservation Service, which has erected a special-type dwelling in Fairbanks. Spaces between floor joists are filled with dry sawdust and a vapor barrier consisting of 3/1,000 of an inch of aluminum on heavy paper. Rock wool batting covered by vapor barrier is used on walls and ceiling. Alaskan home-builders in great numbers inspected the house designed to provide best possible insulation at lowest possible cost.

OTHER PROJECTS planned in Anchorage include a prison farm for the Alaska jail system, to be built out of a \$600,000 allocation and a dock at Anchorage. Dock proposal still is in the preliminary stage, with some officials here talking of a waterfront program costing upwards of eight million dollars.

OUT IN THE BUSH. In the tundra country where there are hundreds of miles of wide open spaces between tiny Eskimo villages, there's a surprising amount of civilian construction activity. Typical of bush-country commercial jobs are a large warehouse building going up at Bethel and a movie theater being erected at the town of North Pole near Fairbanks.

NEW INDUSTRY for Alaska is television. Two stations are being constructed in Anchorage and one in Fairbanks, with all three scheduled for telecasting before January 1954. Total investment in television initially will be over a half-million dollars. The two competing Anchorage TV stations will erect antenna atop city's skyscrapers, one of them on a 14-story apartment building, the other on a seven-story hotel.

ON THE MINING SCENE, presence of chromite deposits promises to advance Alaska as a source of the nation's supply for that strategic mineral. Territorial mines department reports a successful chrome operation is going forward on the Kenai peninsula, with first shipment out of the area scheduled for Oct. 1. . . the defense solid fuels administration is conducting a survey in the territory

aimed at determining balance between coal consumption, production in the territory. Federal requests for increased Alaskan coal production expected to result. . . Interest in potential oil land along northern rim of Gulf of Alaska continuing. Recently 59 applications for oil leases filed on 150,000 acres of land in the area.

BIG PROJECT HAMPERED— Work on Eklutna project was obstructed recently by annual break-up of Lake George, a self-dumping lake about 60 air miles east of Anchorage. Lake's rising waters cause tremendous pressure along 4-mi. front of Knik glacier which dams the lake. In time, the water chews away a channel through the glacier, and in ever-increasing volume pours down the Knik River and past the Eklutna plant. Amount of water from Lake George was so heavy this year that entire valley was flooded and work was halted on sections of the big Eklutna plant.

SOMBER NOTE—Outlook for Alaska construction in '54 dampened by news that \$45,000,000 worth of authorized military construction projects have been revoked by a measure passed by both houses of Congress. Construction cut-backs are spread quite generally over Alaska defense scene. Reasons given by Senate Armed Services committee for cut-back is that (1) certain projects have been constructed for less than authorized amount, permitting recision of difference between actual cost and authorization, and (2) certain projects and items deemed essential at the time of authorization have been deleted in favor of other projects and items deemed more essential under present circumstances. Typical of cuts is that for work on Alaska Communications System lines. Original authorization for the federally-operated telegraph and telephone network was \$4,517,000, allowing construction at 30 Alaskan sites; new allocation allows construction at only nine localities with expenditure of \$1,404,800.

BOOM ERA ABOUT OVER: All signs point to an end of a "boom" era in Alaskan construction. Territory now seems on threshold of new era during which construction dollar will be handed out less lavishly by Uncle Sam, and greater justification for all projects will be required.

NEXT MONTH—

A major portion of the October *Western Construction* will be devoted to portrayal and analysis of construction and engineering in Alaska. Appraisal of this pioneer area will be factual and honest. For the answers to your questions about Alaska, don't miss the October issue.—Editor.



Action PROVES



FEATURES

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When you need a 1-yd. class machine, we ask only this — see the *Lorain-50 in action* before you buy!

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mum output. See how *Center Drive* turntable construction transmits power in the most direct line to cables and dipper teeth. See how easy it is to change to any one of *5 front ends* to enable you to bid most any contract.

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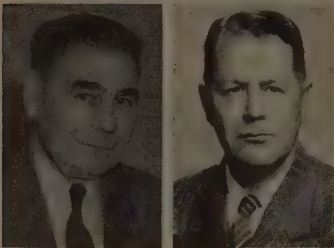
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ENGINEERS ON THE MOVE

Col. Lionel R. Ingram, CE, is assigned as executive officer of the South Pacific Division, Corps of Engineers. As second in authority to Col. Paul D. Berrigan, division engineer, he will assist in administering the military and civil works construction program now under way in California, Arizona, Utah and Nevada. Colonel Ingram replaces Col. W. W. Ragland who has been reassigned to duty in Washington, D. C.

Walter E. Blomgren, assistant chief engineer of the Bureau of Reclamation, has been elected one of the three vice presidents of the International Commission on Irrigation and Drainage by the Commission's executive council meeting in Bangalore, India, on June 20. Blomgren is also chairman of the Commission's United States national committee. In July, Blomgren was named executive committee chairman for 1954 of the Irrigation and Drainage Division of the American Society of Civil Engineers.



Blomgren

Wellborn

Arvin S. Wellborn is appointed chief engineer of The Asphalt Institute and will make his headquarters in New York City. Until his promotion on July 31 he had been managing engineer of the Pacific Coast Division of the Institute located in San Francisco. His long career in the engineering profession admirably equips him for his wider and greater responsibilities.

Wellborn's first position on leaving school was with the Arkansas Highway Department. After a seven year period with the highway department during which he rose to the post of soils engineer, he resigned to join an asphalt pavement construction company as chief engineer and assistant manager. In 1942 he severed that connection to join the U. S. Navy, where he served as a lieutenant commander in the South Pacific, Alaska and in the state of Washington. Following



WILBUR A. DEXHEIMER, new Commissioner of the Bureau of Reclamation (see *Western Construction*, August, p. 104), has been the Bureau's assistant chief engineer of construction at Denver headquarters since 1947. A graduate of Colorado A & M College, his first experience with the Bureau began in 1928 when he became chief of survey party at Ellensburg, Wash. He later worked on location and topographical survey of Hoover Dam Project. After distinguished service with the Army Corps of Engineers during World War II, he became a consulting engineer with Morrison-Knudsen International Co. The new Commissioner took the oath of office on July 13.

that, he was in general contracting for a year and subsequently with the Navy in Cuba, returning to the United States in August 1949 to head The Asphalt Institute's Pacific Coast Division.

He is a registered professional engineer. Among his membership affiliations are included the ASCE, ARB and ACS.

O. T. Illerich opened a consulting civil and structural engineering office at 1058 40th St., Sacramento, Calif., after spending 7 yr. with the State Division of Architecture. He plans to handle all types of building and industrial work as well as bridge design.

Walter L. Huber, national president of the American Society of Civil Engineers, has been named by Douglas McKay, Secretary of the Interior, to membership on the advisory board

on national parks, historic site buildings, and monuments of the National Park Service. The appointment recognizes Huber's long devotion to the interests of conservation in the West.

C. M. (Cot) Howard recently retired from active management of the Concrete Products Association of Washington. Howard, who was with the Association for 24 years, will continue to serve it as consultant. Steve Callender, formerly with W. H. Wit Co., Seattle structural engineering concern, succeeded Howard at the helm.

George M. Webb, assistant planning engineer in the California Division of Highways, has been appointed traffic engineer in place of E. T. Telford, recently transferred to Los Angeles as District highway engineer.

Gordon W. Manly, a Bureau of Reclamation field engineer at Canyon Ferry Dam, has accepted a Point Four appointment as construction engineer adviser to the Damodar Valley Corp., which has six dams under construction in the Damodar Valley about 125 mi. west of Calcutta, India.

L. H. Oppenheim, assistant general manager of Kaiser Engineers, has been named a vice president of the Henry J. Kaiser Co., parent company of the Kaiser group of industries. He will continue to direct the activities of the engineer-contractor organization.

O. B. Brinkerhoff, assistant highway engineer with the California Division of Highways District VIII Office at San Bernardino for 25 yr., has retired.

Clyde H. Spencer, a construction engineer on the Hungry Horse Dam in Montana, has been appointed supervising engineer of California projects of the Bureau of Reclamation. His headquarters will be at Sacramento.

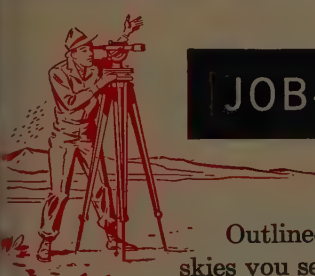
Charles H. Williams, assistant resident engineer at Valdez, Alaska, has been appointed resident engineer on an Alaska Road Commission job to grade and pave with asphalt 60.5 mi. of the Glenn Highway at Tok.

Lloyd McDonald, partner of McDonald Brothers, Los Angeles construction firm, announces the addition of a design and engineering department. This new department, which will be an integral part of the company's present construction service, is the latest in a series of expansion moves by McDonald to keep pace with construction and industrial



Asphalt Plant Operating in Spokane, Washington

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Outlined against West Coast skies you see an asphalt plant at the Fairchild Air Base, Spokane, Washington. Owned and operated by the Pacific Sand and Gravel Company of Centralia, Washington, this plant recently supplied material for plane parking aprons. Contract requirements: 22,000 tons of asphaltic concrete to be laid at the rate of 15 tons per hour.

The advance outlays and the perform-

ance of such a contract required substantial working capital. C.I.T. Corporation provided needed cash through a capital loan—a service that has helped many contractors perform profitably.

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growth of the West. **Russel D. Koons**, for eleven years with the Bechtel organization, will spearhead this addition with more than sixteen years of experience in engineering and construction of major projects. **George S. Ballew**, formerly with Stone & Webster Engineering Corp., will manage McDonald's service departments for the petroleum industry.

Frank Tessitor of Denver, Bureau of Reclamation employee since 1937, has left for Pakistan to serve as adviser in the establishment of an engineering laboratory to be used in the development of Pakistan's water resources. Since 1941 Tessitor has been

in the chief engineer's office in Denver in charge of the metals and machinery testing group. His new assignment is for two years. Another Bureau engineer, **Forrest E. Byrns**, is already in Pakistan as adviser on national water resource problems.

M. W. McLam of Merced, Calif., formerly a general contractor, has opened his own business as a concrete supplier under the name of Valley Ready-Mix.

Harry L. James, vice president and member of the board of directors of the Southern California Chapter, As-

sociated General Contractors, has been transferred from Los Angeles by the Guy F. Atkinson Co. to Portland, where he will serve as assistant area manager. Two men were selected to replace him, **John J. Swigart** as vice president, and **Carl H. Wittenberg** as board member.

Hugh MacDonald, secretary-treasurer of the Junior Forum, Los Angeles Chapter, ASCE, has accepted a position with the Structural Clay Products Institute in Chicago.

Colonel George H. Walker was recently chosen as Acting District Engineer for the San Francisco District of the Corps of Engineers, having been executive officer of the District for the past fourteen months. He replaces **Colonel Henry Walsh** who left for a new assignment in Germany. Walker will serve in the new capacity until a permanent district engineer is selected in Washington.

James K. Carr, engineering consultant with the House Committee on Interior and Insular Affairs, has resigned from that position to become consulting engineer for the Sacramento (Calif.) Municipal Utility District.

George Schumann, chief design engineer for Kaiser Engineers, has been promoted to the newly-established position of chief consulting design engineer. His old spot will be filled by **F. B. Tobias**.

Francis Thornton, after three years as city engineer of Powell, Wyo., resigned to enter private civil engineering practice.

Sam G. Keim, formerly a Los Angeles civil engineer, resigned from his position as Las Vegas (Nev.) city engineer.

K. R. (Andy) Anderson has exchanged the frosty background of Lake Eklutna, Alaska, for the tropical jungle of Sao Paulo, Brazil. He is chief engineer of dredges on a 3-yr., \$7,000,000 job to dredge Pinheiros Canal on a combined Morrison-Knudsen and Hydraulic Dredging Co. contract. Andy is skipper of three hydraulic dredges and a combination gold and hydraulic rig powered by two 750-kw. diesels.

E. I. Roberts and **E. G. Nettleton** have been promoted at the Washington State Highway Department's Vancouver district office. Roberts is now district office engineer, replacing Nettleton, who is now assistant construction engineer. The latter takes over the position of **D. E. Stein**, who was transferred from the Vancouver



SAFETY AWARDS were presented by Seattle Chapter, Associated General Contractors, to those firms having the best safety records for a 1-yr. period. The awards were made by National AGC in a nationwide competition. In the foreground, **Jim Warrack** (right) of J. B. Warrack Co. is shown receiving a first-place award from **Winston D. Brown** of Howard S. Wright Co., Inc., Seattle Chapter president. Those members receiving certificates of commendation are pictured in the background, left to right: **Larry Baugh**, **A. M. Johnson**, **Leland W. Garrett**, **O. B. Daniels**, **Thomas Armstrong**, and **Andy Wick**. Not pictured is **Paul Odegard**, who also received a certificate of commendation.

PRESIDENT Del Fisher of Fisher Contracting Co. is pictured at right pointing out roadway connecting Queen Creek bridge and tunnel at the ceremonies dedicating these major engineering improvements in the State of Arizona. Participating officials (all decked out in Fisher "hard boiled" hats) are shown from right: **Louis Escalada**, former chairman of the State Highway Commission; **Fred D. Schemmer**, Highway Commission member; **John Scott**, vice chairman of the State Highway Commission; Arizona's Governor **Howard Pyle**; Reverend **Larsen**, who gave the ceremonial invocation, and Fisher. Entrance to the tunnel is in background.



district to State headquarters as assistant construction engineer. W. A. Bailey is present district construction engineer at Vancouver.

Jewell R. Benson on July 31 left The Asphalt Institute in Denver, Colo., where he had been special projects engineer for the past several



Benson



Winters

years, to join the Rubarite Corporation in Chicago as chief engineer. Walter F. Winters, formerly chief engineer of The Asphalt Institute, took over as general manager of Rubarite on June 1.

Steve Monek, acting public works superintendent, has been appointed city engineer of Ellensburg, Wash.

Robert W. Haselwood, formerly employed by Modoc County, Calif., has been named city engineer of Anchorage, Alaska.

Luke D. Packard, senior highway engineer for the California State Department of Public Works, has retired after 28 yr. of service.

The Columbia River Interstate Compact Commission has selected Spokane, Wash., for its headquarters and Frank A. Banks of Portland, Ore., as its chairman. L. A. Colby of Missoula, Mont., was elected vice chairman, and Mark Kulp of Boise, Idaho, was reelected secretary.

Joseph O. Elwell has been transferred by the Bureau of Reclamation from the Cachuma Project at Santa Barbara, Calif., to the Sly Park Project.

An accidental observation made by an American engineer flying in bad weather off-course over the Near East resulted in discovery of a long-sought dam site for a \$40,000,000 irrigation project in Jordan. Mills E. Bungler of Denver was the American engineer, en route to Washington from Amman in the capacity of consultant for the United Nations Point Four Program. Flying over the unknown territory, he noticed a point near the junction of the Jordan and



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From Precision Subgraders to Bulk Cement Plants, Truck Mixers, Concrete Spreaders, Concrete Finishers, and Concrete and Black Top Pavers, Blaw-Knox equipment goes to work through Twin Disc Heavy Duty Clutches—usually two or more in each of these multi-operation production-speeding machines.

Throughout the years leading manufacturers and users of production machinery have specified Twin Disc as the source of trouble-free, long life Friction and Hydraulic Drives—proved in performance—backed by the most complete and thorough service in the field.

Patterson Paving Co., Monongahela, Pa., contractors, used Blaw-Knox Complete Package Paving Equipment on western extension of Pennsylvania Turnpike—including 20-25' Precision Subgrader (above) and 20-25' Concrete Spreader, 20-25' Concrete Finisher and 34-E Paver (top). A total of 8 Twin Disc clutches are used in the above equipment, including the Model EH (top), the Model MTU (center) and the Model CL (bottom).

Built for a Long Life . . .

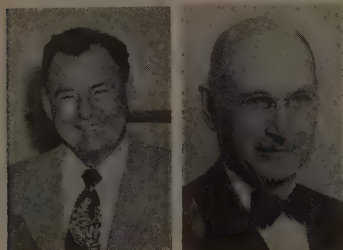
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Yarmuk rivers where four streams joined above a narrow in the valley. He made a note of the position, and work was started soon after construction plans were made. For many years engineers believed that it would be impossible to harness waters of the Jordan without damming the river itself.

Jack Ogden has been appointed general superintendent of Ford J. Twaits Co., with headquarters at the firm's main office in Los Angeles. He has been with the company since 1940, his most recent assignment being as job superintendent of the Police Facilities building now being constructed in Los Angeles. His place there was taken by **R. L. Knipshash**.



Ogden

Morin

John A. Morin recently took office as the new city engineer of Oakland, Calif., succeeding **Charles A. Reed**, retired. Morin brings to his new position 29 years' experience in civil engineering and construction, starting as an instrument man with the first East Bay Municipal Utility District field party in 1924. A few of the major projects with which he has been associated are the Broadway low level tunnel, the Government Island wharf, Point Arguello breakwater, Humboldt Bay sea wall, the Twelfth St. dam traffic interchange, all of which are in Oakland or the San Francisco Bay area. Morin spent three years in the Army during World War II and is presently a Lieutenant Colonel, USAR, Engineer Corps. He is both a registered civil engineer and a licensed land surveyor in the State of California. He is also a member of the ASCE, the American Public Works Association and the East Bay Engineers' Club.

Recent promotions at the Washington Water Power Co. include **J. Harry Lucas**, Spokane Division manager; **George M. Brunzell**, Division plant superintendent; **Lee K. Habel**, electrical underground system; **Eugene V. Hays**, line maintenance and operation; and **Edward G. Gralapp**, line construction. **Victor S. Casebolt**, Moscow District manager, has become Palouse Division manager. His replacement is **E. W. Hatch**. **George A. Whitely** was named Big Bend Division manager. Other appointments include **Marshall L. Blair**, man-

ager of the new Power Supply Department; **Loran A. Eisele**, operating engineer in charge of system operations; **Ray L. Wetherell**, chief system operator; **Walter E. Johnson**, hydrologist; **T. Wendell MacLean**, communication engineer; **Glenn F. Nogle**, power resource engineer; **Maurice F. Hatch**, supervising engineer in charge of intercompany power pool operations, and **Wendell J. Satre**, superintendent of production maintenance and construction.

Ben P. Griffith, executive vice president of the Griffith Company and president of the Colorado River Association is named to serve on the Board of Water and Power Commissioners of the City of Los Angeles along with **J. C. Moller, Jr.**, and **William B. Himrod**. Griffith is a past president of Southern California Chapter, AGC.

Walter Newland is principal inspector for the Bureau of Reclamation on construction of Tiber Dam and dike at Chester, Mont., reported to be the world's longest earth fill. Prior to this assignment, Newland was material engineer at Fort Collins, Colo.

Morris S. Jones, Chief Engineer and General Manager of the City Water Department at Pasadena, Calif., has recently retired from active service. He began his career with the city in 1913 as assistant engineer under **Samuel B. Morris**, and was promoted to chief engineer on September 1, 1935. The recently completed 50,000,000-gal. reservoir project north of Sierra Madre Blvd. was named in Jones' honor.

Dave Morris, city engineer of Tacoma, Wash., since 1948, was recently named director of public works. Under the city's new reorganization plan, Morris will assume the duties of both city engineer and public works director.

Hadley and Hadley, consulting engineers, are now occupying new offices at 807 Securities Bldg., Seattle, Wash.

L. E. Hough has entered into a partnership with **R. L. Rowe** to form a new engineering firm in Aberdeen, Wash. The new firm, known as Rowe & Hough Engineering Offices, is located in the Lafayette Bldg. Hough resigned his position as city engineer of Aberdeen on June 1 after five years of service.

Recent promotions and assignments in the Bridge Department of the California Division of Highways are: **A. L. Elliott**, formerly assistant operations engineer—bridges, promoted to bridge engineer—planning; **J. E. Mc-**

Mahon, supervision bridge engineer promoted to bridge engineer, Southern area; **Stewart Mitchell**, bridge engineer—planning, assigned to the position of bridge engineer—special studies. All three men are members of the American Society of Civil Engineers.

John D. Ellis has recently left the Bureau of Reclamation in Loveland, Colo., to join the design section of the city engineer's office in San Diego, Calif.

Succeeding **Colonel C. C. Haug**, who was transferred to the Far East, **Colonel William J. Ely** recently took command of the Sacramento District Corps of Engineers. Colonel Haug is not a newcomer to California, having served at one time as assistant to the South Pacific Division Engineer in San Francisco.

DEATHS

Vincent Bressi, 65, prominent Western contractor, died July 14 at his home in Beverly Hills, Calif.

H. L. Higgins, head of the contracting firm of H. L. Higgins Co., Pueblo, Colo., died suddenly on July 4.

L. S. Rathbone, field engineer for Johnson, Drake & Piper project at Tracy, Calif., died recently.

Lloyd V. Akey of Gunnison, Colo., died recently. He was the head of Lloyd V. Akey Construction Co.

Vincent R. Guthrie, a consulting engineer on civil and irrigation problems since 1919, died at Rocky Ford, Colo., on July 6.

James H. Mendenhall, 87, retired paving contractor of Seattle, Wash., died June 30, in that city. After retiring from the contracting business, he was for many years employed in the offices of the King County treasurer.

Earl F. Burtis, 60, a civil engineer for the Bureau of Reclamation at Sacramento, died in Oakland, Calif., July 14.

Seymour S. Sharp, 60, superintendent of State Water Division 1 in Wyoming was drowned July 4 when he fell into the North Platte River where he and his assistant were surveying a new water line for the town of Saratoga. He was at one time assistant state engineer of Wyoming.

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8 HEILINERS for GEORGE M. BREWSTER & SON, INC.

of Bogota, N.J. are operating near Red Bank, N.J., moving over a million yards of sandy clay loam at a rate of 225-cu. yds. per hour per machine. Loading time per unit averages 45 seconds in 60 ft. and the 1200-ft. round trip time average is 3 to 3½ minutes.

5 HEILINERS for CONSTRUCTION AGGREGATES CORP.

of New York are moving 112-cu. yds. of sand per hour per unit on the section of the Garden State Parkway south of Morganville. Loading time averages 40 to 65 seconds in 200 ft., and average cycle time for the 8400-ft. round trip is 8 minutes.

4 HEILINERS for FRANK STAMATO & CO.,

of Lodi, N.J., are working near Eatontown and in Ocean County where the tractor had to meet a variety of tough conditions ranging from very wet to dry sand and gravel.

3 HEILINERS for J. F. CHAPMAN & SON

of Hillside, N.J., have contracts for grading, draining and structures near the north end of the Parkway working in material ranging from rock and shale to sand and gravel.

2 HEILINERS for REID CONTRACTING CO.

of Woodbridge, N.J., are operating near Toms River, and have a lot of tough conditions to meet such as a high water table, sand and gravel with clay and new haul roads.

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NORMONT EQUIPMENT CO.....Great Falls, Montana
ENGINEERING SALES SERVICE, INC.....Boise, Idaho

WILSON EQUIPMENT & SUPPLY CO.....Cheyenne and Casper, Wyo.
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SMITH BOOTH USHER CO.....Los Angeles, California
J. W. KERNS FARM & INDUSTRIAL EQUIPMENT,
Klamath Falls, Oregon



SUPERVISING THE JOBS

L. O. Ashworth is superintendent for Gallagher & Burk, Inc., on a \$278,314 contract for widening a reinforced concrete bridge in Contra Costa County, Calif., south of Martinez. Harry Layton is his assistant. Carl Burk is excavation foreman and C. F. Porter is paving foreman.

Frank Zielenski is superintendent for Isbell Construction Co., Inc., on an excavation and road-mix surfacing job in Washoe County, Nev. Foremen on the job are Randy Booth and Clyde Burchfield. Isbell was recently awarded the contract on a \$213,398 bid.

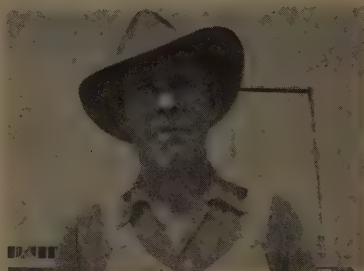
James Rinaudo is job superintendent and Ralph Wigle is general superintendent on a widening and surfacing road job in San Joaquin and Calaveras counties, Calif. On the same job Everett Welby is working as labor foreman. William Stokes is acting as timekeeper and office manager. Claude C. Wood Co. was recently awarded the contract at \$258,921.

Ross Phillips is superintending the erection of a reinforced concrete girder bridge crossing in Sonoma County, Calif., for Erickson-Phillips & Weisberg who were awarded the contract at \$850,063. Another key man on the job is Paul Glover, foreman.

Gus Lorenz is superintendent and William J. Booth, Jr., is his assistant on the contract held by Manson Construction Co. for erection of bridge from Warren to Fox Island in Washington. Elmer Fosness and Joe Gotchy, Jr., are pile-driver foremen. Carpenter foreman is Martin Dinesen. This contract is for about \$1,000,000. Resident engineer for the State is N. E. Olson. Chief of party is W. C. Grant.

Al Hyde is superintendent on a \$103,834 contract for restringing and redecking timber portions of the Columbia River bridge at Brewster, Wash. Bill George is pile foreman on removal and relaying timbers and George Slater is timber framing foreman. The contract is held by Alton V. Phillips Co.

Emmett Allen is superintendent on a grading and surfacing job west of Grass Valley, Calif. Frank Garrison is project engineer; Harv Robinson is



BUILDING a super market in Sacramento, Calif., was occupying the time of G. F. Carter from April until July. He served as project manager on the job for Fernandez Construction Co.

master mechanic, and for the State Highway Department L. O. Kendall is resident engineer. Joe Vicini was recently awarded the contract on a bid of \$131,328.

Don E. Baker is superintending a surfacing job in Converse County, Wyo., for L. H. Weber who recently received the \$104,339 contract award.

K. C. Muirhead is general superintendent on a \$515,000 contract held by L. J. Hesser for the realigning and oiling of U. S. 85 at Greeley, Colo. He is assisted by Leonard Phillips. Other key men on the job are Dean Schu-

man, superintendent; Rex Vaughn master mechanic; Les Bredine, office manager, and Joe Hanley, assistant superintendent. Sam Vigil and Dave Sipes are labor foremen.

L. H. Gilgrove, assisted by James A. Gilgrove, is superintending the contract recently awarded the company for the widening of five bridges and approaches on U. S. 85-87 south of Denver, Colo. This is a State Highway Department contract amounting to about \$60,000.

John Solwick is superintendent of the construction of a headquarters building for the Oregon State Highway Department just north of Bend. Paul B. Emerick was awarded the contract on a bid of \$393,739.

Art Vitus is superintendent for M. H. Golden Co. on erection of the Childrens Hospital in San Diego, Calif. Gordon Henry and Dorm Goodrich are carpenter foremen and R. G. Smith is labor foreman. Gene Allen is detailer. H. C. Johnson is office manager. This is over \$1,000,000 job.

Virgil T. Whited is project manager on the expansion of the General Electric Supply Co. building at San Diego, Calif. The contract is for \$150,000 and is held by Geo. W. Carter Co. Subcontractor on the dirt fill is Paul's Truck Service of San Diego.

Bruce E. Crandall is superintendent for John L. Goodwin, contractor, for the erection of a school at Sunset Beach, Calif. This is about a \$400,000 contract recently awarded to Goodwin. Other key personnel on the job are Harold Goodman, concrete super-

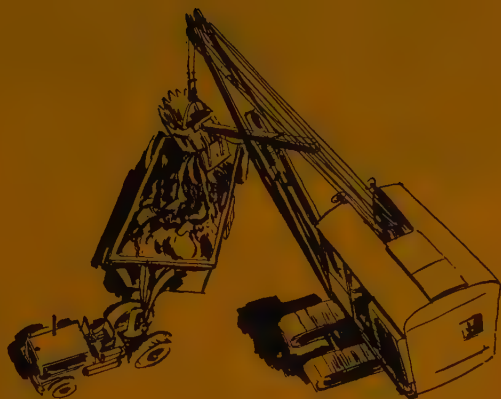
ALASKA'S snowy mountains provide the background for this job scene at Haines, where a \$2,220,886 contract for expansion of port facilities is being carried out by joint contractors Schumann & Johnson and Manson-Osberg. The picture came to us from Mrs. Dusty Rhodes of Vallejo, Calif. Dusty is a job foreman on the project which is just about finished now. Mrs. Dusty took out a subscription to *Western Construction* as a surprise for Dusty and his friends on the job up North.



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HERE ARE three top men in the Paul M. McCollum, Inc., organization. From left is C. L. Cypher, vice president; Paul E. McCollum, president, and Al Foote, superintendent. Background is the scene of a road widening and realigning job approaching Yosemite National Park.

intendent; Ephraim Carter, concrete foreman, and Al Gunderson, carpenter foreman. Wayne E. Moore, inspector, represents the San Diego Unified School District.

E. A. Draeger, superintendent; M. Barcus and J. C. Roach, assistant superintendents, and Ray Russell, project manager, are heading the erection of a smelter plant at Riddle, Ore., be-

ing built for the Hanna Nickel Smelting Co. by the Bechtel Corporation. A. de la Guardia is office manager and C. V. Landmark is purchasing agent. D. R. Martin is the job engineer.

Among the foremen on the job are: carpenter, R. Fitzsimmons (general), J. M. Boardman, W. L. Randolph (area), A. Shaker, J. R. Halford, A. Kliever, A. M. Curtiss (area), O. M. Hatcher, H. E. Scott, L. E. Lyman, Ivan Theabold; iron-worker, M. A.

Volz (general), H. M. Kuhl, L. V. Jones and F. J. Ross; cement-finisher, W. B. Adams; labor, M. D. Water (general), J. M. Brinkley; equipment, J. L. Zumwalt; warehouse, G. J. Fitzsimmons.

D. V. (Dave) Viles is superintendent for A. N. Minden, contractor for the 4-story reinforced concrete addition to the McCauley Hospital at Coos Bay, Ore., for the Sisters of Mercy. Work is expected to be completed before the end of 1953.

G. S. (Glenn) Hunt is supervising the erection of a 4-story building at Coos Bay, Ore., for the J. C. Penney Co. This is a \$450,000 contract recently awarded to Henry M. Mason Co., Inc. Assisting Hunt are carpenter foreman Rudy Murugg and labor foreman Rueben Bartsch. Dean Smith is office manager.

C. M. Hogan, superintendent, and M. S. Kruse, job superintendent, head the highway job under way between Vista and Oceanside, Calif., for the Griffith Co. Office manager is Ralph Preston. Fred Cody is master mechanic for this and all work for the contractor. Claude Fisher Co., Ltd., has the excavation subcontract, with George Peterson in the superintendent.

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spot, and **Floyd (Buck) Johnson** and **Dave Meehan** grading foremen. **Steve Short** is Fisher's master mechanic. Contract is scheduled to be completed next spring.

Cecil Martin, job superintendent; **J. Dietrich**, project manager and **Harp**, general superintendent, are leading the construction operations. **Lindgren & Swinerton's** \$2,000,000 contract for the erection of a factory and office building in Anaheim, Calif.

J. W. Lawrence, assisted by **Charles Walker**, is superintending the construction of two overpasses, part of the Valley highway project in Colorado, for the **Lawrence Construction Co.**, Denver. This is about a \$200,000 project of the State Highway Department.

Nate Shore, assisted by **Arlie Bailey**, is superintending the work of widening U. S. 85-87 near Monument and Colorado Springs, Colo., for the **Henry Shore Co.**, who received the contract from the State Highway Department at about \$280,000.

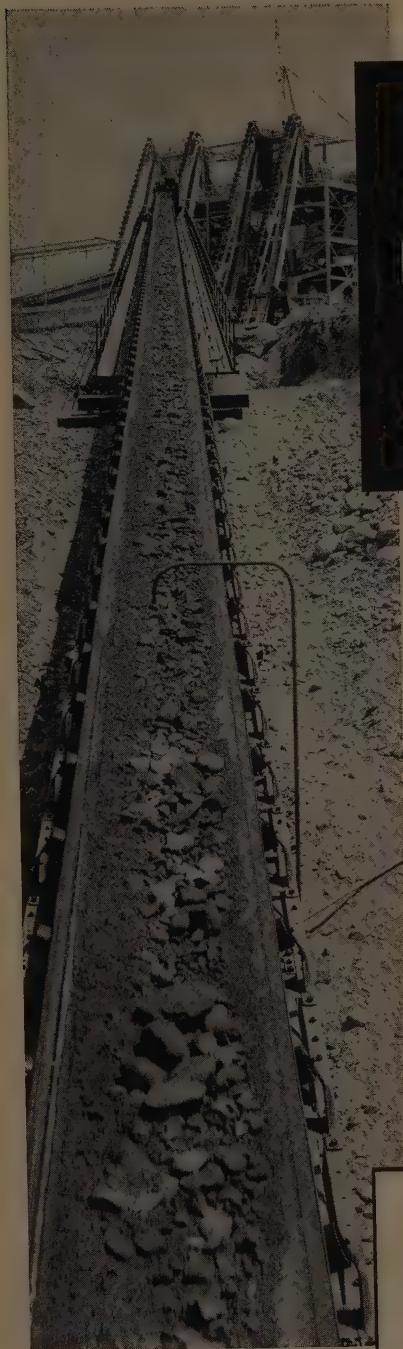
Ted Anderson is project manager for **Western Paving Constr. Co.** on this company's \$925,000 contract for runway strengthening at **Lowry Air Base** in Denver, Colo. Shift superintendents are **Bill Cummings** and **Darrell Stoltz**.

Harry Dick is general superintendent for the **General Construction Co.'s** foundation pile-driving work in connection with a grain elevator for the **S. P. & S. R. R.** in Vancouver, Wash. Other personnel connected with the job are: general foreman **Ed Stanton** and pile-driver foremen **Jack Prator**, **Russell Meeks** and **Bill Hendrickson**. Work is just about completing.

George A. Read is **L. H. Hoffman's** superintendent on the erection of a bleach plant at **Oregon City, Ore.**, for **Publishers Paper Co.** **Walt Smith** is carpenter foreman and **George Robinson** ironworker foreman. Job is just about finishing.

A. S. Logan is general superintendent for the \$242,000 contract held by **John A. Logan** for grading and clearing work near **Estacada, Ore.** **Manford (Bud) Jones** is shop foreman. Subcontract for two bridges is held by **Pacific Northwest Steel Erectors**, with **Otto Burger** as general superintendent and **Lloyd Rohl** erection foreman.

Bob Nesser is general superintendent for **Morrison-Knudsen and Rumsey & Co.**, who are constructing the **Battery St. subway** in **Seattle, Wash.**



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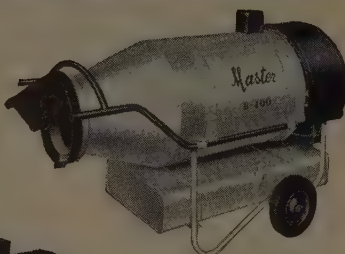


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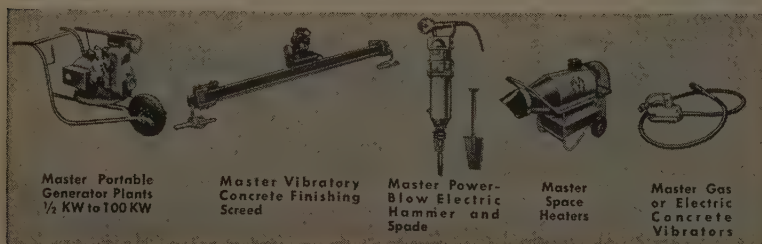
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quality Master-made units
to meet every need

NEW MASTER SUPER-SPACE HEATER SPECIFICATIONS

MODEL NO.	CAPACITY	*SAFETY	BURNER	FUEL	
B-160	160,000 BTU per hour	Indications of carbon monoxide in the exhaust gases of the kerosene fueled Master Space Heater was less than 0.001 per cent by volume . . . as tested by an independent testing laboratory. According to accepted standards this content is one tenth of the amount considered hazardous.	Master Gun Type	Kerosene, No. 1 Fuel Oil or No. 2 Fuel Oil	
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(Continued)	FUEL CONSUMPTION	HOT AIR OUTPUT	CONTROLS	SIZE	WEIGHT
B-160	1.14 per hr.	1100 C.F.M.	Thermostat for full automatic temperature control. Fuel tank safety control.	W-24½" L-58" H-34"	166 lbs. less fuel
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for the State Department of Highways. John Rumsey, Jr., is acting as project manager on the contract. The following are at the site as superintendents: steel, Oscar Peterson; equipment, Barney Ragon; pile driver, Frank Wilkinson; concrete, George Wiita. Foremen are: carpenter, Ernie Still; cement finisher, Jerry Robison; concrete, Dan Madison and Dan Naranchich (sewer); labor, Pett Soling; pile-driver, John Foster; drill, Homer Halverson, and liner-plates, Herman Weeks. Earl Reynolds is master mechanic. Office manager is Ralph Smith; timekeeper, Bob Baker; and purchasing agent, Jess Coppidge. Jack Wells is field engineer.



W. J. Wiseman (see item below)

William J. Wiseman is general superintendent over all work in the Long Beach and Los Angeles area for Millie & Severson of Long Beach. The firm is currently putting up 9 structures in that area.

Russell Hopkins is general superintendent and Gunnar Nygard is project manager for Morrison-Knudsen Co., Inc., on the \$880,110 contract for construction of an earth-fill dike on the upper Clackamas River for the Portland General Electric Co. Will Huff is excavation superintendent. William T. Swartz, Clarence (Rocky) Myers, Paul Geiger, George Meier and E. E. Coleman are grade foremen. Jim Sellars, Lawrence Dole and Jim Bowler are carpenter foremen. Jim Cleek, Doris Holmes and Walter Bradbury are labor foremen. Master mechanic is Walt Forslund and office manager is Paul Mohlenpah. Glenn Toy is the project engineer.

J. C. Hubbard, superintendent, and Albert Oakley and Clayton Peterson, foremen, are heading the job for E. E. Peterson on an award for 5 culverts and two bridges in Campbell County, Wyo.

W. J. Loomis, superintendent, assisted by T. J. Serna, grade foreman and S. E. Johnson, oil foreman, is supervising a \$158,751 grading and asphalt surfacing contract in New Mexico for Floyd Haake. This work comprises 10.6 mi. from Tucumcari to Conchas Dam highway in Quay and San Miguel counties. Another con-

t for asphalt surfacing in the
 unt of \$168,287 held by Haake is
 being supervised by Loomis, with
 L. Gibson as structure foreman.
 s work is located in Colfax County.

a Columbia County, Ore., Edward
 Pinkston, superintendent, and
 bert E. Wills, assistant superin-
 tent, are heading a \$755,270 job
 7 miles of grading and construc-
 of a 50-ft. reinforced concrete
 lge for Kuckenberg Construction

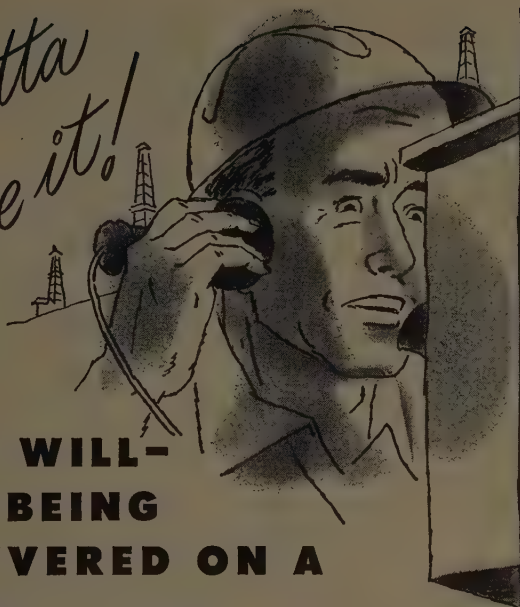
ill Cole, superintendent, and Red
 , job engineer, are heading a \$984-
 award held by Peter Kiewit Sons'
 for 2 miles of grading and 5 miles
 paving on the Oregon Coast High-
 y in Curry County.

a grading job along the Columbia
 er in Oregon is headed by Project
 nager W. F. Martin for Rogers
 nstruction Co. N. P. Menard is
 istant superintendent; Richard
 ckle, office manager; M. H. Hol-
 , grade foreman; Von J. Watson,
 vder foreman, and Lance Boreska,
 ster mechanic.

erris Ray, superintendent, and
 illiam Bickley, job engineer, are
 ading 8 miles of work on the Mc-
 ry-Eagar highway in Arizona, for
 M. Sundt Construction Co.

Construction of the powerhouse
 Chief Joseph Dam at Bridgeport,
 ash., is going up on a \$39,749,990
 ntract held by Columbia River Con-
 nctors. Top personnel on the job
 as follows: Pete Piedmont, gen-
 eral superintendent; P. J. Soukup,
 roject manager; G. M. Shupe, proj-
 engineer; R. I. Gutru, office man-
 er; Don O'Hagan, graveyard su-
 intendent; Frank Urban, swing
 perintendent; Dave Shaw, master
 echanic; C. Reiswig, carpentry
 perintendent; Joe Ray, pipe super-
 endent; Bill McGee, rigger super-
 endent; Bill Haggarty, electrical
 perintendent; L. E. Hixson, con-
 rete superintendent; A. E. Lamber-
 n, paint superintendent; Roy Smith,
 tch plant superintendent; Roger
 omas, carpentry shop superintend-
 nt; J. E. Gore, excavation superin-
 endent; Jim Napper, general car-
 ntry foreman; Joe J. Luco, Marion
 Anson, Metz S. Pachosa, Stanley
 Lauer, and Michael D. Soreng,
 rpenry foremen; T. K. Jensen,
 ovel foreman; A. E. Swanson, Jack
 Clark, and Cecil Auby, shop fore-
 en; B. L. Swearengen, R. M. Hix-
 n, Rayborn Adams, Chester Tryon,
 ed Jesse Strum, concrete foremen;
 ke Lucas, labor foreman; Alvin
 yers, general fitter foreman; Don-
 I. Lantz, lineman foreman; Harry
 Smith, Harold W. Corpe, and
 enn W. Angst, wire foremen;

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Arthur B. Siri, Santa Rosa, Calif., contractor has been slicing down a hillside a mile out on the Masonite road near Ukiah, Calif., and leveling off for a space to permit log decking for the Hollow Tree Lumber Co. Here he is pictured from left with **Sam Parnum** and **James Curtis**, superintendents.

Charles S. Dean, **Erwin Goytowski**, **John A. O'Flaherty**, **Even L. Myers**, **Clifford E. West**, and **George W. Grout**, fitter foremen; **Jack Murray**, **George R. Dempsey**, **Robert E. Valdez**, **William M. Walker**, **Harry H. Husum**, and **Floyd W. Vincent, Jr.**, iron worker foremen; **Walter E. Brown**, **Jacob C. Windle**, **Hosea L. Bohannon**, and **John W. Jones**, carpentry shop foremen.

Carpentry foremen on the project are: **Ernest R. Hutchison**, **Robert L. Wilson**, **Rupert J. Napper**, **Raynold K. Butler**, **Marcus A. Cone**, **Byrus Bork**, **Russell Cargill**, **Ulese W. Dollarhide**, **Lloyd J. Napper**, **Harry J. Pachosa**, **Albert D. Marley**, **Therman L. Killian**, **Donald E. Black**, **Henry F. P. Secrest**, **Wesley P. Witcher**, **Ernest B. Caviness**, **Sherman S. Doud**, **Francis M. Nash**, **Benton E. Piland**, **Donald N. Patrick**, **Alvin P. Busse**, **Russell Wood**, **George E. Smith**, **Bernard H. Murray**, **John H. Maxey**, **Louis W. Trevathan**, **Steve M. Aldridge**, **Pat E. Anson**, **Hiram K. Pettitt**, **Keith H. At-**

teberry, and **Alfred R. Boolean**. Others on the job are: **Joseph L. Williamson**, **Joseph S. Waite**, and **Jack A. Machaels**, finishing foremen; **Howard A. Nickels**, **Henry E. Bauer**, and **Vernon V. Romey**, batch plant foremen; **Frank M. Broers**, tractor foreman; **Lloyd A. Whetstine**, **Perry R. Strain**, **Wilbur G. Davisson**, **Ralph O. Westlake**, **Harry J. Remlinger**, **Marlin J. Mason**, **Hubert D. Adams**, **Marshall A. French**, **Carl J. Pavlicek**, **John H. Podey**, **Alfred F. Fetter**, **Elmer G. Prokash**, **George M. Dosen**, **Charles B. Beadell**, **Ernest E. Douglas**, **Jim J. Hajek, Jr.**, **Alfred C. Schultz**, **William H. Barden**, and **Marvin A. Hill**, clean-up foremen; **Carl E. Gilbrech**, **Willard O. Kessler**, **Dale K. Leplar**, **Carl D. Carroll**, **Everett L. Gilkison**, **Verland D. Benning**, **Theron F. Drake**, **Harry Bagnell**, **Keith Largent**, **Jack H. Burrows**, and **Dick Carrier**, concrete foremen; **Reuben E. Vaughn**, **W. A. Caster**, and **Louis Carollo**, labor foremen; **Leonard J. Koerber**, form stripper foreman; **Karl Nilsson**,

excavation foreman; **Nick Piedmont** and **Alva Tune**, concrete foremen; **D. Trovillo**, oiler foreman; **Harold C. Bird**, drill foreman; **H. H. Johnson**, **E. B. Hamlin**, **C. H. Steiner**, **C. Allen**, **John Holmes**, **Bill Cochran**, **Albert Berry**, **M. Acher**, **H. H. Curtis**, and **C. W. Bolton**, surveying party chiefs. **A. W. Campbell** and **Leland H. True** are field engineers; **T. J. Boyd**, safety engineer; **Stan Stearns** is office engineer; **W. A. Stewart** is cost engineer; **P. A. Campbell** is accountant; **Bill Smith** is paymaster, and **R. Enos** is warehouse manager. This large project began last year in April and is expected to be completed in April 1956.

Harvey Rutherford, general superintendent; **Jack Reynolds**, office engineer, **Rex Rice**, yard superintendent, **Don Spiker**, general steel foreman, and **Pete Smolenski**, general foreman on the swing shift, are heading the job for placing reinforcing steel at Chief Joseph Powerhouse. The \$600,000 award is held jointly by **Rutherford-Skoubye** and **The Steel Construction Co.** of Oregon.

Bud Copeland, superintendent, **Tom Schott**, Copeland's assistant, and **Wally Wilson**, job office manager, are heading **Peter Kiewit Sons' Co.**'s \$680,095 award for grading and paving in **King** and **Kittitas** counties, **Wash.**

Completion of road and walks at **Porterville State Home** in **California** is headed by **Marshall De Bisschop**, superintendent for **J. Henry Harris**, contractor, who holds the \$184,520 award. **William (Bill) Matthews** is assistant superintendent in charge of equipment.

Dick Hood, supervisor; **Gordon Johnson**, grade foreman, and **Martin Zimmerman**, bridge superintendent, are key men on the job for **Fredrickson Bros.**' \$1,176,448 contract for 2.2 mi. of grading and paving and two bridges in **Alameda County, Calif.**

John Holmdahl is supervisor for **Martinson Construction Co.** on a street paving job in **Denver, Colo.**

O. H. Tucker, general superintendent, and **F. D. Hudkins**, project manager, are heading the construction operations for **Macco-Puget Sound** on the \$8,000,000 contract for the concrete dam being built on **So. Boulder Creek** for the **City of Denver**. They are being assisted by the following superintendents: **P. A. Corkins**, **Alfred Maas**, **Jim Maas**, shift superintendents; **G. E. Smith**, electrical; **G. N. Cox**, rigging; **F. S. Jordan**, form; **J. J. Jeffries**, aggregate. **M. S. Eychner** is master mechanic and **S. D. Kelly** is safety engineer. Also among the

ON THE JOB at **Lucky Peak Dam** construction near **Boise, Idaho**, are (left to right) **K. L. Sinan**, fill foreman; **O. J. Daly**, project manager, and **John Howard**, inspector for the **Corps of Engineers**. Joint venturers on this large contract are **Morrison-Terteling-Macco-Puget Sound**.





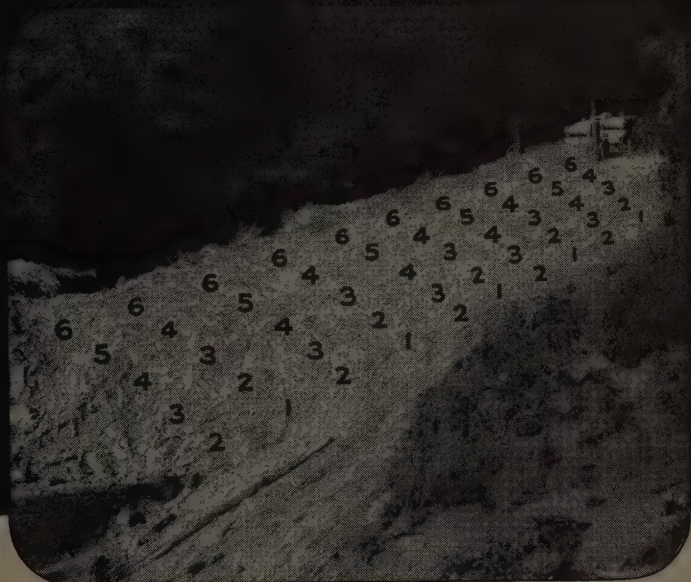
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contractor's personnel are R. E. Collier, office manager; C. W. Stinson, office engineer; W. Gummere, paymaster, and Jim Kessler, purchasing agent. In charge of public relations is D. S. Richards.

In Lincoln County, Wash., 14 miles of grading and surfacing and construction of a bridge is headed by William M. Wilson, superintendent; T. W. Nelson, master mechanic; Frank Stevens, foreman, and G. W. McAdoo, supply clerk, for Goetz & Brennan, which holds the \$507,148 award.

On Latimer Construction Co.'s \$65,000 contract for a bridge over Clear Creek, at Denver, Colo., "Bus" Gray is resident engineer for the Colorado State Highway Department.

A million-dollar job for canal construction is headed by A. E. Hamlett, project manager; William Shimasaki, engineer; D. C. Davis, assistant engineer; Louis Curtis, excavation superintendent; James Malone, concrete superintendent; Floyd Wine, master mechanic; W. D. Lingel, office manager; R. E. Smith and George Friesen, spreader foremen; Charles Stier-

walt, A. A. Reimund, and M. Jacoby, carpentry foremen; D. J. Thompson, shop foreman; C. A. Affleck, H. H. Husher, and Harvey Hargraves, labor foremen. The USBR is represented by Art Swanson, resident engineer, and Joe Kirk, Swanson's assistant. Ches Bros. and Sandkay, Inc., is contractor. Location is Quincy, Wash.

Arland Quein is supervising 12 miles of grading and surfacing on P.S. No. 1 in King and Snohomish counties, Wash., for Associated Sand & Gravel Co. and Western Asphalt Co., which holds the \$613,312 contract.

At Everett, Wash., the bridge crossing the Snohomish River is going up by Manson Construction & Engineering Co. at a cost of \$1,913,080. Chief personnel are: Walter Peterson, general superintendent; Clyde Sherman, project engineer; Bud Prentice, Earl Hietmann, Hans Thornquist, and Kenneth Bates, pile driver foremen; Ole Ronmark, carpentry foreman; Frank Hutton, labor foreman, and Lee Johnson, office manager.

Asphalt surfacing on U. S. 66 in Valencia County, N. Mex., is supervised by B. H. Pebley for Northwestern Engineering Co., a Denver firm. Val White is office engineer; Ted Smith and Theron Stark are graders; George Baab is structural foreman, and Edward Vandervort is district manager.

E. F. Heitz is supervising a \$399,250 addition to the sewage disposal plant at Walla Walla, Wash. Fred J. Early, Jr., Co., Inc., is contractor.

Bill Ramstrom is supervising the George Erickson Construction Co. award for a multi-million dollar addition to Spear Sanitarium in Denver.

George Mason is supervising award for laying a steel pipe water main in Denver, Colo., for Gilbert Clark Construction Co.

Chief Joseph Dam, under construction near Bridgeport, Wash., since December 1950 by Chief Joseph Builders, is headed by the following personnel: T. E. Curtis, general superintendent; W. N. Evans, project manager; K. L. Parker, chief engineer; M. Hayes, field engineer; J. E. Gibson, office engineer; A. D. Haile, office manager; R. H. Miller, dam superintendent; F. E. Stevens, swing shift superintendent; J. DeMilita, walker; L. R. (Doc) Kramer, safety engineer; S. D. Fraser, carpenter superintendent; J. O. Gossett, master mechanic; W. C. Jones, rigger superintendent; J. W. Drinnon, batch plant superintendent; A. M. Freitas, aggregate plant superintendent; W.



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Nalli (left), bridge engineer for the State of California; Cal Powers, general superintendent, and John Brown (right), assistant superintendent, are the job for John C. Gist Co.'s million-dollar award for construction of two miles under the Union Pacific tracks in Sacramento. Not pictured is Vic Mose, general foreman.

Hughes, electrical superintendent; R. Warthen, excavation superintendent; C. A. Lindberg, James H. Wilson, R. W. Whitley and W. B. Evans, engineers; R. L. Aydelott, assistant carpentry superintendent; J. Johnson, steamfitter foreman; T. Palm, aggregate plant foreman; R. Rider, V. E. Hamilton, and H. Shatto, labor foremen; H. J. Armstrong, finisher foreman; S. S. Holmes, M. S. Roberts, M. L. Umberger, C. R. Cansburn, and M. O. Jeff, carpentry foremen; Perry Burksdale, electrical general foreman; Leonard Haugsban, electrical foreman; J. M. Henningsgard, chief warehouseman; R. E. Brown, assistant office manager; F. E. Steel, G. A. Davis, and H. W. Beavers, rigger foremen; W. L. Woodworth and W. J. Gossett, mechanical foremen; J. L. Colvin, pipe superintendent; R. Terrenoud, stripping foreman; E. H. Reumer, concrete foreman; G. W. Rothum and O. J. Johnson, cleanup foremen; T. E. Driscoll, paymaster; A. Henningsgard, purchasing agent; J. J. Hiatt and H. L. Schmidt, timekeepers; R. J. Jones, inventory clerk, and W. D. Godbey, stenographer. The contract for placing reinforcing steel is held by Rutherford-Koubey. Harvey Rutherford is superintendent and Joe Steffens is steel foreman.

A \$121,009 award held by Bentson Construction Co., Inc., for 10.8 miles of grading, surfacing and seal coating in Pinal County, Ariz., is supervised by Dale Milner.

Charlie Page, superintendent; R. Brant, project manager, and Pat Byrne, project coordinator, are heading construction of barracks and a mess-and-administration building at Edwards Air Force Base in California. McDonald Bros. holds the \$1,068,845 award.

Lee Cox, general superintendent; Bill Henager, project engineer; Paul Higden, job superintendent on the

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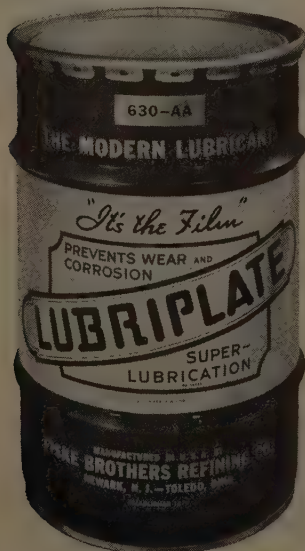
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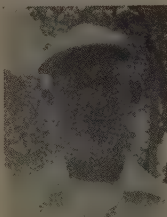


day shift; Bob McKee and Harvey Swanson, job superintendents on the night shift; Joe Baker, grade superintendent; Bud Kemp, master mechanic; "Fill" Hastings, labor foreman, and Paul Rider, grade foreman, are heading a \$590,000 job on the Everett-Marysville highway in Washington, for Guy F. Atkinson Co. Edward Wilkerson is resident engineer on the job.



Haase
(upper left)

Withrow
(upper right)



Parker
(left)

(See item below)

Albert C. Parker, superintendent, assisted by Ernie Mayfield, is heading the job for H. Earl Parker, Inc., on construction of a levee at Freeport, Calif. Jim Withrow is master mechanic; Bill Higgins is structure foreman; Buster Haase and Earl Fordahase are labor foremen, and Herman Keil is rock foreman. Charles Elliot and William Highfield represent the Corps of Engineers in the capacity of resident engineer and chief inspector, respectively. The job is expected to be completed in December.

D. P. (Don) Hipps is general superintendent on construction of the Steamboat Slough Bridge at Marysville, Wash. Other top personnel on this \$930,425 job held by M. P. Butler are: Al Mallow, structural iron superintendent; Herman Helmun, carpentry foreman; Vern Weygandt, M. M. Wilson, and Steve Radowitz, pile driver foremen, and Jack G. Early, reinforcing iron foreman.

Contractor L. R. Sommer of Balboa, Canal Zone, has a crew at Elmendorf Air Force Base in Alaska, no less, for construction of a \$434,000 outside electrical distribution system. Earl Freund is superintendent; Allen Barnes is general foreman, and Miss D. G. Haywards is office manager.

M. J. Brock & Sons have a contract for putting up 283 homes in the Long Beach, Calif., area. O. J. Harryman,

general superintendent on all work for the company, is heading the job assisted by: G. C. Savery, job project superintendent; Oscar Gothberg, tractor superintendent; Earl Arnold, carpentry superintendent; Joe Johnson, finishing superintendent; Doyle Hill and John Moore, labor foremen; John Roinen, expeditor, and A. Wines, office manager. Johnny Dorris is supervising for W. K. Wark, sub-contractor for foundations and other concrete work.

John P. Schmidt, general superintendent; George Gelnicker, superintendent, and J. B. Kenney, Jr., project manager, are heading a \$250,000 job on the Denver Valley Highway. James B. Kenney, Inc., is contractor for this Colorado project.

Dan Handy, general superintendent; D. P. Yarrington, engineer for the Bureau of Public Roads; Bob Banks, office manager; S. R. Samuelson and John Guthrie, foremen, and Morris Fountain, master mechanic are heading the job on a half-million dollar contract held by Lowdermill Bros. for road construction through Boulder Canyon near Boulder, Colorado.

Paul Cross, superintendent; Grove Meador, foreman, and W. H. Whisenant, crusher foreman, are heading the job for Henry Thygesen & Co. for 18 miles of rolling and seal coating in San Juan County, N. Mex.

Construction of a sewage treatment plant at Pasco, Wash., is supervised by I. L. Allen for contractor W. B. Edmiston & Sons, Inc. Hanse Thompson and Alvin Unruh are foremen of carpentry and labor, respectively, and C. Dean Smith is inspector.

Art Johnson, assisted by Charles Jenkins, is supervising construction (tilt-up) of a central stores warehouse at the Richland, Wash., atomic energy plant. A. R. Nieman is acting as project manager for his firm, A. R. Nieman Construction Co., which holds the \$290,000 award. Russ Cochran is cement finisher foreman and Robert Gallegos is labor foreman.

Virgil Beecher, general superintendent; A. J. Raber, inspector, and Jim Mullin, carpentry foreman, are heading work on additions to a Pasco, Wash., junior high school, an award held by Ruud Construction Co.

Ernest Gound is superintendent on the construction of an overpass and connecting road near Phoenix, Ariz. Earl Eaglin is carpenter foreman on the same job. This contract was recently awarded to Phoenix-Tempe Stone Co. at \$176,073.

Helge Sather supervised construction of a recently-completed American Legion clubhouse at Richland, Wash., for Ruud Construction Co.

James Kelley, superintendent for John G. Mehren, is supervising a road grading and armor coating contract in Nevada County, Calif., recently awarded Mehren on a bid of \$144,965.

Chas. J. Shannon is serving as project manager on his company's contract in the amount of \$215,585 for the surfacing of a section of Clark Fork highway in Montana. Lee Tintner is master mechanic on the job.

Construction of a pole line distribution system at the Richland atomic energy project is headed by G. A. (Blondie) Roberts, general superintendent; "Whitey" Williams, electrical foreman; H. R. Johnson, crew foreman; J. R. Brown, line foreman, and Hal Cram, office manager.

Neely Foulger is superintending a grading and drainage job in Mendocino County, Calif., for Cecil L. Moore. The other key men on the job are Oscar Sjeruen, engineer for the contractor, Dale Yttreness, resident engineer, and Ray Skeeters, master mechanic. Moore's bid for this work was \$133,484.

E. D. Hunt is supervising the \$185,415 interceptor sewer work in San Pablo, Calif., for Kevry Construction, Inc. Jack Guellid and Sam Hackett are employed on the job as foremen and Don Vadnais as timekeeper.

Russ Tout is superintendent for Thomas Construction Co. on grading and paving work in Fresno, Calif. George Borovich assists him on culverts and paving. Andy Anderson is grade foreman and Chris Kinzel is master mechanic. Thomas Construction Co. was awarded the contract at \$168,996.

Ivan H. Winn is acting as superintendent for Winn & Co., Inc., on a \$101,765 contract the company received for stock-piling and seal-coating 55 mi. of road in Idaho.

E. G. Spooner, superintendent for A. A. Corder Co., is supervising a grading job near Yellow Pine, Idaho, which Corder received on a bid of \$230,715. Also working at the site is Rudolph Bischke, drill and powder foreman.

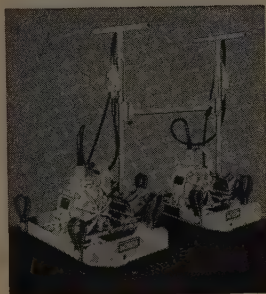
Jack Burchett is general superintendent for J. H. & N. M. Monaghan & Associates on the \$370,000 contract awarded them for highway work on U. S. 6, Derby to Hudson, Colo. Other

JACKSON

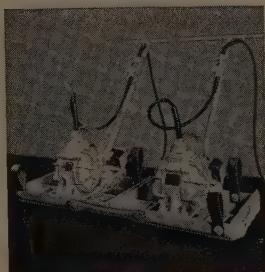
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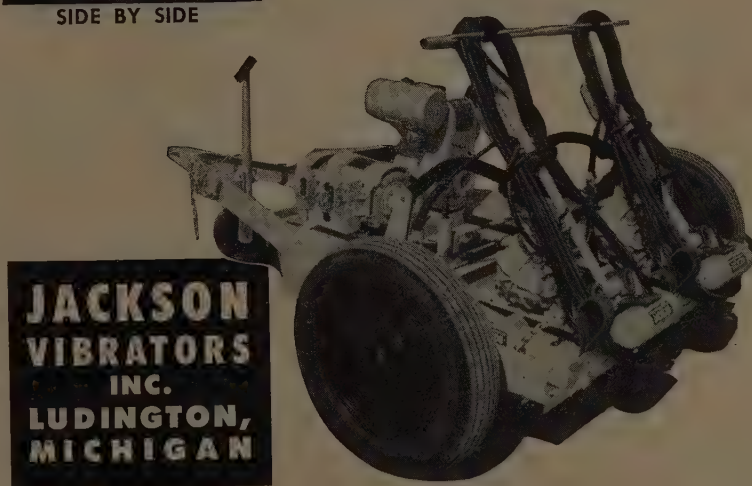
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key personnel are **Ed Hanson**, superintendent; **Joe Floryancic**, carpenter foreman; **Norman Smith**, labor foreman; **John Schmier**, master mechanic, and **Jerry Aymer**, paymaster.

Work on The Dalles Dam on the Columbia River is proceeding under supervision by the following men: **Vernon Bradley**, general superintendent; **A. H. Steiner**, project manager; **Guy Heimsoth**, assistant project manager; **J. B. McNabb**, chief engineer; **Bert Lewis**, master mechanic; **Joe Canto** and **Jim Daley**, shift superintendents; **Lee Reid**, "Swede" **Edner**, **Alex Morgan**, **Jim Forrest**, **Dale Smith**, **Joe Baker**, and "Rooster" **Cordell**, general foremen; **Jim Hill** and **Chuck Throckmorton**, assistant master mechanics; "Jake" **Jacobs**, shop foreman; **Carl Schmitt**, drill superintendent; **Gabe Gabrielson**, electrical superintendent; **Lee Kirkman**, lube superintendent; "Fuzzy" **Casstevens**, tire shop superintendent; **Jake Absher**, **Tom Yant**, **Sammy Malan**, **Baldwin** and **Falbe**, drill foremen; **Ted McDaniels**, powder foreman; **M. O. Crader**, truck dispatcher, and **O. T. Dellinger**, chief storekeeper. This \$14,437,978 contract was awarded to **Atkinson-Ostrander** last December and is scheduled for completion by December 1955.

Vernon Bradley and **A. H. Steiner** are also top men on another award held by **Guy F. Atkinson Co.** and **Ostrander Construction Co.**, the bridge crossing the Columbia River two miles east of The Dalles Dam site. Others on the job are: **John Skeels**, job engineer; **R. Hamen**, office engineer; **Joe Davis**, carpentry superintendent; **Bill Roarr**, concrete superintendent; **Art Whetstone**, **Joe Pixler**, and **Joe McManus**, carpentry foremen; **Don Whetmore**, concrete foreman; **Chris Schneider**, mechanical foreman; **Charles Chamberlain**, excavation superintendent; **D. C. Schriener**, swing shift excavation superintendent, and **Clyde Rasor**, timekeeper. **Tudor Engineering Co.** is represented by **Tom McKenzie**, area engineer, and **Clyde Barrett**, chief inspector. **H. W. (Bill) Ziegler**, superintendent; **R. A. (Red) Chisholm**, job engineer; **Emmett Forth**, erection foreman, and **Howard Garner**, riveting foreman, are heading the job for **Judson Pacific-Murphy Corp.**, which holds the contract for structural steel work.

A. G. (Andy) Allen, general superintendent, and **W. M. Sloan**, grade foreman, are heading a \$227,730 contract held by **Ellis Construction Co.** for 8 miles of grading and surfacing in Washington.

A \$5,000,000 housing project for the **Richland, Wash.**, atomic energy plant is headed by **J. W. (Jim) Jackson**, project manager for **Guthrie Con-**

struction Co. Other key men on the job are: **Dick Adams**, project engineer; **Norm Meyers**, equipment superintendent; **W. T. Haynes**, carpentry superintendent; **Lloyd Flienger**, foundation superintendent; **Leo Robie**, office manager; **W. E. Fryett**, mechanical foreman, **Stan Hesler**, general labor foreman, and **C. J. Robbins**, **L. B. Rees**, **W. H. Parker**, **C. S. Knoles**, and **J. E. Leach**, carpentry foremen.

T. M. (Tom) Reilly, general superintendent; **Edward V. Cunningham**, assistant superintendent, and **Lloyd Gadeberg**, master mechanic, are heading a \$1,053,000 award held by **Goodfellow Bros., Inc.**, for 11½ miles of grading and surfacing on the **Columbia River Highway** in Oregon.

Phil McInnis, general superintendent; **Bill Umbach**, assistant superintendent, and **Harold Cunningham**, steel foreman, are heading construction of a 2-story telephone building at **Wenatchee, Wash.**, for **McInnis Construction Co.** and **Henry George & Sons**. **Tom Bartlett** is general superintendent over installation of plumbing and heating, and **Joel Ryd** is brick foreman for the subcontractors.

Walter Nordstrom, superintendent, and **C. C. Cleman**, foreman, are heading construction of an undercrossing at **Vancouver, Wash.**, for **Carl M. Halvorson, Inc.**

Ken Gooding, project manager; **Lee Myers**, mechanical superintendent; **William Fisher**, electrical superintendent; **Ken Collins**, foreman for turbine installation; **Jim Jack**, electrical general foreman; **Wilmer Erickson**, rigging foreman; **Harlow Spencer**, labor foreman, and **A. A. Stranski**, office manager, are heading up the job for **Cascade Constructors**, which is installing turbines, pumps and electrical and mechanical equipment at **McNary Dam** in Oregon.

E. James Mackey, Jr., assisted by **Harry Ishoy**, is supervising construction of school buildings in **Sacramento, Calif.**, for **Edwin J. Mackey**, contractor. **Jim Rotz** is foreman for **M. R. Carpenter**, subcontractor for plumbing and heating.

E. N. Dolan, superintendent, **Ray Pitner** and **Clem Dutra**, foremen, are **O. L. Soule** men heading the job on construction of a \$294,884 sewage system for **Coos Bay, Ore.**

A warehouse going up in **Wenatchee, Wash.**, by the tilt-up construction method, is under the supervision of **A. R. (Whitey) Lowry**. **Busboom & Rauh** is contractor.

PIT FOUR TUNNEL

... Continued from page

The principal outside activity presently under way and relating to the tunnel construction is excavation of the surge chamber. A 127-ft. raise for this structure has recently been completed at a point some 200 ft. inside the main portal and excavation of full diameter is presently under way.

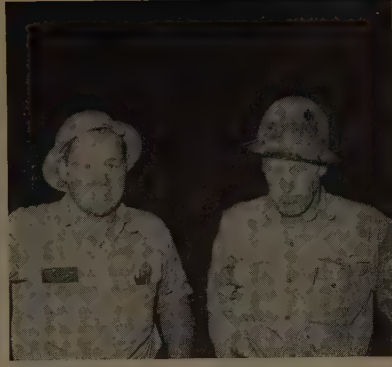
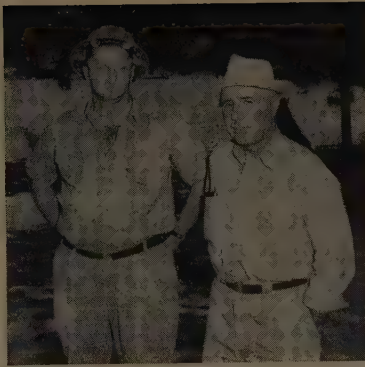
Concrete lining operations are long way off—after all, there is still 15,000 ft. to go, and the project is due for completion until May 1955. However, some plans for concrete work have been formulated. Tunnel lining concrete will all be batched at the adit on the upstream end, and for this work it is planned to erect a batch plant having 4 aggregate bins totaling 150 tons and 2 cement silos with a capacity of 1,400 bbl. The wet concrete will then travel downhill through the tunnel and into the forms, conveyed in about 20 or 30 agitator cars of 4- and 6-yd. capacity.

Tunnel lining forms will be fabricated by **Berkeley Steel Construction Co., Inc.** Provision has been made in the tunnel design for either circular or horseshoe finished section, reinforced or unreinforced. At present, on the basis of ground conditions found so far, it is expected that an unreinforced horseshoe section will prevail through a considerable portion of the tunnel. Near the portal 314 ft. will receive a steel liner. In position in the tunnel, the forms will provide for clear thickness of concrete amounting to 9 in. in the invert and 8 in. over timber at the sides and crown. It is not planned to remove any timbering other than what may be necessary in order to get concrete into place. Generally, this would cover only the collar bracing.

A batch plant has already been erected at the main portal and will be the focus for concreting operations in the surge chamber and the powerhouse itself. The aggregate capacity of this plant is the same as the other; cement storage is limited to 350 bbl.

The manner in which pay items relating to tunnel excavation and lining are handled is interesting if not unique for this type of work. Basically, there are three components involved which are (units in parenthesis) excavation (lin. ft.), support timber (fbm.), and concrete lining (lin. ft.). Pay adjustments for the difficulty of work encountered—actual hazard as well as additional man-hr. required—are handled by a breakdown of the excavation item. The contractor is paid different unit prices per foot of tunnel excavation depending upon the amount of support required. Four classifications are used: support a from 0- to 3-ft. centers, 3- to 6-ft., over 6-ft., and unsupported sections.

Timber support is paid for by the board foot, as determined by estimate or actual computation. Tunnel lining



A LOT OF PEOPLE are in on any tunnel job. Here are some of the principals on Pit 4. For the contractor, **E. H. Hatch** (left) is project manager. The superintendent is **Les Huntington** (right). Heading up the P. G. & E. crowd at present (center picture) are **Horace Moulton** (left), acting resident engineer, and **J. E. Cooney**, general superintendent. In the tunnel, caught in mid-stride, are **Forest Sorenson** (left), P. G. & E.'s field engineer, and **O. L. Allen**, walker for Walsh.

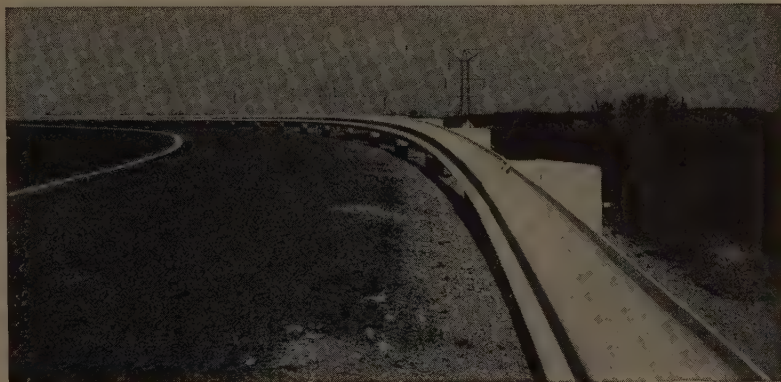
is paid for at a flat rate per lineal foot of tunnel, original estimates of yardage having been based on assumed averages for excavation overbreak and volume of timber support.

Pacific Gas & Electric Co. forces on Pit River construction are headed by **J. E. Cooney**, general superintendent. Project engineer on the Pit 4 work is **George Thacher**. Pending a new assignment for Thacher, **Horace Moulton** is acting resident engineer. **Forest M. Sorenson** is field engineer, with assistance on the tunnel surveys being provided by **Jack McIntyre** and **Jerry Gubert**. **R. D. Raglin** is office engineer and **Arlo Elson** does the accounting.

The tunnel and other project structures were designed by the engineering department of Pacific Gas & Electric Co. under the direction of **H. V. Lutge**, chief civil engineer, and **T. J. Corwin**, supervising civil engineer. Actual design was by **J. B. Cooke**, senior civil engineer, and his staff.

Construction of the project is supervised by the general construction department of the company under the direction of **H. W. Haberkorn**, engineer of hydroelectric construction, assisted by **John W. Woodward**, construction engineer, and the field staff.

For Walsh Construction Co., the work is handled out of their long-established San Francisco office, with **J. H. Gill** in charge. **E. H. Hatch** is project manager and **L. E. Huntington** is superintendent. **Ray Miller** is job engineer and **W. F. Logan** is office manager. **R. W. McAvoy** is master mechanic and **R. C. Schultz** is chief electrician. Walkers on the three shifts in the portal heading are **O. L. Allen**, **G. W. Herd**, and **W. W. Wilmoth**. Walkers in the adit heading are **Bill Delp**, **Steve Wilmoth**, and **J. C. Mathis**.



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R. A. Nason, field superintendent, and **J. H. Beaver**, project manager, are supervising the **L. H. Hoffman** contract on erection of a pulp mill at Everett, Wash., for the **Weyerhaeuser Timber Co.** They are being assisted by superintendents: **A. G. Hunt**, millwright; **Andrew Johnson**, carpenter; **E. W. Ratty**, labor, and **Millard Gee**, ironworker. Foremen on the job are: **Jerry Hockinson**, general boiler-maker; **Martin Lindquist**, labor; **Jesse Derifield**, paint. **Earl Bailey** and **F. C. Brown** are engineers. Office manager is **Robert Millar** and **Dick Herron** does the purchasing.

For the **Mechanical Constructors Co.**, holder of pipe subcontract, **R. S. Bonn** is general superintendent assisted by **James Harding**. **Pat Leedle** is general foreman—instruments. **E. C. (Gene) Snider** is office manager. For the **Electrical Construction Co.**'s subcontract, **Ray Sullivan** is superintendent and **Leonard Prince** is foreman.

E. L. Richter is general superintendent for **United Engineers & Constructors, Inc.**, on the installation of the powerhouse for **Weyerhaeuser**. Other key personnel on this contract are: **L. J. Dubey**, general foreman, electric; **R. O. Reynolds**, pipe; **Jess Cummings**, ironworker, and **C. R. Riner**, millwright.

Tobe Wight has the general superintendent spot for the **General Construction Co.** on the effluent disposal pond work and inlet and outlet structures, just about completing. General foreman is "**Chuck**" **Wight**; job engineer, **John Gressit**; office manager, **G. N. Reeves**, and master mechanic, **Les Schuh**.

George W. Johansen is superintendent of boiler installation for **C. C. Moore & Co., Engineers**, holder of this contract. Johansen is being assisted by the general foreman **Frank E. Linwood** and boilermaker foremen **Bob Palmer** and **Adrian Harrsch**. **Gerhard Dieckmann** is office manager on the job.

Robert Phillips is working as superintendent for **Jack B. Parsons** on a grading and draining job on U. S. 191 in **Oneida County, Idaho**. Other key men working for the contractor at the site are **Ronald Hadfield** and **Grant Collect**. This is a \$182,437 contract.

James W. Jones is supervising a \$179,822 highway job in **Pondera County, Mont.**, for **Nilson-Smith Construction Co.**

Joe Haak is superintendent for the **Platte Valley Construction Co.** on road work in **Albany County, Wyo.** This is a \$243,872 contract.

A. B. (Curley) Overmyer, assisted by **W. P. (Pep) Hanna**, is superintending a \$118,470 contract for the

Diesel Oil Sales Co. Work consists of seal-coating 64 mi. of state highway in **Washington**.

Among the key personnel for **Lou Richardson's** highway job in **Rosebud County, Mont.**, are **August Kvammen**, gravel foreman, and **Roy Poffenberger**, street foreman. This is a \$189,173 contract for 12.7 mi. of grading and road-mix oiling.

C. R. Pilcher is job superintendent for **Kiely Construction Co.** on a \$209,475 contract for 10.8 mi. bituminous surfacing on the **Yellowstone Trail** highway in **Montana**.

W. L. Blakely and **W. C. Boerner** are job superintendents on **P. L. Saddler's** \$398,501 contract for grading, draining and riprap work on **P.S.H. 1** in **Lewis County, Wash.** **H. J. Saddler** is the superintendent.

A. L. (Dutch) Willems is acting as superintendent on a \$222,221 contract recently awarded **Nilson-Smith Construction Co.** for 6 mi. of grading and gravel surfacing in **Lake County, Mont.**

Tom Kelly is superintendent for **Peter Kiewit Sons' Co.** on its recent award for resurfacing 13.3 mi. highway between **Susanville** and **Willow Creek Valley** in **Lassen County, Calif.** **Wilbur May** is hot-plant superintendent. This job is being done at a cost of \$141,348.

On **Lou Richardson's** recent \$226,340 award for 9.5 mi. of gravel surfacing and plant-mix oiling in **Custer County, Mont.**, **Ed Oftedal** is gravel foreman, and **Les Peak** is plant superintendent.

J. E. Ricker is superintendent and **N. Spencer** is project engineer for **Morrison-Knudsen Co., Inc.**, on this company's \$1,990,791 contract for concrete lining and structures, **Dome Canal**, **Wellton-Mohawk Division**, **Gila Project, Ariz.** **J. O. McGinnis** is general foreman and **G. Van Landingham** is master mechanic. Office manager is **C. D. Johnson**.

Jack Bennett is job superintendent for **Williams & Burrows, Inc.**, and **Carl N. Swenson Co., Inc.**, who are constructing the office and laboratory building for the **Department of Public Health** in **Berkeley, Calif.** Contract was awarded the joint venture firm on a bid of \$1,417,000. **La Marr Dees** is office manager.

Don Barkley is superintendent for **J. E. Haddock, Ltd.**, on construction of a steel girder bridge and some grading and asphalt concrete paving

in **Los Angeles County**. General foreman is **Bill Murphy**. **B. T. Cook** is office manager. **Haddock** got the contract at \$772,539.

Charles H. Foster is superintending the \$108,588 contract of **Morrison-Knudsen Co., Inc.**, for 0.7 mi. of plant-mix bituminous surfacing of **U. S. 30** in **Nampa, Canyon County, Idaho**.

Bill Hitt is **Peter Kiewit Sons' Co.**'s job superintendent on the company's \$162,410 contract to erect a 356-ft. reinforced concrete and steel truss bridge over **Rinehart Creek** in **Curry County, Ore.**

John Patterson is superintending a highway job in **Cowlitz County, Wash.**, for **Peter Kiewit Sons' Co.** This is a \$872,482 contract for clearing, rolling, draining and paving 6.05 mi. of **State Highway 1**, **Rocky Point** to **Castle Rock**. Another key man on the job is **Jerry Kriskey**.

Neal S. Boostrom is superintending on the **Point Loma Naval Supply Depot** aviation fuel storage facilities in **California**. This is a \$2,145,245 job awarded to **Peter Kiewit Sons' Co.**

Dallas L. Dennis is superintendent for the \$190,765 contract awarded **G. D. Dennis & Sons** for the shoofly railroad at **The Dalles Dam** in **Klickitat County, Wash.**

Bill Brady is superintendent on the work at **Bull Creek flood control channel**, **San Fernando, Calif.**, for **W. F. Maxwell**, contractor who received the contract on a \$242,805 bid. **Victor Franks** is steel foreman. **H. B. Raun** is engineer.

Truman Hart is superintendent for **W. F. Maxwell** and **Hemreck & Easter** on their \$293,067 contract for 2.7 mi. grading and surfacing and two bridges on **State Highway 138** in **Ventura County, Calif.** Steel foreman on the job is **Victor Franks**. **H. B. Raun** is the engineer.

R. (Blackie) Hoffner is job superintendent for **Stanley H. Arkwright, Inc.**, the contractor working on the 6.1-mi. highway job near **Roundup, Mont.** He has the assistance of **Tommie Martin** and **Walter Lueth**, foremen, and **Rollin Adams**, pipe foreman. This contract was awarded **Arkwright** on a bid of \$156,087.

Hubert M. Roth, assisted by **Donald F. England**, **Hubert Roth** and **John W. Fuller**, foremen, is supervising for **England & Roth Construction Co.** on its \$163,289 contract for grading and base course surfacing 8 mi. road in **Campbell County, Wyo.**

CONTRACTS

Summary of bids and awards for major Western projects

Alaska

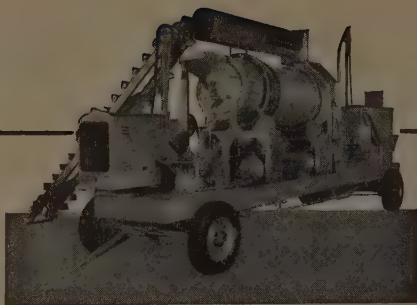
- \$546,850—**S. Birch & Sons and Lytle & Green**, Central Bldg., Seattle—Low bid for gasoline and jet fuel storage facilities, Elmendorf Air Force Base; by C. of E.
- \$7,230,325—**S. Birch & Sons and Lytle & Green**, Central Bldg., Seattle—Low bid for hardstands, taxiways and hydrant refueling facilities, Elmendorf Air Force Base; by C. of E.
- \$245,330—**S. Birch & Sons and Lytle & Green**, Central Bldg., Seattle—Award for 7.3 mi. of Anchorage-Elmendorf alternate rt.; by Alaska Rd. Comm.
- \$563,640—**Empire Construction Co. and Tauf Charneski**, 0234 S.W. Bancroft St., Portland—Award for Ketchikan sewers and access rds.; by Alaska Public Works.
- \$2,543,755—**Morrison-Knudsen Co., Inc.**, 603 Hoge Bldg., Seattle—Award for Section D, 41 mi. on the Richardson hwy., incl. 12 bridges; by Alaska Rd. Comm.
- \$4,525,825—**Morrison-Knudsen Co., Inc.**, 603 Hoge Bldg., Seattle—Award for hardstands, taxiways and hydrant refueling facilities, Eielson Air Force Base; by C. of E.
- \$540,695—**Rogers Construction Co. and Babler Bros.**, 11760 N.E. Glisan, Portland—Low bid for 15.7 mi. of surf. on the Tongass hwy.; by BPR.

Arizona

- \$141,979—**Arizona Sand & Rock Co.**, Box 959, Phoenix—Low bid for $\frac{3}{4}$ mi. of widening and resurf., North 16th St., Phoenix; by St. Hwy. Dept.
- \$370,778—**Fisher Contracting Co.**, Box 6306, Phoenix—Low bid for about 3.8 mi. of grading and bitum. plant-mix surf., Winslow-Holbrook hwy. beginning in Winslow; by St. Hwy. Dept.
- \$358,720—**Pioneer Constructors**, Box 2768, Tucson—Low bid for 2.8 mi. of grading and draining, U. S. 80 beginning about 27 mi. southeast of Tucson; by St. Hwy. Dept.
- \$325,406—**Wallace & Wallace**, Box 470, Phoenix—Low bid for 5 mi. of grading and draining, Humboldt North on Rock Springs-PreScott hwy.; by St. Hwy. Dept.

California

- \$286,443—**Gordon H. Ball, San Ramon Valley Land Co., and John M. Ferry**, 685 Delaware St., Berkeley—Award for 10 mi. of resurfacing on U. S. 99 beg. Whitaker Ridge South, Los Angeles County; by Div. of Hwys.
- \$1,162,500—**Stanley Ball**, 1101 Westminster Ave., Alhambra—Low bid for paving, Naval Air Station, Miramar; by U. S. Navy.
- \$194,810—**M. W. Brown and R. E. Hertel**, Box 222, Redding—Award for a steel plate girder bridge and approaches at Indian Creek on Sign Rt. 24, Plumas County; by Div. of Hwys.
- \$361,640—**Clements & Co.**, Box 328, Hayward—Award for 14.87 mi. of grading, Sierra Natl. Forest, Madera County; by BPR.
- \$186,628—**Close Bldg. Supply, Inc.**, 721 C St., Hayward—Award for 2 mi. of grading and plant-mixed surf. on untreated rock base, Mariposa North, Mariposa County; by Div. of Hwys.
- \$874,875—**Fred J. Early, Jr., Co. and Peter Kiewit Sons' Co.**, 22138 S. Vermont Ave., Torrance—Award for sewage treatment plant, Santa Ana; by Orange County Sanitation Districts 1, 2, 3, 5, 6, 7, 11.
- \$593,954—**Fredericksen & Kasler**, 212-214 13th St., Sacramento—Award for 3.2 mi. of grading, plant-mixed surf., and 3 steel beam bridges, Visalia Airport Exchange, Tulare County; by Div. of Hwys.
- \$241,496—**Fredrickson Bros.**, 1259 65th St., Emeryville—Low bid for 5 mi. of grading and surf., Secondary County Hwy. 1107 betw. Travis Air Force Base access rd. and Vacaville, Solano County; by Div. of Hwys.
- \$196,380—**Gallagher & Burk, Inc.**, 344 High St., Oakland—Low bid for reconstruction of Park Blvd. betw. Excelsior and Greenwood St., Oakland; by City.
- \$258,380—**R. Goold & Son**, Box 190, Stockton—Low bid for access railroad, Travis Air Force Base; by C. of E.
- \$3,060,396—**Griffith Co.**, 1060 S. Broadway, Los Angeles—Award for grading, P.C.C. paving, and 7 bridges, Golden State Freeway betw. 0.6 mi. south of Sign Rt. 7 and 0.4 mi. north of north city limits of Los Angeles; by Div. of Hwys.
- \$282,067—**Griffith Co.**, 1060 S. Broadway, Los Angeles—Award for 2.3 mi. of grading, widening and resurf., U. S. 101 in San Diego betw. Torrey Pines Mesa and Penasquitos Creek, San Diego County; by Div. of Hwys.
- \$496,000—**Haddock Engineers, Ltd.**, Box 390, Montebello—Award for ballistics range facilities, Inyokern; by U. S. Navy.
- \$194,590—**E. A. Irish**, 2944 Glenden St., Los Angeles—Low bid for installation of water system in Del Aire distr., Hawthorne; by Los Angeles County.
- \$2,155,000—**H. H. Johnson, Inc.**, 770 G Ave., Chula Vista—Award for 158 stucco dwellings, Glencleft Subdivision, San Diego; by Hobart Investment Co.
- \$339,253—**Judson Pacific-Murphy Corp.**, 4300 Eastshore Hwy., Emeryville—Low bid for bridge crossing Klamath River at Happy Camp, Klamath Natl. Forest; by BPR.
- \$585,164—**Edward Keeble**, Rt. 4, Box 64, Tully Rd., San Jose—Low bid for 2.3 mi. of grading and surf., Skyline Blvd. betw. Edgemar Rd. and Alemany Blvd., Daly City, and installation of hwy. lighting, San Mateo County; by Div. of Hwys.
- \$7,628,991—**Peter Kiewit Sons' Co.**, 442 Post St., San Francisco, and **Parish Bros.**, Benicia—Award for Monticello Dam; by USBR.
- \$2,606,538—**R. V. Lloyd & Co.**, Box 391, Coachella—Award for earthwork, pipe lines and structures, incl. pumping plants, laterals 111.6W and 113.7W and sublaterals, Unit I, Delano-Earlimart Irrigation District, Friant-Kern Canal; by USBR.
- \$434,265—**M & K Corp.**, Financial Center Bldg., San Francisco—Low bid for 34th St. storm water pumping station, Oakland; by City.
- \$293,210—**Macco Corp.-Johnson Western**, 14409 S. Paramount Blvd., Paramount—Low bid for extending and restoring gunite levee facing, San Gabriel River from Pacific Electric Ry. to Del Amo St., Long Beach; by Los Angeles County.
- \$2,875,900—**Robert E. McKee, General Contractor, Inc.**, 4700 San Fernando Rd., Los Angeles—Award for general construction, Units 2-3, main institutional group, Calif. Medical Facility, Vacaville; by State.
- \$467,224—**W. F. Maxwell**, 634 S. Western Ave., Los Angeles—Low bid for 0.6 mi. of grading and surf., and widening 3 bridges, U. S. 99 beg. at north city limits of Bakersfield, Kern County; by Div. of Hwys.
- \$246,115—**M. S. Mecham & Sons**, 11125 Garfield Ave., South Gate—Award for San Jose Creek realignment at Pacific Colony St. Hospital, Spadra, Los Angeles County; by State.
- \$213,765—**Mercer Fraser Co. & Mercer Fraser Gas Co., Inc.**, 2nd and Commercial Sts., Eureka—Low bid for 3.4 mi. of surf., U. S. 101 betw. Fields Landing and $\frac{1}{2}$ mi. south of Eureka, Humboldt County; by Div. of Hwys.
- \$289,653—**Mercer Fraser Co. & Mercer Fraser Gas Co.**, 2nd and Commercial Sts., Eureka—Award for restoring embankments, base, and surf., slope protection, and repairing 2 timber bridges, betw. Arcata and Del Norte County line, Humboldt County; by Div. of Hwys.
- \$191,798—**Metkovich & Bebek**, 143 E. 81st St., Los Angeles—Low bid for Fremont trunk sewer, Sunnyvale; by City.
- \$303,867—**L. Neilson**, 815 Rosedale Ave., Lafayette—Award for reinf. conc. slab and welded girder bridge across Russian River, St. 70 nr. Ukiah, Mendocino County; by Div. of Hwys.
- \$352,287—**R. J. Noble Co.**, Box 620, Orange—Award for 3.2 mi. of grading and surf., Huntington Beach Blvd. betw. Garfield and Smeltzer Aves., Orange County; by Div. of Hwys.
- \$377,390—**Offco Construction Co., Inc.**, 2650 Cherry Ave., Long Beach—Low bid for Laterals 10 to 16, Goleta Distr. System; by USBR.
- \$250,217—**Oilfields Trucking Co.**, Box 751, Bakersfield—Low



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bid for 7.2 mi. of grading and a reinf. conc. bridge on State 135 betw. Kansas Ave. and 1 mi. north of Corcoran, Kings County; by Div. of Hwys.

\$314,998—**Penn Construction Co.**, 3932 Depot St., Baldwin Park—Low bid for 6-mg. reinf. conc. reservoir, Pasadena; by Sunnyside Water Co.

J. H. Pomeroy & Co., Inc., 333 Montgomery St., San Francisco—Award for construction of an assembly plant to cost about \$8,600,000, Milpitas; by Ford Motor Co.

\$416,220—**R. M. Price Co.**, 2285 Pine Crest Dr., Altadena—Award for a reinf. conc. bridge and approaches crossing Santa Ana River 1/2 mi. north of Olive, Orange County; by Div. of Hwys.

\$184,059—**Sheets Construction Co.**, 201 E. Victoria St., Gardena—Award for 1.6 mi. of widening and asph. conc. paving, Lakewood Blvd., betw. Center St. and Gardendale St., Los Angeles County; by Div. of Hwys.

\$434,810—**Smale & Robinson, Inc.**, 1033 Avalon Blvd., Wilmington—Low bid for reinf. conc. and timber wharf facilities, Port of Los Angeles at Wilmington; by Los Angeles Harbor Dept.

\$596,879—**Ukropina-Polich-Kral and John R. Ukropina**, 201 E. Las Tunas Dr., San Gabriel—Award for 7 reinf. conc. bridges and misc. rd. work, Ben Ali-Roseville Freeway betw. Ben Ali in Sacramento County and Placer County line; by St. Hwy. Dept.

Del E. Webb Construction Co., Box 4066, Phoenix, Ariz.—Award for general contract for construction of \$14,000,000 luxury hotel, Beverly Hills; by Hilton Hotel Corp.

Colorado

\$169,720—**McMillon Construction Co.**, 3050 S. Huron St., Denver—Award for Street Paving District No. 191, Denver; by City and County of Denver.

\$138,420—**McMillon Construction Co.**, 3050 S. Huron St., Denver—Award for Street Paving District No. 148, Denver; by City and County of Denver.

\$157,750—**Northwestern Engineering Co.**, Box 567, Denver—Award for 8.7 mi. of grading and asph. surf., St. 125 betw. Cowdrey and Colo.-Wyo. state line; by St. Hwy. Dept.

\$502,247—**Western Paving Construction Co.**, 5105 Washington St., Denver—Low bid for strengthening Parking Apron No. 1, Lowry Air Force Base; by C. of E.

Idaho

\$257,240—**J. S. Anderson Construction Co.**, 2124 N. Waterworks St., Spokane—Award for 5.4 mi. of grading, St. Joe River rd., Shoshone County; by BPR.

\$1,299,059—**Detweiler & Detweiler**, Twin Falls—Award for Schedule A, central heating plant and high temperature water distr. system, Mountain Home Air Force Base; by C. of E.

\$148,214—**Peter Kiewit Sons' Co.**, Idaho Falls—Award for 10.7 mi. of rd.-mixed bitum. surf., Teton Hwy. betw. Lamont and Teton, Fremont and Teton counties; by St. Dept. of Hwys.

\$246,760—**Luchich Co.**, Seattle—Award for Myrtle Creek rd., west of Bonners Ferry; by BPR.

\$231,620—**McNutt Bros.**, 351 1/2 E. Broadway, Eugene, Ore.—Award for 10 mi., Rattle Creek and Bee Top Mt. rds.; by BPR.

\$374,026—**Carl E. Nelson**, 50 E. 10th, North, Logan, Utah—Award for 9.9 mi. of cement stabilized base and plant-mix bitum. surf., Yellowstone Park Hwy., bet. Arimo and Downey, Bannock County; by St. Dept. of Hwys.

\$413,245—**Woodward Construction Co.**, Box 1046, Rock Springs, Wyo.—Award for 4.8 mi. of grading and plant-mixed bitum. surf., Fall Creek to Massacre Rocks, Power County; by St. Dept. of Hwys.

Montana

\$271,328—**F & S Contracting Co.**, Box 4, Butte—Award for 3.7 mi. of grading, gravel surf., road-mix oiling and draining, Arlee-Ravalli hwy., Lake County; by St. Hwy. Comm.

\$151,477—**Peter Kiewit Sons' Co.**, Box 875, Sheridan, Wyo.—Low bid for 9 mi., Good Creek Section, Flathead Natl. Forest, Flathead County; by BPR.

\$129,391—**Albert Lalonde Co.**, Sidney—Award for 6.8 mi. of grading, draining, gravel surf., and road-mix oiling, Glasgow-Ophelm hwy., Valley County; by St. Hwy. Comm.

87,625—**J. M. Purcell Construction Co.**, Kalispell—Award for 10 mi. on Meadow Creek and Hell Roaring Creek rds., Lincoln County; by BPR.

29,772—**Robertson & Cave, Inc.**, Great Falls—Award for 1/4 mi. of grading and draining, Shelby South hwy., Toole County; by St. Hwy. Comm.

291,975—**Tirrell & Co.**, Missoula—Award for Montana Forest Rd. Project Flathead 318-A; by BPR.

225,890—**Otis Williams & Co.**, Kennewick, Wash.—Award for 18.4 mi. on Talley Lake-Brush Cr. rd., Lost Creek rd., and Sylvia Lake rd., about 20 mi. north of Kalispell, Flathead County; by BPR.

Nevada

383,152—**Gibbons & Reed Co.**, Box 1113, Salt Lake City—Award for 2.3 mi. of heavy grading and draining, nr. Major's station, White Pine County; by St. Dept. of Hwys.

1,046,890—**J. H. Pomeroy & Co.**, 727 W. 7th St., Los Angeles—Award for maintenance hangar, utilities and hangar doors, Nellis Air Force Base, Las Vegas; by C. of E.

New Mexico

297,192—**Jack Adams**, Box 610, Los Alamos—Award for 2.1 mi. of grading, draining and surf., Roswell-Frazier rd., Chaves County; by St. Hwy. Dept.

555,467—**Armstrong & Armstrong**, Box 873, Roswell—Award for 2.9 mi. of roadway and a conc. bridge in the city of Roswell, Chaves County; by St. Hwy. Dept.

212,930—**P. R. Burn**, Box 1111, Las Cruces—Award for sewage treatment plant, Las Cruces; by City.

216,800—**Floyd Haake**, 111 Lovato Lane, Santa Fe—Low bid for sewer gas lines, gravel and hot-mix surf., Walker Air Force Base, Roswell; by C. of E.

343,748—**Lowdermilk Bros.**, Box 568, Espanola—Award for 9.3 mi. of grading and surf., Regina-Coyote rd., Santa Fe Natl. Forest, Rio Arriba County; by BPR.

Oregon

\$809,953—**G. D. Dennis & Sons** and **G. D. Ranells Construction Co.**, 7355 S.E. Johnson Creek Blvd., Portland—Award for 14 1/2 mi. of grading, West Fork Smith River Rd., Douglas County; by BPR.

\$880,110—**Morrison-Knudsen Co., Inc.**, 603 Hoge Bldg., Seattle—Award for earthfill dam, Frog Lake forebay project, Clackamas County; by Portland General Electric Co.

\$149,000—**W. H. Shields Construction Co.**, 252 Taylor St., Eugene—Award for relocation of Market Rd. No. 36, bridge trestle, reconstruction of approaches and raising Lowell Bridge and grade, and raising County Rd. 36, nr. Lowell, Lane County; by C. of E.

\$149,465—**J. A. Troxell**, 9449 N.E. Lake Washington Blvd., Bellevue, Wash.—Award to raise Bear Creek dam 16 ft. and to erect control house, Astoria; by City.

\$194,685—**Umpqua River Navigation Co.**, Reedsport—Award for sewer system and sewage pumping station, Reedsport; by City.

Utah

\$14,750,000—**Bechtel Corp.**, 220 Bush St., San Francisco—Award for Unit 3, 100,000-kw. addition to Gadsby steam power plant, Salt Lake City; by Utah Power & Light Co.

\$10,000,000—**Bechtel Corp.**, 220 Bush St., San Francisco—Award for 60,000/66,000-kw. carbon steam power plant at Castle Gate nr. Price; by Utah Power & Light Co.

\$173,343—**Miya Bros. Construction Co.**, Ogden, and **K. C. Construction Co.**, Salt Lake City—Award for 3.1 mi. of grading, draining and gravel surf., Provo River-Haydens Fork rd., Wasatch Natl. Forest, Summit County; by BPR.

\$175,000 (approx.)—**Morrison-Knudsen Co., Inc.**, Box 120, Salt Lake City—Award for grading for a new track yard and facilities project at Ogden; by Ogden Union Railway Depot Co.

\$299,142—**Jack B. Parson Construction Co.**, Smithfield—

Paved Areas made smooth, colorful, resilient with

BITUMULS®

WALK-TOP

Factory-compounded in fast colors—Black, Red, or Green—Economical—Easy to Apply—Long-Lasting

Walk-Top—applied cold—offers an economical, yet profitable seal for all surfaced areas. In all parts of the country, Paving Contractors and "Hot-Plant" operators stock Walk-Top to supply the current demand for smooth, colorful seal that is grit-free, resilient and weatherproof.



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Home-owners are proud of their neat, distinctive "Walk-Top sealed" driveways

FOR PLAY AREAS—From coast to coast, Walk-Top is standard for sealing school yards and other play areas. (San Francisco sealed over 2,000,000 sq. ft. last year!)

WALKS AND PARKING AREAS—Walk-Top is used extensively to provide a smooth, fast-draining and void-filling seal.

FOR DRIVEWAYS—For a clean, enduring and colorful seal, apply Walk-Top cold over the old pavement with brush or squeegee.

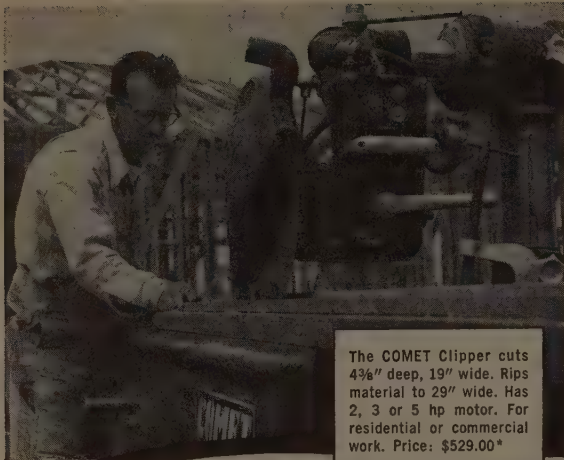
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Tucson, Arizona, 600 West Simpson St.
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The COMET Clipper cuts 4 3/4" deep, 19" wide. Rips material to 29" wide. Has 2, 3 or 5 hp motor. For residential or commercial work. Price: \$529.00*

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Hundreds of Western made COMET saws have been in continuous service for eight to ten years *without ever having been in the shop for any major repair work!* That's because COMET saws are designed to take hard wear and remain accurate and fast. Permanently lubricated, fully enclosed, ball-bearing rollers carry the arm. All parts are extra heavy. Exposed surfaces are chrome or cadmium plated or enameled to protect against corrosion.

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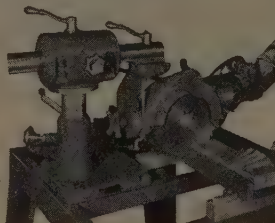
There are four COMET construction saws—the Junior, Clipper, Senior, and Timber Cutter. These range from 1 hp to 10 hp with blades from 8" to 44". All have full-rated horsepower for continuous operation at designed capacity. All are protected against overload—all are sturdy and accurate. Residential, commercial, tract, or heavy construction—there's a COMET Saw for every job!

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Makes your electric handsaw a radial saw in less than a minute!

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2031 Santa Fe Avenue, Los Angeles 21, Calif.

*Prices quoted are for basic unit, FOB, Los Angeles.

Award for 5.2 mi. of 3-in. plant-mixed bitum. surf. and a 27.7-ft. conc. span, U. S. 191, Malad River to 2 1/2 mi. no. of Plymouth, Box Elder County; by St. Rd. Comm.

\$131,318—**Reed & Jensen**, 1057 S. 4th West, Salt Lake City—Low bid for 1.7 mi. of 3-in. road-mixed bitum. surf., U. S. 91, Washington County; by St. Rd. Comm.

\$205,936—**Vernal Sand & Gravel Co.**, Vernal—Award for 7.6 mi. of 2-in. road-mixed bitum. surf., Sand Wash revision and Fort Duchesne to Randlett, Uintah County; by St. Rd. Comm.

\$177,003—**Whiting & Haymond**, 250 W. 2nd, North, Springville—Award for 6.5 mi. of 2 1/2-in. road-mixed bitum. surf., Salina Canyon Forest boundary east to tunnel, Sevier County; by St. Rd. Comm.

\$513,751—**L. A. Young Construction Co.**, Salt Lake City—Award for 8 mi. of 3-in. plant-mixed bitum. surf. and a 64 1/2-ft. conc. bridge, Vermillion-Salina hwy., Sevier County; by St. Rd. Comm.

\$247,656—**Young & Smith Construction Co.**, 306 Beason Bldg., Salt Lake City—Award for 2 1/2 mi. of 2 1/2-in. road-mixed bitum. surf., Haw's Corner to Deweyville, Box Elder County; by St. Rd. Comm.

Washington

\$964,155—**Bumstead-Woolford Co.**, 1411 4th Ave. Bldg., Seattle—Low bid for addition to power plant bldg., Hanford area; by AEC.

\$2,249,965—**Cherf Bros.**, Ephrata, **Sandkay Construction Co.**, and **J. A. Jones Construction Co.**—Low bid for apron paving, warm-up pad and utilities, Larson Air Force Base; by C. of E.

\$187,041—**Clifton & Applegate**, Yardley—Award for Marston Bridge and approaches, Yakima County; by St. Hwy. Comm.

\$191,940—**General Construction Co.**, 3840 Iowa Ave., Seattle—Award for Schedule B, storm sewer outfalls, Admiral Way, Seattle; by City.

\$184,733—**F. R. Hewett & Co.**, Box 46, Parkwater—Award for 21.5 mi. of light bitum. surf. and seal treatment, P.S.H. No. 16, Loup Loup Branch-Beaver Creek vicinity and Carlson to Winthrop, Okanogan County; by St. Hwy. Comm.

\$310,662—**Herman Kathman**, 12054 23rd Ave., Seattle—Award for 3.1 mi., grading, bitum. surf., and double reinf. conc. box culvert, Ault Field north, Island County; by St. Hwy. Comm.

\$268,424—**Natt McDougall Co.**, 824 Pittock Block, Portland—Award for 0.6 mi. of grading and drainage structures, P.S.H. No. 1, Vancouver Freeway-6th St. to 18th St., Unit 1, Clark County; by St. Hwy. Comm.

\$223,397—**Northwest Construction Co.**, 3950 6th Ave. N.W., Seattle—Award for 3.9 mi. of grading, draining and cement conc. paving, Avondale Rd. (county rd.), King County; by St. Hwy. Comm.

\$369,825—**Scheumann & Johnson**, 1001 Lloyd Bldg., Seattle—Award for sewage pumping plant at 63rd Ave. SW and W. Spokane St., Seattle; by City.

\$281,464—**Smith Bros. General Contractors, Inc.**, Box 96, Vancouver—Award for 1.8 mi. of grading and asph. conc. paving, Stauffels Bridge approaches on P.S.H. No. 12, Pacific County; by St. Hwy. Comm.

\$166,726—**Washington Asphalt Co.**, 309 W. 39th St., Seattle—Award for 10.9 mi. of grading and asph. conc. paving, P.S.H. No. 2, Issaquah to North Bend, King County; by St. Hwy. Comm.

\$1,278,395—**Woodworth & Co., Inc.**, 1200 East D St., Tacoma—Award for 3.9 mi. of grading, draining, asph. conc. paving, and conc. bridges, P.S.H. No. 1, North Fort Lewis to Scott Rd., Pierce County; by St. Hwy. Comm.

Wyoming

\$104,933—**Asbell Bros. Construction Co.**, Riverton—Award for 6.4 mi. of grading, draining, and base course surf., Lucerne to Black Mt. rd., Hot Springs County; by St. Hwy. Dept.

\$106,062—**Read Construction Co.**, 706 W. 19th St., Cheyenne—Award for 1 mi. of grading, draining, quintuple M.P.C.M. pipe arch culvert, and surf., South Cheyenne, Laramie County; by St. Hwy. Dept.

\$230,009—**Leon White**, Weston—Award for 7.8 mi. of grading, draining, base course surf., and 10 reinf. conc. culverts, Gillette to Broadus rd., Campbell County; by St. Hwy. Dept.

UNIT BID PRICES

Selected abstracts for Western projects

Streets and Highways

One mile of grading on the Bayshore Freeway

California—San Mateo County—State. Guy F. Atkinson Co., South San Francisco, was awarded a contract by the California Division of Highways on the basis of a low bid of \$856,704 for grading between .3 and 1.3 miles south of the San Francisco County line. The work is a unit of the over-water section of the Bayshore Freeway. Unit bids submitted were as follows:

1) Guy F. Atkinson Co.	\$ 856,704	— Fredrickson & Watson Construc-	
2) Chas. L. Harney, Inc.	868,827	tion Co. and M & K Corp.	\$1,068,292
3) McCammon-Wunderlich Co.	889,832	— Piombo Construction Co. and	
4) Peter Kiewit Sons' Co.	933,666	Parish Bros.	1,099,057
5) Eaton & Smith	1,012,437	— Gordon Ball and San Ramon	
6) Macco Corp. and Morrison-		Valley Land Co.	1,154,334
Knudsen Co., Inc.	1,062,364	— L. C. Smith Co.	1,295,794

	(1)	(2)	(3)	(4)	(5)	(6)
600 cu. yd. roadway excav.	1.00	1.70	.51	1.00	1.50	.80
250 cu. yd. struct. excav.	6.00	3.20	2.42	4.50	12.00	6.00
460 cu. yd. ditch and channel excav.	3.00	3.00	.96	.75	2.50	4.00
40,000 cu. yd. imported borrow	.87	.79	.78	.90	.96	.998
Lump sum, haul road bridge	\$25,000	\$70,000	\$100,000	\$60,000	\$72,000	\$100,000
Lump sum, dev. wat. sup. and furn. wat. equip.	900.00	\$35,000	\$22,200	\$7,800	\$10,000	\$4,800
4,200 M. gal. applying water	1.00	1.80	1.45	1.00	2.50	1.90
200 hrs. idle time	3.00	30.00	110.00	42.40	28.00	10.00
1,200 sq. ft. plant-mixed ditch lining	.45	.19	.46	.25	1.00	.20
105 lin. ft. plant-mixed dikes	1.60	1.25	.85	2.00	1.00	1.40
8 cu. yd. CL "A" port. cem. conc. (structs.)	75.00	80.00	97.00	170.00	144.00	160.00
203 lin. ft. metal plate guard railing	3.50	3.50	3.80	4.00	6.00	5.00
0.5 mi. new portable fence	\$2,000	\$2,000	\$2,160	\$2,300	\$3,000	\$2,500
64 lin. ft. 18-in. corrug. metal pipe (16 ga.)	3.90	4.80	4.00	3.00	4.00	4.00
182 lin. ft. 30-in. corrug. metal pipe (14 ga.)	8.00	8.00	8.05	6.00	8.00	8.00

8.9 mi. of grading, rolling and asphaltic concrete surfacing

Washington—Clallam and Jefferson counties—State. J. D. Shotwell Co., Tacoma, was awarded a contract by the State Highway Commission on the basis of a low bid of \$283,771 for grading, rolling, and asphaltic concrete surfacing on 8.9 miles of P.S.H. No. 9, Bogachiel River to Hoh River. Unit bids were as follows:

(1) J. D. Shotwell Co.	\$283,771	(3) D-H Paving Co.	\$302,010		
(2) Western Asphalt Co.	290,854	(4) Boeck Bros.	309,009		
		(1)	(2)	(3)	(4)
0.4 acre clearing		500.00	600.00	750.00	\$1,000
0.4 acre grubbing		500.00	600.00	750.00	\$1,000
2,450 cu. yd. common excav. incl. haul		.75	.80	1.00	1.50
80 cu. yd. common trench excav. incl. haul		2.00	4.00	2.00	5.00
10 cu. yd. struct. excav.		4.00	10.00	4.00	5.00
104 days pneumatic tired roller		50.00	60.00	60.00	55.00
52 days smooth-wheeled power roller		60.00	60.00	60.00	60.00
470.2 stas. (100-ft.) finishing roadway		10.00	10.00	10.00	12.00
1,430 M. gal. water		1.00	3.00	3.50	4.00
2,560 ton selected roadway borrow		1.00	1.25	1.10	1.25
3,960 ton cr. stone surf. top crse. in place from stkpl.		1.00	1.25	1.35	1.20

TYPE I-1 ASPHALTIC CONCRETE PAVEMENT

580 ton truck sand in stockpile	1.50	1.00	1.00	1.50
11,280 ton Class C wearing course	5.00	5.40	5.75	5.40
14,280 ton Class L leveling course	5.00	5.40	5.50	5.40

CEMENT TREATED BASE

108 ton asphalt cement MC-3 curing seal in place	45.00	65.00	47.50	42.50
1,070 cu. yd. new fine mineral aggr. in pl. from stkl.	2.00	2.00	2.75	1.45
8.91 mi. mixing cement treated base	\$3,000	\$1,500	\$2,000	\$3,000
7,460 bbl. portland cement	6.00	6.50	6.00	6.50
49,050 ton mineral aggr. for cem. treat. base in pl. from stkl.	1.00	.95	1.00	1.05

OTHER ITEMS

8 lin. ft. pl. corr. met. culv. pipe #16 ga. 18-in. diam.	4.50	10.00	6.00	10.00
368 no. reinf. conc. spot posts	12.00	15.00	12.00	12.00

Concrete box culvert

Idaho—Twin Falls County—State. Neilson-Smith Construction Co., Twin Falls, submitted a low bid of \$9,624 before the Department of Highways for construction of a concrete box culvert on U. S. 30 about 3 miles west of Buhl. Unit bids were as follows:

1) Neilson-Smith Construction Co.	\$9,624	2) Ben F. Walton	\$10,976
	(1)	(2)	(3)
400 cu. yd. uncl. excav. (channel change)			1.00
100 cu. yd. excav. for structures			6.00
100 cu. yd. mechanical tamping			3.00
65 cu. yd. concrete Class "A"			75.00
8,300 lb. metal reinforcement			.15
52 lin. ft. salv. 58-in. x 36-in. arch type CMP			2.00
Lump sum, detour			\$2,100

Continued on page 132

just nail 'em in...
pour your concrete



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WATERSTOPS

● Concrete shrinkage can't cause leakage between pours when you're protected by ribbed and grooved polyvinyl plastic Labyrinth Waterstops in the joints.

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FOLSOM FAULT

... Continued from page 64

It was, of course, desirable to avoid removal of mass concrete in Block 23 when correcting the fault condition. Therefore, it was determined to extend the exploratory drifts beneath that block to such width and length as seemed necessary to remove all possible fault material. The drifts and their access shafts were then plugged with concrete.

Inasmuch as later excavation beneath the location of Block 22 (already described) would cause the existing drifts and shafts in that area to be daylighted, bulkheads were installed in the drifts at the plane of the joint between Blocks 22 and 23. These bulkheads restricted the flow of concrete, retaining all of it under Block 23. It was not possible to do a proper job of concreting through only the two access shafts upstream and downstream from Block 23. Therefore, three 8-in. holes were churn-drilled down through Block 23 above the drifts and five similar holes sunk in the rock along the joint between Blocks 22 and 23. Hoppers were placed successively over these drill holes and the concrete introduced through them. In order to restrict the flow of concrete along the drifts below, intermediate bulkheads were built in the drifts so that, in effect, a single compartment would receive concrete through any one drill hole.

Concrete for this work was a 6-sack mix having a 6-in. slump and containing rock of 1½-in. maximum size. A total of 1,700 cu. yd. was used. The results of this activity were excellent so far as can be determined by observation of concrete later exposed during the excavation below Block 22.

Investigation and correction of the fault condition was carried out under the general direction of two recent project engineers for the Corps of Engineers on the Folsom work, R. B. Jenkinson and C. F. Beatie. Direct supervision for the Corps of Engineers was exercised by S. D. Burks, field engineer for concrete dam construction, and Mike Oreno, chief inspector. Geologic investigations were headed by Russell Roddy, project geologist.

The prime contractor on Folsom Dam is a joint venture of Merritt-Chapman Scott Corp. and The Savin Construction Corp. D. E. Stinson is project manager. The contractors' field forces on the fault work were headed by Fred Earp.

U. S. 87 is "Henry Ford"

HENRY FORD will be honored by having America's longest highway, U. S. Highway 87 which runs from Alaska through Mexico, named after him. This was decided at a Colorado Springs, Colo., meeting of the International 87 Highway Association.

UNIT BID PRICES. CONTINUED

Grading and PCC paving on cement-treated subgrade

California—Fresno County—State. Thomas Construction Co., Fresno, was awarded a contract by the California Division of Highways on the basis of a low bid of \$168,996 for 0.7 mi. of grading and PCC paving on cement-treated subgrade between Cherry Ave. and Santa Clara St. in the city of Fresno. Unit bids submitted were as follows:

(1) Thomas Construction Co.	\$168,996	(4) Gordon Ball and San Ramon Valley Land Co.	\$191,480
(2) Gene Richards, Inc.	172,946		
(3) M.J.B. Construction Co.	189,635		
470 cu. yd. removing concrete	4.00	(2)	6.00
Lump sum, clearing and grubbing	\$9,605	(3)	\$13,182
18,000 cu. yd. roadway excav.	.58	(4)	\$9,140
100 cu. yd. structure excav.	2.00		2.50
30 cu. yd. ditch and channel excav.	2.00		5.00
17,500 sq. yd. compacting original ground	.05		.04
60,000 sta. yd. overhaul	.005		.02
Lump sum, dev. wat. sup. and furn. wat. equip.	\$2,550		\$4,300
1,400 M. gal. applying water	.50		1.25
38 sta. finishing roadway	20.00		15.00
18,100 sq. yd. mixing and compacting (C.T.S.)	.32		.30
2,500 sq. yd. mixing and compacting (C.T.B.)	.25		.30
600 bbl. P.C. (C.T.S. & C.T.B.)	5.00		4.80
23 ton asphaltic emulsion (curing seal and sl. ct.)	55.00		50.00
3 ton liq. asph. SC-2 (prime coat)	70.00		50.00
720 ton mineral aggregate (P.M.S.)	5.50		6.00
37 ton paving asphalt (P.M.S.)	29.00		24.00
50 lin. ft. raised traffic bars	3.00		2.50
4,010 cu. yd. Class "B" P.C.C. (pavement and base)	16.60		16.50
2,200 ea. pavement tie bolt assemblies	.75		.60
75 cu. yd. Class "A" P.C.C. (structures)	80.00		68.00
7,500 lb. bar reinforcing steel	.16		.14
7,100 lb. misc. iron and steel	.35		.22
560 cu. yd. Class "A" P.C.C. (curbs)	38.00		35.00
100 ea. curb dowels	.50		1.00
15 ea. right-of-way monuments	8.00		7.00
7 ea. center line monuments	25.00		5.00
95 ea. culv. markers, monu. markers and guide posts	7.00		10.00
1 ea. horizontal reflector unit	10.00		5.00
4,900 lin. ft. chain link fence	1.60		1.44
80 lin. ft. 12-in. R.C.P.	2.90		4.05
60 lin. ft. 15-in. R.C.P.	3.40		4.35
6 lin. ft. 36-in. R.C.P.	15.00		10.05
470 lin. ft. 24x6¾-in. part circle C.M.P. (8 ga.)	4.00		3.20
420 lin. ft. 12-in. non-reinforced concrete pipe	1.65		3.35
760 lin. ft. 18-in. non-reinforced concrete pipe	2.50		3.91
20 lin. ft. 8-in. perforated metal pipe (16 ga.)	3.00		3.00
10 ton filter material	7.00		10.00
12 cu. yd. sump excavation	10.00		10.00
205 lin. ft. salv. exist. conc. pipe	2.00		3.50
172 lin. ft. relaying salv. conc. pipe	1.50		2.50
50 lin. ft. 2½-in. galv. steel pipe	2.30		3.00
500 lin. ft. 3-in. galv. steel pipe	2.40		3.25
1,900 lin. ft. rem. and salv. nozzle lines	.25		.75
2,100 lin. ft. rem. and salv. supply lines	1.25		.60
600 lin. ft. relaying salv. supply lines	1.35		1.25
7 ea. timber barricades	40.00		55.00

Bridge

U. S. Army railroad undercrossing and approaches

Washington—Snohomish County—State. John E. Alexander, Vashon, was awarded a contract by the State Highway Commission on the basis of a low bid of \$113,676 for construction of the U. S. Army railroad undercrossing and approaches on .263 miles of P.S.H. No. 1 in Snohomish County. Unit bids submitted were as follows:

(1) John E. Alexander	\$113,676	(5) Joe Lundberg Construction Co.	\$153,446
(2) Thomas Sealzo Co.	130,297	— David Nygren	156,726
(3) N. Fiorito Co.	131,821	— Lewis Elterich Co.	158,480
(4) A. W. Stevens Contracting Co.	141,158		
8.26 acres clearing	300.00	(2)	400.00
7.21 acres grubbing	300.00	(3)	325.00
0.13 acres roadside cleanup	500.00	(4)	350.00
49,680 cu. yd. common excav., incl. haul of 600 ft.	.27	(5)	200.00
70 cu. yd. common trench excav., incl. haul of 600 ft.	1.00		1.00
20,290 cu. yd. stas. overhaul	.01		.02
14.5 M. cu. yd. stas. overhaul	4.00		4.00
1,700 cu. yd. channel change excav., incl. haul	.55		1.00
14,880 cu. yd. excav. of unsuitable matl., incl. haul	.55		.65
750 cu. yd. structure excav.	1.50		3.00
5 days 800-hp. wheel power roller	70.00		80.00
14 days tamping roller	50.00		50.00
6 days pneumatic-tired roller	60.00		50.00
19 days mechanical tamper	40.00		50.00
1,680 lin. ft. slope treatment Class A	.10		.15
13.9 stas. (100-ft.) finishing roadway	12.00		15.00
60 M. gal. water	3.00		3.00
310 cu. yd. gravel backfill for foundations	6.00		8.00
20 cu. yd. gravel backfill for drains	5.00		10.00
129 cu. yd. concrete, Class A	50.00		60.50
25,600 lb. steel reinforcing bars	.11		.105
300 lin. ft. conc. or V.C. drain pipe 4-in. diam.	.75		.80
190 lin. ft. plain conc. or V.C. sewer pipe 6-in. diam.	1.00		1.25

Continued on page 134

the Place
**CHOUTEAU
 OKLAHOMA**

the Pipe
**"CENTURY"
 ASBESTOS-CEMENT**

ALL over America, economy and efficiency-minded officials are choosing "Century" asbestos-Cement Pipe for water mains. Here are some excellent reasons:

"Century" Asbestos-Cement Pipe is made from two practically indestructible materials, asbestos fiber and portland cement. It cannot rust and is highly resistant to soil corrosion. That contributes to long life.

"Century" Asbestos-Cement Pipe is strong, light in weight, easy to handle and lay. That contributes to economical installation.

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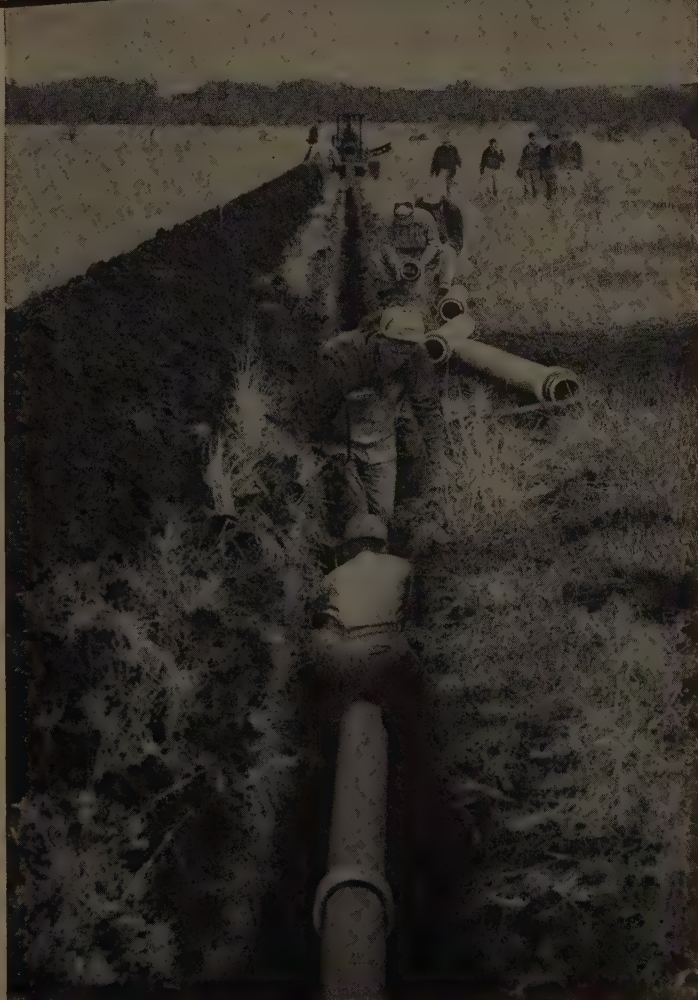
Put all these advantages together and you see why so many towns now get their water through "Century" asbestos-cement pressure pipe.

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"Century" pipe installation from Grand River Dam to the City of Chouteau, Oklahoma.
 Engineers: Hoil Engineering Corp., Contractors: Eagle Construction Co., both of Tulsa.

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"Best Wire Rope Service ... on 33 Draglines"

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(Name on Request)

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City _____ Zone _____ State _____

UNIT BID PRICES CONTINUED

	(1)	(2)	(3)	(4)	(5)
170 lin. ft. bit. coat. cor. met. culv. pipe, 16 ga., 8-in. diam., type 2	2.00	3.00	3.50	2.50	2.50
141 lin. ft. std. reinf. conc. culv. pipe, 12-in. diam.	2.00	2.00	2.75	5.00	3.00
210 lin. ft. std. reinf. conc. culv. pipe, 18-in. diam.	3.00	4.00	3.75	4.00	5.00
210 lin. ft. cast iron water pipe with mech. jts. (150 cl.) 6-in. diam.	4.00	7.00	6.00	8.50	5.00
55 lin. ft. relaying transit water pipe 6-in. diam.	1.00	3.00	5.00	18.00	6.00
1 only special manhole	200.00	350.00	400.00	250.00	250.00
2 only concrete inlets	65.00	100.00	75.00	125.00	60.00
1 only iron body gate valve 6-in. diam.	90.00	100.00	100.00	180.00	85.00
7 only reinf. conc. right-of-way markers	6.00	7.00	7.00	7.25	8.60
7 cu. yd. hand placed riprap	15.00	20.00	25.00	12.00	10.70
1,105 lin. ft. barbed wire fence complete in place	.35	.50	.70	.50	.50
Lump sum, reconstructing bldg. No. T-306	400.00	500.00	\$1,000	190.00	400.00
Lump sum, removing bldg. No. T-403		50.00	1.00	30.00	250.00

STEEL GIRDER RAILROAD UNDERCROSSING

635 cu. yd. structure excav.	4.00	4.00	8.00	5.50	4.80
345 cu. yd. concrete Class B	40.00	40.00	47.00	52.00	57.00
51,000 lb. steel reinforcing bars	.11	.11	.115	.125	.11
120,000 lb. structural carbon steel	.16	.16	.16	.17	.13
6.1 M.B.M. timber and lumber (creosote treated)	200.00	200.00	300.00	255.00	320.00
1.3 M.B.M. timber and lumber (salts treated)	200.00	200.00	300.00	255.00	330.00
2,900 lin. ft. furnishing precast conc. piling	4.50	4.50	4.00	4.25	4.00
114 only, driv. precast conc. piles first 10-ft. penetration	50.00	50.00	75.00	80.00	60.00
1,700 lin. ft. driv. precast conc. piles beyond 10-ft. penetra.	.15	.15	.25	.125	.15
2 only, furn. and driving precast conc. test piles	750.00	750.00	\$1,000	\$1,500	970.00
104 lin. ft. galvanized steel deck covering	5.00	5.00	2.50	3.90	6.00
Lump sum, removing portions of exist. struct.	\$3,500	\$6,000	\$6,500	\$2,360	\$5,000

Oregon Highway Dept.'s first prestressed concrete highway bridge

Oregon—Gilliam County—State. Hamilton & Thoms, Eugene, was awarded a contract by the State Highway Department on the basis of a low bid of \$151,435 for construction of a prestressed concrete bridge crossing Willow Creek on the Columbia River Highway. This is the first use of prestressed concrete in this department's highway bridge work. The structure, which is designed for H20-S16 loading with a 30-ft. roadway, consists of three 98-ft. simple spans with five girders in each span. The space between girders is filled in to complete the deck and the structure will be prestressed transversely. Unit bids submitted were as follows:

(1) Hamilton & Thoms	\$151,435	(3) R. H. Jones	\$165,706
(2) Parker-Johnson Co. and Marshall Construction Co.	154,229	(4) General Construction Co.	171,850
		(5) J. A. Terteling & Sons	190,628

	(1)	(2)	(3)	(4)	(5)
All required, shoring, cribbing, etc.	\$25,000	\$30,000	\$15,000	\$10,000	\$3,035
1,100 cu. yd. structural excav.	5.00	10.00	15.00	5.50	8.60
10 cu. yd. excav. below elevations shn.	10.00	20.00	25.00	15.00	20.00
750 cu. yd. rock riprap	2.50	2.50	3.00	5.00	2.50
480 cu. yd. Class "A" concrete	70.00	60.00	78.00	80.00	109.10
530 cu. yd. Class "A-A" concrete	80.00	63.00	96.00	100.00	137.00
108,000 lb. metal reinforcement	.12	.15	.115	.125	.135
All required, prestressing reinforcement and prestressing	\$30,000	\$32,764	\$30,966	\$47,000	\$36,500

Three timber bridges in Montana

Montana—Fergus County—State. Walter Macklin & Son, Billings, received an award for construction of two 38-ft. and one 57-ft. timber bridges on the Hilger-Winifred highway on the basis of a low bid of \$19,815 submitted before the State Highway Commission. Unit prices were as follows:

(1) Walter Macklin & Son	\$19,815	(5) W. P. Roscoe Co.	\$29,947
(2) Schye & Sullivan	19,978	(6) Walling Construction Co.	25,391
(3) Paul Lee & Virgil Ward	21,013	— Montana Engineering Construction Co.	26,959
(4) Cop Construction Co.	21,805		

	(1)	(2)	(3)	(4)	(5)	(6)
50.682 M.B.M. treated timber	280.00	276.00	280.00	305.00	320.00	325.00
3.116 M.B.M. untreated timber	300.00	276.00	280.00	280.00	310.00	350.00
19 ea. 20-ft. treated timber piles	60.00	65.00	65.00	50.00	55.00	80.00
8 ea. 25-ft. treated timber piles	65.00	75.00	75.00	62.50	72.00	90.00
39 ea. 30-ft. treated timber piles	70.00	80.00	85.00	75.00	78.00	100.00
Lump sum, removal of existing struct. and maintain traffic	300.00	175.00	800.00	\$1,100	\$1,100	500.00

Bridge trestle and raising bridge

Oregon—Lookout Point Project—C. of E. F. H. McEwen, Eugene, submitted a low bid of \$136,352 before the Corps of Engineers for relocation of Market Road No. 36, construction of a bridge trestle, reconstruction of bridge approaches and raising Lowell Bridge, and grade raise County Road No. 360. Location is near Lowell in the Dexter Dam area. Unit bids submitted were as follows:

(1) F. H. McEwen	\$136,352	(4) C. J. Montag & Sons	\$192,355
(2) General Construction Co.	176,340	(5) Contracting officer's estimate	108,209
(3) A. H. Saxton & Son	186,160		

PART A

	(1)	(2)	(3)	(4)	(5)
4,000 cu. yd. roadway excavation	1.00	1.10	.90	1.50	.80
10,000 cu. yd. borrow excavation	.95	1.10	1.50	1.25	.40
3,600 cu. yd. base course, in place	2.50	2.75	2.50	2.50	1.50
1,200 cu. yd. crushed stone leveling course, in place	2.50	3.30	2.75	3.25	3.00
100 M. gal. sprinkling	3.00	3.00	4.00	3.00	2.80
500 cu. yd. base course, in stockpile	3.00	3.25	2.60	3.00	1.20
2,700 cu. yd. crushed stone leveling course, in stockpile	3.00	3.25	2.70	3.00	2.60
1,000 cu. yd. 1 1/4-in. - 3/4-in. mineral aggregate, in stklp.	3.25	3.50	2.70	3.00	2.60
450 cu. yd. 3/4-in. - 1/2-in. mineral aggregate, in stklp.	3.25	3.50	2.70	3.00	2.60
450 cu. yd. 1/2-in. - No. 10 mineral aggregate, in stklp.	3.25	3.50	2.70	3.00	2.60
3,600 lin. ft. metal guard rail, in place	3.50	4.00	3.40	4.50	3.00

UNIT BID PRICES... CONTINUED

PART B

	(1)	(2)	(3)	(4)	(5)
4000 lin. ft. stockpile fencing, in place	.75	.50	.80	2.00	.45
4000 lin. ft. piling, timber, treated	3.15	2.55	3.50	2.50	2.50
50 cu. yd. concrete, in place	90.00	80.00	80.00	70.00	55.00
2700 lb. steel, reinforcement	.15	.15	.15	.15	.15
150 M.B.M. timber, in place	245.00	300.00	360.00	500.00	240.00
40 ea. pile shoe, in place	7.00	5.00	12.00	25.00	4.60
Lump sum, raising timber truss span	\$24,730	\$50,000	\$50,000	\$32,000	\$16,300
Lump sum, removal of existing structures	\$2,650	\$4,000	\$4,500	\$6,000	\$3,150
200 cu. yd. excav. for footings	6.00	10.00	15.00	2.00	2.30

Ten steel and concrete bridges on treated timber piles

California—San Diego—City. M. H. Golden Construction Co., San Diego, submitted a low bid of \$608,648 before the San Diego City Council for construction of Wabash Blvd. Section "B" (10) bridges. Unit bids submitted were as follows:

1) M. H. Golden Construction Co.	\$1,008,648	(3) W. F. Maxwell	\$1,077,845
2) Charles MacClosky Co.	1,042,858		

	(1)	(2)	(3)
400 M. gals. water	3.00	5.00	2.50
8,500 cu. yd. excav., structure	3.00	7.50	3.40
14,265 lin. ft. 18-in. x 18-in. R.C. precast piles, furnish	4.80	3.60	7.60
14,265 lin. ft. 18-in. x 18-in. R.C. precast piles in place	1.90	3.00	4.50
8,514 lin. ft. timber piles (untreated)	1.40	1.10	1.13
743 lin. ft. timber piles (treated)	2.25	2.50	2.50
421 ea. timber piles (drive)	42.00	40.00	47.00
11,800 cu. yd. P.C.C. Class A	41.15	50.00	48.00
382,284 lb. reinforcing steel (furnish)	.08	.07	.07
382,284 lb. reinforcing steel (in place)	.025	.013	.02
3,008 lin. ft. steel bridge rail	11.50	9.00	10.00
5,840 lb. structural steel shapes and plates	.50	.70	.50
49,797 lb. steel H piles and cap plates (furn. and drive)	.30	.15	.21
475 lin. ft. C. I. pipe sleeves	1.70	3.00	1.25
18,085 lb. annealed tie-wire	.10	.10	.10
175 cu. yd. drain gravel in place	5.00	8.00	5.00
1,437 lin. ft. 4-in. black fibre duct	.60	.60	.56
16.5 M.B.M. Douglas fir timber (structural grade)	485.00	500.00	300.00
5.2 M.B.M. redwood timber (structural grade)	525.00	500.00	300.00
123 lin. ft. 30-in. corrugated metal pipe, in place	21.00	8.00	10.00
20 lin. ft. 12-in. R.C. pipe, in place	11.00	7.00	5.00
2 ea. curb inlets	\$1,300	300.00	100.00
Lump sum, removal of exist. timber bulkheads and wingwalls	\$16,700	\$3,500	\$1,000
210 sq. ft. P.C.C. sidewalk	4.5	.80	.50
16 lin. ft. P.C.C. curb	3.50	5.00	2.00
80 cu. yd. P.C.C. pavement	38.00	25.00	20.00
28 ton A.C. pavement	20.00	15.00	10.00
Lump sum, field office	\$7,000	\$1,500	\$1,000
Lump sum, electrical installations	\$19,000	\$2,800	\$3,672

184½-ft. steel and concrete bridge

Montana—Petroleum County—State. N. A. Nelson Construction Co., Sheridan, was awarded a contract by the State Highway Commission on a bid of \$62,356 for construction of an 184½-ft. steel and concrete bridge on the Grassrange-Jordan highway. Unit bids submitted were as follows:

1) N. A. Nelson Construction Co.	\$62,356	Schye & Sullivan	\$71,136
2) Dudley Construction Co.	64,734	W. P. Roscoe	80,881
3) Walter Mackin & Son	67,688	Hansen & Parr Construction Co.	81,738
4) Haggerty-Messmer Co.	68,516	Laug Construction Co.	82,701
5) F. L. Flynn & Co.	69,082	Montana Engineering Construction Co.	84,912
6) Holm Construction Co.	69,235		
Northwest Engineering Co.	70,409		

	(1)	(2)	(3)	(4)	(5)	(6)
6,682 lb. structural steel	.45	.25	.40	.50	.35	.40
12,082 lb. reinforcing steel	.15	.16	.17	.16	.17	.18
265.0 cu. yd. Class A concrete	60.00	60.00	60.00	74.00	70.00	70.00
274.9 cu. yd. Class AD concrete	77.00	96.00	82.00	80.00	80.00	75.00
366.0 lin. ft. steel bridge rail	10.00	10.00	10.00	10.00	8.00	10.00
860.0 cu. yd. structure excav.	6.50	4.00	10.00	6.00	10.00	10.00
720 cu. yd. unclassified excav.	1.00	.75	.50	2.25	1.00	.50

Water Supply

Water treatment plant for Salt Lake City

Utah—Salt Lake City—City. Paulsen Construction Co., Salt Lake City, was low bidder with \$531,677 submitted before Salt Lake City Corporation for construction of Schedule II, City Creek water treatment plant. Unit bid prices were as follows:

1) Paulsen Construction Co.	\$531,677	Jensen Construction Co.	\$558,935
2) Oakland Construction Co.	531,731	Alfred Brown Co.	565,695
3) Mark B. Garff and Ryberg & Garff	543,848	Tolboe & Harlin Construction Co.	571,686
4) Dorland Construction Co.	544,355	Utah Construction Co.	600,900
5) Gibbons & Reed Co.	548,000	Davis & Butler Construction Co.	606,288
6) Olson Construction Co.	557,466		

	(1)	(2)	(3)	(4)	(5)	(6)
Lump sum, clearing and grading	\$24,308	\$19,470	\$12,700	\$20,561	\$22,800	\$11,531
Lump sum, raw water intake struct.	\$5,040	\$3,827	\$4,016	\$4,412	\$3,800	\$5,282
Lump sum, grit chamber	\$4,581	\$4,283	\$4,238	\$4,522	\$4,000	\$5,015
Lump sum, chemical building	\$91,694	\$103,022	\$97,600	\$86,720	\$92,300	\$93,898

Continued on page 136



Stops Dozer Rope Waste



A Reel of Tuffy Dozer Rope Can Save Up to 300%

When 10' or so of Tuffy Dozer Rope is crushed or cut on the drum, don't throw the whole rope away. Just feed through enough to replace the damaged part! When you're using Tuffy, there is plenty of service left in the undamaged part. You get 6 to 9 cuts from one reel and, figuring roughly, there are two dozer ropes to each reel of Tuffy. That gives you an approximate ratio of 6 to 2... around 300% increased service! And you can have your dozer back on the job in less than half the time usually needed! Tuffy ½" Dozer Rope is now furnished in 150' reels. Write today for simple details on how to mount Tuffy on your Dozer!

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By _____ Title _____

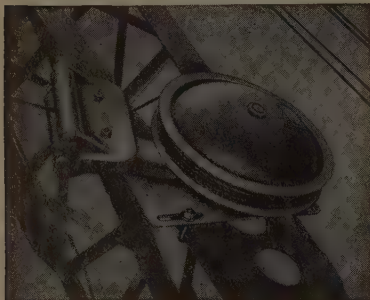
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FAIRLEAD ROLLERS — Save needless line wear.

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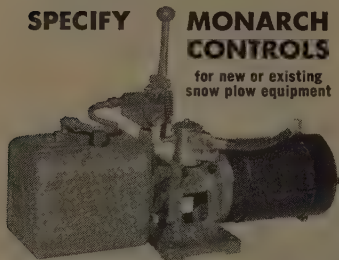
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MONARCH ROAD MACH. CO.

324 North Front Ave.
GRAND RAPIDS 4, MICHIGAN

UNIT BID PRICES... CONTINUED

	(1)	(2)	(3)	(4)	(5)	(6)
Lump sum, flash mixer coagulation and sedi- mentation basins	\$191,521	\$183,455	\$188,000	\$214,225	\$186,500	\$196,611
Lump sum, water piping	\$5,095	\$4,469	\$8,075	\$5,726	\$5,100	\$5,158
Lump sum, air piping	206.00	129.00	397.00	246.00	200.00	198.00
Lump sum, alum solution piping	555.00	425.00	1,075	658.00	550.00	554.00
Lump sum, sludge and basin drain piping	\$5,268	\$5,037	\$8,396	\$4,506	\$5,800	\$5,733
Lump sum, raw water influent line	926.00	\$1,171	\$1,851	986.00	\$1,000	\$1,767
Lump sum, sedimentat'n basin effluent piping	\$5,445	\$4,393	\$3,989	\$3,671	\$5,400	\$6,158
Lump sum, sample pumps, manhole & piping	\$3,205	\$2,041	\$3,818	\$2,664	\$2,250	\$2,821
Lump sum, sewage disposal and piping	\$4,529	\$4,060	\$4,252	\$5,869	\$4,000	\$3,897
Lump sum, chlorine solution piping	\$6,520	\$6,777	\$8,122	\$6,692	\$7,400	\$7,537
Lump sum, high pressure water tank	\$2,003	\$1,585	\$2,945	\$2,058	\$1,700	\$1,746
Lump sum, air compressor	446.00	442.00	550.00	471.00	500.00	484.00
Lump sum, chemical handling equipment	\$19,560	\$18,800	\$21,276	\$17,988	\$22,200	\$23,595
Lump sum, chemical feeders	\$18,535	\$19,806	\$19,761	\$20,242	\$19,600	\$22,011
Lump sum, flash mixers	\$5,359	\$5,131	\$6,085	\$5,408	\$5,600	\$6,158
Lump sum, coagulators	\$36,775	\$36,845	\$38,498	\$35,448	\$40,200	\$39,826
Lump sum, sludge collectors	\$61,529	\$65,405	\$65,057	\$62,309	\$72,100	\$71,620
Lump sum, high pressure water pump	\$1,565	\$1,364	\$1,988	\$1,585	\$1,500	\$1,495
Lump sum, recirculating sludge pumps and piping	\$3,445	\$3,664	\$3,360	\$3,430	\$4,000	\$4,006
Lump sum, raw water parshall flume meter	964.00	\$1,037	997.00	\$1,090	\$1,100	\$1,100
Lump sum, laboratory equipment	\$2,892	\$3,197	\$3,750	\$2,881	\$3,200	\$3,135
Lump sum, electrical work	\$22,669	\$23,123	\$23,219	\$22,523	\$25,200	\$25,520
Lump sum, pavement	\$7,042	\$8,793	\$9,827	\$7,464	\$10,000	\$10,210

Water and sewer system for Kodiak, Alaska

Alaska—Kodiak—Alaska Public Works. Leo S. Wynans Co., Inc., Portland, bid low at \$485,500 before Alaska Public Works for construction of a water and sewer system at Kodiak, Alaska. Unit bids submitted were as follows:

(1) Leo S. Wynans Co., Inc.	\$485,500	(3) S. Macri Construction Co.	\$554,650
(2) Pacific Alaska Contractors, Inc.	476,000	— Carson Construction Co.	646,355

	(1)	(2)	(3)
Cu. yd. Common excav.	1.85	2.00	2.00
Cu. yd. Unclassified excav.	8.25	8.00	3.50
Cu. yd. Rock excav.	9.00	10.00	25.00
Cu. yd. Selected backfill under pipe	8.00	10.00	3.00
Cu. yd. Embankment material over top of pipe	9.00	8.00	3.00
Sq. ft. Bracing, sheathing and shoring put in place and removed after work is finished	.65	.50	1.00
Sq. ft. Bracing, sheathing and shoring put in place and removed after work is finished; then removed and reused in other excav.	1.25	1.10	1.00
Sq. ft. Bracing, sheathing and shoring left in place	.75	.45	3.00
M.B.M. Untreated timber and lumber in place	300.00	280.00	300.00
M.B.M. Treated timber and lumber	310.00	310.00	400.00
Lin. ft. Treated timber piling	3.00	2.85	4.00
Lin. ft. Untreated timber piling	2.50	2.60	3.50
Cu. yd. Concrete—Class "A"	75.00	60.00	150.00
Cu. yd. Concrete—Class "B"	70.00	57.50	145.00
Cu. yd. Concrete—Class "C"	65.00	55.00	140.00
Cu. yd. Concrete—Class "D"	60.00	52.50	135.00
Cu. yd. Concrete—Class "E"	55.00	50.00	130.00
Pound Steel reinforcing bars	.46	.28	.25
Lin. ft. Cast iron water pipe, bell and spigot, 150#, 12-in. diam.	24.00	23.11	10.70
Lin. ft. Asbestos-cement water pipe, 100#, 12-in. diam.	20.00	20.25	7.20
Lin. ft. Wood stave water pipe, 250-ft. head, 12-in. diam.	23.00	21.54	7.20
Lin. ft. Cast iron water pipe, bell and spigot, 150#, 10-in. diam.	18.00	18.23	8.45
Lin. ft. Asbestos-cement water pipe, 100#, 10-in. diam.	16.00	14.18	5.75
Lin. ft. Wood stave water pipe, 250-ft. head, 10-in. diam.	15.50	15.26	5.75
Lin. ft. Cast iron water pipe, bell and spigot, 150#, 8-in. diam.	8.00	9.15	6.50
Lin. ft. Asbestos-cement water pipe, 100#, 8-in. diam.	8.50	7.16	4.85
Lin. ft. Wood stave water pipe, 250-ft. head, 8-in. diam.	8.00	7.07	4.85
Lin. ft. Cast iron water pipe, bell and spigot, 150#, 6-in. diam.	7.50	7.41	4.30
Lin. ft. Asbestos-cement water pipe, 100#, 6-in. diam.	6.00	5.58	3.80
Lin. ft. Wood stave water pipe, 250-ft. head, 6-in. diam.	6.50	6.18	3.80
Lin. ft. Cast iron water pipe, Bell and spigot, 150#, 4-in. diam.	6.00	6.09	3.30
Lin. ft. Asbestos-cement water pipe, 100#, 4-in. diam.	5.00	4.91	2.50
Lin. ft. Wood stave water pipe, 250-ft. head, 4-in. diam.	5.25	5.13	2.50
Lin. ft. Cast iron water pipe, flanged, 150#, 10-in. diam.	24.00	23.45	10.70
Lin. ft. Cast iron water pipe, flanged, 150#, 10-in. diam.	19.00	18.53	8.45
Lin. ft. Cast iron water pipe, flanged, 150#, 8-in. diam.	10.00	9.35	6.50
Lin. ft. Cast iron water pipe, flanged, 150#, 6-in. diam.	8.00	7.61	4.30
Lin. ft. Cast iron water pipe, flanged, 150#, 4-in. diam.	6.50	6.29	3.30
Per lb. Cast iron water pipeline fittings, except fire hydrants	.50	.42	.35
Each New fire hydrants	400.00	310.00	550.00
Lin. ft. Un-reinforced concrete sewer pipe, bell and spigot, 12-in. diam.	16.00	16.10	7.00
Lin. ft. Creosoted wood stave sewer pipe, 100-ft. head, 12-in. diam.	15.00	14.86	6.50
Lin. ft. Asbestos-cement sewer pipe, Class 1, 12-in. diam.	13.00	12.81	7.00
Lin. ft. Un-reinforced concrete sewer pipe, bell and spigot, 10-in. diam.	15.00	14.74	5.50
Lin. ft. Creosoted wood stave sewer pipe, 100-ft. head, 10-in. diam.	14.00	13.44	6.10
Lin. ft. Asbestos-cement sewer pipe, Class 1, 10-in. diam.	14.50	13.27	6.10
Lin. ft. Un-reinforced concrete sewer pipe, bell and spigot, 8-in. diam.	14.75	13.30	4.10
Lin. ft. Creosoted wood stave sewer pipe, 100-ft. head, 8-in. diam.	13.00	13.09	4.75
Lin. ft. Asbestos-cement sewer pipe, Class 1, 8-in. diam.	13.50	12.95	5.05
Lin. ft. Cast iron sewer pipe, bell and spigot, 100#, 12-in. diam.	23.00	22.60	11.00
Lin. ft. Cast iron sewer pipe, bell and spigot, 100#, 10-in. diam.	18.50	18.38	8.75
Lin. ft. Cast iron sewer pipe, bell and spigot, 100#, 8-in. diam.	16.00	15.93	7.25
Each Cast iron wyes for house connections, 100#, 12-in. x 12-in. x 6-in.	84.00	82.50	55.00
Each Cast iron wyes for house connections, 100#, 10-in. x 10-in. x 6-in.	82.00	78.35	45.00
Each Cast iron wyes for house connections, 100#, 8-in. x 8-in. x 6-in.	75.00	69.45	21.00
Each Un-reinf. conc. wyes for house connections, 12-in. x 12-in. x 6-in.	33.00	32.75	20.00
Each Un-reinf. conc. wyes for house connections, 10-in. x 10-in. x 6-in.	30.00	28.72	18.00
Each Un-reinf. conc. wyes for house connections, 8-in. x 8-in. x 6-in.	36.00	24.10	13.50
Each Cast iron sewer pipeline fittings	.50	.41	.35
Each 12-in. gate valve with valve box	350.00	327.00	240.00
Each 10-in. gate valve with valve box	225.00	217.00	200.00
Each 8-in. gate valve with valve box	175.00	170.00	160.00
Each 6-in. gate valve with valve box	92.00	83.00	110.00
Each 4-in. gate valve with valve box	70.00	68.00	90.00
Each 1-in. combination air relief and vacuum valve with box	65.00	63.00	75.00

Miscellaneous

Irrigation system

Oregon—Douglas County—State. Western Golf Course & Supply Co., Portland, submitted a low bid of \$3,149 before the Oregon State Highway Department for an irrigation system at Reedsport Junction. Unit bids were as follows:

1) Western Golf Course & Supply Co.....	\$3,149	(3) Tom Lillebo	\$4,420
2) R & M Construction Co.	4,308		
		(1)	(2)
10 lin. ft. ½-in. copper pipe		.44	.77
110 lin. ft. ¾-in. copper pipe		.75	.87
700 lin. ft. 1-in. copper pipe		.93	1.04
240 lin. ft. 1¼-in. copper pipe		1.15	1.17
330 lin. ft. 1½-in. copper pipe		1.50	1.37
280 lin. ft. 2-in. copper pipe		2.25	3.92
1 only 2-in. gate valve		12.00	30.00
2 only 1¼-in. control valves		15.00	17.95
4 only 1½-in. control valves		17.00	25.76
1 only 2-in. control valves		23.00	25.00
9 only ½-in. drain valves		9.00	10.50
50 only sprinkler heads, pop-up, non-revolving		4.50	7.55
14 only sprinkler heads, pop-up, revolving		14.00	35.50
14 only shrubbery heads		1.60	3.10

Installation of guardrail and guide posts

Idaho—Owyhee County—State. McWaters & Bartlett, Boise, was awarded a contract by the Department of Highways on the basis of a low bid of \$9,760 for installing guardrail and guide posts at various locations between the Oregon state line and Marsing on U. S. 95. Unit bids were as follows:

(1) McWaters & Bartlett	\$ 9,760	(5) C. B. Lauch	\$14,800		
(2) Ray Neilson	11,420	— J. O. Young & Son	15,480		
(3) Verman Bros. Co.	11,960	— Intermountain Builders	15,700		
(4) A. D. Stanley	12,840				
	(1)	(2)	(3)	(4)	(5)
2,880 lin. ft. steel beam type guardrail	2.95	3.50	3.50	3.90	4.00
240 ea. guide posts Type "4"	6.25	6.75	9.00	8.00	15.00

proven efficiency!

proven dependability!

proven on-the-job economy!



Thousands of STOW vibrators the country over are proving their value every day . . . proving their efficiency by making possible quick, perfect placement of stiff mixes . . . proving their dependability by working hour after hour, day after day under the most rugged conditions without time-losing breakdowns, without expensive maintenance.

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Write today or see your local distributor for a copy of STOW BULLETIN 511 and complete details on STOW concrete vibrators and screeds.

BETTER CONCRETE

... Continued from page 86

Field control

The second important point in concrete construction, in my opinion, is the interpretation of the specifications by the supervising engineering personnel and the actual field control of the concrete. It must be recognized by the contractor, the design engineer, and the person in direct charge of concrete control in the field, that it is impossible to exactly duplicate laboratory procedures and results in the field on a production basis without making costs prohibitive. From the contractor's standpoint, all that he asks is that the concrete control from the original production and processing of aggregates through the placing and final troweling be handled on a realistic and practical basis, considering always the end result desired, using every good engineering and production practice, and considering always that a construction job is not a laboratory.

A good concrete job, in my opinion, is a combination of specifications realistically written for the particular job at hand, full cooperation between the contractor, the designer, and the supervising personnel, using controls and limits that are practical, plus a lot of hard work.

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CONSTRUCTION**
**CLASSIFIED
COLUMNS**

Turn to
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158-162
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NEW LITERATURE

701

Practical guide to powder-actuated fastening system

All you need to know about modern fastening methods is covered in the first complete applications manual ever prepared for use with the powder-actuated fastening system. Recently published by **Ramset Div., Olin Industries**, it is available to builders, contractors and others in related fields wherever powder-actuated tools and fasteners are employed to fasten steel to steel, steel to concrete, or wood to concrete or to steel. The 28-page brochure incorporates full use of illustrations, charts, diagrams and specification tables. Specifications cover the more than 20 fixtures and accessories, and the 56 drive pins and threaded studs offered by Ramset. Selection tables setting forth the proper type of fastener and the proper powder charge for various receiving materials are included as a guide. Fill in coupon for your free copy.

702

All about water control apparatus

Rodney Hunt Industrial Machine Co. is offering a valuable and comprehensive 250-page catalog on water control apparatus without obligation, but only to consulting engineers, contractors, and others actively engaged in water control construction work. This hard-cover catalog consists of 8 sections: sluice gates, timber gates, hoists, fabricated gates, racks and rakes, valves, and engineering data. Included are hundreds of diagrams, photographs with detailed descriptions, and specifications. The section on sluice gates alone covers 2,000 combinations of standard types and sizes, with special design features, applications, uses and advantages, installations and specifications comprising 16 chapters. An important feature is a 28-page section devoted to engineering data and tables for water control. Six main subjects are covered: determining sluice gate size, flow of water in pipes, measuring the flow of water, Manning's formula for flow of water in open channels, hydraulic data, and general data.

703

"Nothing like it in the tractor world"

A 3-color illustrated leaflet published by **Allis-Chalmers Manufacturing Co.** gives the inside and outside pictures of four A-C crawler tractors, the HD-5, HD-9, HD-15, and HD-20. A unique way of presen-

tation shows the construction details of each model with full cutaway pictures, and the variety of applications on the job. As the pages are turned, there is a spread of the cross-sectional views with the job application illustrations for each model. When completely opened, the 4 tractors in cross-section view stand side by side.

704

Covers concrete reinforcing bars

Columbia-Geneva Steel Div., U. S. Steel Corp., has released an illustrated leaflet describing U.S.S. Di-Lok concrete reinforcing bar. It includes a black and red pocket-size concrete reinforcing bar detail chart which is a replica in miniature of a large, 25 x 34-in. wall chart which is also offered free of charge.

705

On cold applied paving joint sealers

A comprehensive new catalog describing its line of cold applied paving joint sealers for use on concrete and bituminous highways, streets, bridge decks, canal linings, airport aprons and runways recently has been published by **Presstite Engineering Co.** Includes photographs and descriptions of equipment for use in applying the sealants, and laboratory data, specifications, and methods of application.

706

How torque control improves performance of Aero-Crane

Bulletin 85 tells all about Orton Crane & Shovel Co.'s one-man-operated Aero-Crane. Emphasis is on the advantages achieved by the application of the GM Allison torque converter to this unit which has made it almost completely "desk-operated." Use of torque control is reported to increase the operating facility with pin-point control and reduce operator fatigue. Diagrams, specification charts, and photographs complete the story behind the Aero-Crane.

707

Reconditioning and rebuilding arc welding equipment

The straight line mass production techniques and economies employed by **Lincoln Electric Co.'s** new Linconditioning Division are described in a recently-issued brochure. This new division utilizes conveyor lines and line operations to rebuild welders, work which usually is done on a one-at-a-time basis. The 8-page liter-

ature is illustrated with photographs and diagrams showing the step-by-step process for acquiring new welder performance.

708

Literature available on new type rock drill

Eugene Engineering Co. is offering a 10-page brochure describing its new tractor-mounted, self-contained EECO rock drill. Structural features, operation, and specifications are completely described. For example, the section on operational features tells you all about dry drilling, changing the drill position, traveling, and the new method known as flotation drilling which the manufacturer has incorporated on this unit for more efficient results. Put key number on coupon and mail in for your free copy.

709

Bulletin on Marion 111-M electric shovel

All the facts about **Marion Power Shovel Co.'s** 111-M Ward-Leonard electric shovel are summed up in a 12-page, 2-color booklet now available. Illustrations show the unit in many material handling applications. This unit carries a standard 4-yd. dipper or bucket, and is featured as shovel, dragline, clamshell, crane, and coal loader.

710

Describes road machinery

The various kinds of Bros road machinery products are described in a 4-page folder recently released by **William Bros Boiler & Manufacturing Co.** Included are both medium and giant weight tampers, pneumatic tire rollers, all-steel rollers, bituminizers, Spraymatic spray bars, portable steam generators, and asphalt circulators and heaters.

911

A scraper for every occasion

A new 3-color, 12-page illustrated catalog issued by **Allis-Chalmers Manufacturing Co.** covers its line of 7 modern pull-type scrapers. Each machine, including 4 units produced at the Cedar Rapids works and 3 Gar Wood scrapers, is clearly illustrated and accompanies complete individual specification charts and other pertinent data.

912

New brochure discusses hard-facing

A comprehensive and analytical study of hard-facing, its application and its wear-resisting qualities wherever impact and abrasive conditions exist, is contained in a new 52-page brochure published by **Mir-O-Col Alloy Co.** The report incorporates the latest technical data and instructions on hard-facing, as well as new information on the manufacturer's own

ne of hard-facing metals. A special section, the application index, recommends specific rods for over 1,000 individual pieces of equipment.

913

"How to Construct Sanitary Fill"

A new 12-page brochure published by Drott Manufacturing Co. tackles the problems concerned with a rat-infested, unhealthy and unsightly city lump. The advantages of the Drott bulldozer method for turning this common eyesore into clean and useful land are pointed out in detail.

914

Building code requirements for vermiculite products

Recommended proper requirements for vermiculite plastering, acoustical plastic, fireproofing and concrete are contained in this 16-page booklet by Vermiculite Institute. The recommendations are based on standards of the American Standards Assn., American Society for Testing Materials, and Vermiculite Institute. Building code language and several pages of line drawings make this a convenient reference for officials and agencies responsible for approval of materials and construction, or for the writing or revision of building codes. Included on page 3 are directions for using the data.

915

Information on vibrating screens

Deister Machine Co. has released complete information on its heavy-duty Types ETP (end tension, pillow-block) and ETU (end tension, utilized) high-speed vibrating screens. Specific operational features, such as the exclusive Deister elliptical throw and the longitudinally-curved screen cloth surface, are described, and advantageous performance characteristics of each are pointed out. Full range sizes of this line of vibrating screens are given, in addition to the various motor mountings offered.

916

All about Buckeye ditchers

Form No. F-167, a new catalog illustrated with action and still photographs, shows the many types and sizes of the 9 models of Buckeye ditchers. This informative literature which is published by Gar Wood Industries, Inc., presents data on the ditchers' engines, horsepower, machine weights, ground bearing pressures, digging speeds, digging depths, and widths.

917

How to put a level on roads

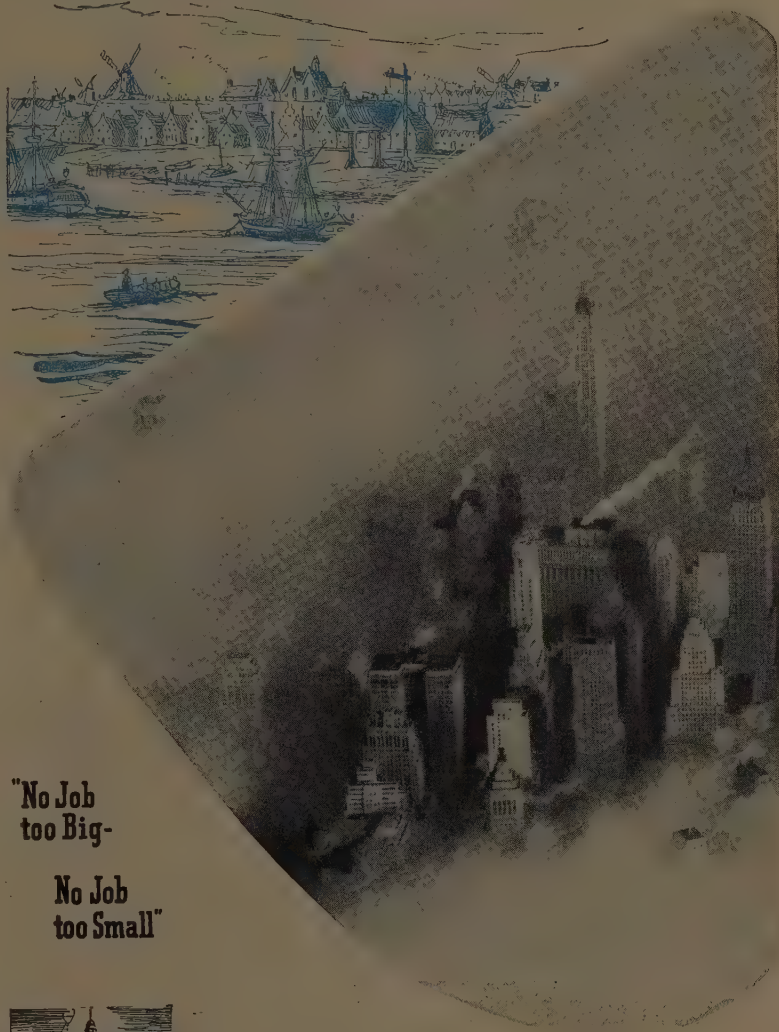
The difficulties encountered when attempting to construct roads which are level at the center as well as at the shoulder are tackled in this little

The Sky's the Limit!

This year, Manhattan is celebrating its 300th anniversary. No one has had a greater share in its development than the contractor, whose constantly improved building techniques have made possible this great concentration of industry, commerce, and cultural activities on a 22-square mile island.

Over the years, the Aetna Casualty and Surety Company has handled contract bonds for many of the great contracting firms which helped to mold the Manhattan skyline. Some of these firms, which today are Titans in the contracting field, have been Aetna clients from their earliest and smallest beginnings.

Thousands of contractors know from experience that the Aetna name on the bond is respected, that Aetna's helpful facilities are unmatched, that its financial strength is unquestioned. That is why so many contractors bond with Aetna — always.



"No Job too Big"

No Job too Small"



ÆTNA CASUALTY AND SURETY COMPANY

AFFILIATED COMPANIES: ÆTNA LIFE INSURANCE COMPANY
AUTOMOBILE INSURANCE COMPANY • STANDARD FIRE INSURANCE COMPANY
HARTFORD 15  CONNECTICUT

booklet by **Blaw-Knox Co.** It tells you all about the Fluid Level, which, particularly when used with the Adnum paver, is a means of achieving uniform density and uniform thickness with a truly level course the full width and length of the road, from subgrade to surface. Includes information of the Adnum joint marker.

918

Wire rope recommendations for contractor's equipment

A small 20-page booklet published by **Macwhyte Co.** tells how to make the most out of wire rope in conjunction with contractor's equipment, such as shovels, draglines, clamshells, and trench hoes. Each page has an outline drawing indicating the type of equipment along with recommendations for the type of wire rope to be used on each machine. Cross-section drawings indicate the physical structure of the various kinds of wire rope.

919

Brochure available on Adnum Jr. Model 8 paver

An illustrated 4-page brochure contains pertinent information on the Adnum Jr. Model 8 bituminous paver which is recommended for smaller paving jobs. Illustrative photographs show you the paver's important features, and drawings point out why its construction enables it to lay a smooth course. Also includes a list of specifications. Published by **Blaw-Knox Co.**

920

Informative data on perlite concrete

A revised mix design chart for perlite concrete released by **Perlite Institute** contains helpful new data for the design of efficient roof deck insulation, lightweight floor fill, and precast slabs and blocks. This information is part of a specification for perlite concrete recently adopted by the 49 perlite producing members of the Institute. A separate specification for the mixing and placement of perlite concrete roof deck insulations, which is approved for use under bonded, built-up roofing, is also available.

921

Bulletin on Varidrive motors

A revised and amplified 16-page Bulletin No. 1797 has been issued on Varidrive motors by **U. S. Electrical Motors, Inc.** The multi-colored publication includes 80 illustrations of motors, mechanical features, remote controls, and other pertinent items regarding this line of electrical units.

922

On tubular steel scaffolding

Building and maintenance contractors should be interested in a small 6-page color folder (No. 53) published by **Advance Scaffold Div., Beaver Art Metal Corp.** The folder illustrates the

various panel styles and identifies proper application of the Advance tubular steel scaffolds. It also contains a description of the patented method of panel and brace assembly with self-contained cam and stack locks which speed up assembly and dismantling through elimination of bolts, nuts, clamps, and other methods of attachment.

923

Equipment for materials handling

A 12-page pictorial guide to new methods in bulk and package materials handling is offered by **Allis-Chalmers Manufacturing Co.** Featured are action shots of crawler and industrial wheel tractors, motor graders, and power units, plus detail views of the rubber-tired earth moving equipment recently added to the Allis-Chalmers line. On-the-job pictures show the versatility of these machines. The importance of mechanized materials handling in releasing manpower for other productive work is emphasized. Includes capacity, horsepower, weight, and other basic data on the equipment and necessary attachments.

924

Paving breakers for every job

How to find the right paving breaker for every job is the theme of a new illustrated catalog issued by **Ingersoll-Rand Co.** Each of the firm's line of breakers is described both in regard to specifications and the jobs it can perform. A typical cross-section view shows all the important features of construction and design. In addition, 2 pages of this 8-page bulletin illustrate the individual tools and accessories available for the complete line.

925

Vickers Oil hydraulic equipment

Catalog M-5101 is a detailed treatment of the oil hydraulic equipment for mobile applications manufactured by **Vickers, Inc.** Sixteen pages provide the latest specification and engineering information about Vickers hydraulic vane-type pumps and motors, valves, power steering pumps and boosters, and other oil hydraulic units specifically designed for construction and other types of equipment. Includes detailed drawings, photographs, and charts.

926

Operator's handbook

Here's a new "Operator's Handbook" (Form 30575), published by **Caterpillar Tractor Co.** for working Caterpillar's cable and hydraulic shovels. It's in the popular, colorful, cartoon-style pattern used successfully in earlier "Operator's Handbooks." Shows how to work the controls, put

the machine through its paces, and switch attachments for making it adaptable to various enterprises.

927

Abrasive products for the building trade

Recommendations and applications for the uses of materials produced by **Bay State Abrasive Products Co.** are contained in this 4-page, 2-color bulletin. Contains pictorial analyses of Spee-D-Cut and Saf-T-Cut masonry blades, Bayflex raised hub disc-wheels, and Duracut abrasive blades. Complete table of those available products and their prices are included.

928

48-page booklet covers Murphy diesels

What to look for in diesel engines is covered in this 48-page, 2-color booklet offered by **Murphy Diesel Co.** The ten main engineering design features are fully described and illustrated. In addition, ratings and descriptions of various Murphy models are presented. Includes 19 pages of photographs of typical installations.

929

Bulletin on truck mixers

A new bulletin, covering Blue Brute truck mixers and specification sheet for the Blue Brute 3½-S, end-discharge, tilting mixer is offered by the **Worthington Corp.** The 24-page bulletin, No. R1700-B13, thoroughly describes and illustrates both the LC and LO models of inclined-axis, truck-mounted concrete mixers. Many of the improved design features of the mixers are illustrated by photographs or cut-away drawings indicating details of each.

930

"Strand and Fittings for Prestressed Concrete"

The second edition of the catalog "Strand and Fittings for Prestressed Concrete" is now available from **John A. Roebling's Sons Corp.** The 16-page booklet covers various aspects of this timely subject, including strand, wire, fittings, post-tensioned design, and applications. It contains photographs, charts, and tables, and is believed to be the only such material on this subject available.

931

On heavy-duty apron feeders

A 4-page treatment of their line of extra-heavy-duty 9-in. pitch apron feeders is now available from **Universal Engineering Corp.** It tells about the flights, chains, sprockets, shafts, carry rollers, return roller assemblies, main frame, lubrication, and drive of this new apron feeder, which was designed for applications in mines, quarries, and allied industries. Includes photographs, charts, and specifications.

literature. briefs . . .

932

TEAM CLEANERS—All you need to know about **Malsbary Manufacturing Co.**'s line of steam cleaners is contained in this new bulletin. It helps the reader determine what size cleaner best fits his work load, lists standard accessories, and contains a part of pressures, capacities, temperatures and volumes.

933

CABLE CONTROLS—A new booklet issued by **Caterpillar Tractor Co.** discusses its line of cable controls, both rear- and front-mounted. Cutaway and model views elucidate the advantages of these units.

934

BULK HANDLING — **Brooks Equipment & Manufacturing Co.** is offering 4-page literature on its various Load Luger hoists and containers for bulk handling or pallet handling. Contains separate specifications chart.

935

DUMP TRAILERS—An informative catalog sheet by **Hercules Steel Products Corp.** illustrates and describes the important features of two new Hercules Front-Mount twin tele-copic dump trailer packages.

936

JACKS, RAMS AND PULLERS—Two new catalogs on its line of mechanical and hydraulic rams, jacks, pullers, and special purpose jacks

have been issued by **Templeton, Kenly & Co.** Each contains application pictures and information, and listings and illustrations of all available accessories and attachments.

937

TRACTO-LOADER—This new bulletin by **Tractomotive Corp.** concerns the TL-10 Tracto-Loader, a material handling machine featuring a hydraulic torque converter drive and specially designed clutch-type transmission. This unit is sold exclusively through Allis-Chalmers dealers.

938

FLEXIBLE METAL HOSE—**Atlantic Metal Hose Co., Inc.**, has issued a bulletin on its line of high pressure, interlocking bronze and steel flexible hose, tar and asphalt hose, loading and unloading, and necessary couplings. Lists all current applications and provides full test and engineering data.

939

ELECTRODES—**Arcair Co.** is offering a diminutive booklet containing valuable information about the electrodes of special carbon-graphite composition which have been developed for use with its gouging and cutting torches.

940

WIDENING ROADS — A 4-page "how to do it" folder on the Domor road widener, a quick change attachment which can be mounted on any motor grader blade, is offered by **Ulrich Products Corp.** Step-by-step photographs show you the proper use

of the machine in preparing the widening trench along the edge of a surfaced road which is filled with concrete or asphalt without using forms.

941

SAFETY FIRST — A valuable new monthly publication for construction workers has been issued by the **National Safety Council**. Entitled "The Safe Builder," it will help satisfy the industry's demand for regular accident prevention reminders aimed at employees. Makes good use of cartoons, humor, and homey philosophy in order to show workers how they profit from doing every job the safe way.

942

MOTOR STARTERS — Two new leaflets describe in detail the specifications and applications of **Federal Electric Products Co.**'s line of manual and magnetic motor starters.

943

INDUSTRIAL SOUND SIGNALS —Described as the first of its kind in the field of industrial sound signals, "Signal Guide Book" is a new combination manual, data book, and catalog issued by **Benjamin Electric Manufacturing Co.**

944

FLOOR RESURFACING—A brochure is available from **United Laboratories, Inc.**, describing its low-cost Mastic, cold-applied asphalt flooring to be used as new surfacing over old floors or as an underlayment for leveling floors before the application of tile or linoleum.

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More information on any of the items in this section may be obtained by using coupon on page 141.

945

Front-mounted trencher can be converted to heavy-duty loader

Model WT swing trencher, reported to sell for 30% less than other trenching equipment on the market, is reported to be the only front-mounted unit on the market and is so constructed that it can be converted to a heavy-duty loader



by addition of a standard loader dipperstick assembly. Powered by the independent Wagner hydraulic system, it is designed to handle a wide range of bucket sizes and types. Its highly maneuverable boom has a lateral swing of more than 30 deg. to the right or to the left and a maximum dump height sufficient to load trucks. The many uses of this versatile tool include tree planting, installation of septic tanks, pipe laying, and underground wiring. Manufacturer is Wagner Iron Works.

946

Dual steering tandem front axle ups payload capacities as much as 7 tons

A practical answer to getting more payload per truck—safely and legally—is offered by Chain Belt Co.'s Rex-Spangler dual-steering tandem front axle. The new unit



takes care of additional payload by providing for better distribution of this extra weight. Just as the 3-axle truck increases the payload over the 2-axle truck, the extra fourth, Rex-Spangler dual steering tandem front axle, further increases the possibilities of obtaining maximum legal payloads—as much as 5 or 7 tons. The unit is an additional steering axle coupled to the standard front axle

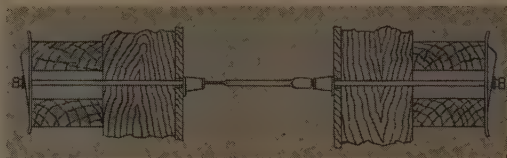
of a truck by a walking beam, resulting in a tandem bogie that steers all front wheels with center poise steering.

Besides providing greater economic benefits to the trucker, it also provides a more economic and safer use of existing highways. Better weight distribution not only means less wear and tear on highways and bridges but also results in fewer units necessary to haul a given tonnage. A load on a single vehicle is not subject to "jack-knifing" as is a trailer. Equipped with a Rex-Spangler axle, the truck is reported to have the same turning radius as a truck with a single axle. Not only do the axles carry an equal distribution of the load under all operating conditions, but the center poise steering eliminates skidding of tires because the four wheels steer without cramping or binding.

947

Strip-Easy Snap Tie speeds concrete construction (free sample offered to show how)

An entirely new type of form tie for the concrete construction industry has been announced by Universal Form Clamp Co. This product, the Strip-Easy Snap Tie, is designed to give the contractor greater strength, positive spreading and faster form erection for ordinary, finished and watertight walls. Hot



forged ends assure greater strength and increased safety; a specially designed washer provides additional bearing on the form and keeps grout seepage to a minimum; wood cones insure positive break-backs and permit tie removal before stripping forms, and wide, flattened sections prevent turning in concrete. The manufacturer is offering a free sample of the Strip-Easy Snap Tie to better illustrate these features attributed to the new product. Put the key number above item on the coupon and mail it in for a sample tie as well as free literature.

948

Big capacity at low price offered by heavy-duty electric saw

A new 8¼-in. portable electric saw, claimed to be the most powerful saw in its class ever offered by the manufacturer, recently has been introduced to sell for \$95. Designated Model 108, it can cross-cut a 1- x 10-in. plank in ½ sec. This saw, which has a frame made of die-cast aluminum with a center-balanced loop handle and trigger switch, incorporates four exclusive safety features: a telescoping guard designed to prevent catching as the saw proceeds through wood; a finger lever at rear of guard to enable the operator to uncover the blade with-

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Install Velvetouch Matched Facing Sets

Whether you're having trouble with the master facings on your tractors or the clutches in your trucks, you'll find Velvetouch Matched Facing Sets keep equipment out of the repair shop and on the job. Because Velvetouch gives you **FOUR** controlled friction surfaces instead of two... gives you positive protection against heat-checked flywheels and pressure plates!

In addition, Velvetouch Matched Facing Sets insure increased clutch capacity, for they **DOUBLE** the controlled friction area you get with conventional plates. And with Velvetouch, you can reclaim old flywheels and pressure plates that have already been heat-damaged, and put them back into service... better than ever!

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out danger when making pocket cuts; an auxiliary guard which automatically covers the front teeth at any depth; and a built-in, kickproof clutch which not only eliminates dangerous bucking, but also prevents motor strain and damage to the material. Its weight is only 13½ lb. Available with various accessories from Porter-Cable Machine Company.

949

New, low-platform, Tilt-Top trailer

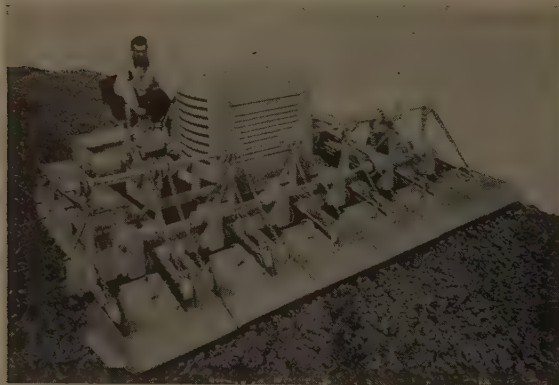
An unusually low (8 deg.) climb angle is featured on a new low platform Tilt-Top trailer. Designated Model D, it is reported to be the first heavy trailer especially de-



signed for easy loading of such smaller crawler tractors as the Oliver OC-3 or Terra-trac T-34, as well as rollers up to 4 tons. The same sturdy structural features are embodied as those used in all of the manufacturer's Tilt-Tops. These include an all-steel, electrically-welded frame with tapered side channels for maximum capacity without needless weight, and a straight-through H-beam axle. The standard 8- x 14-ft. platform is planked with 2-in. oak. The platform is about 22 in. from ground level and has 72-in. clearance between tires to provide maximum usable space. Manufacturer is Miller Research Engineers.

950

Vibro-Tamper method speeds up macadam construction



By means of an efficient use of vibrating and tamping forces incorporated in the improved Vibro-Tamper, the entire sub-base for a road or macadam runway now can be laid in one operation, more than doubling the speed

achieved by use of conventional rolling equipment wherein two or three 5-in. courses are individually compacted. The manufacturer states that Vibro-Tamper can compact in several passes a single 12-in. course to 9-in. compacted thickness of 95-proctor density. In waterbound work, the unit "runs in" screenings in as low as 2 passes, saving 50% of the time formerly required for spreading, brooming and rolling.

The Vibro-Tamper is powered by an 85-hp. industrial gasoline engine through a gear reduction providing a 30-to-1 reduction to the crawler track. Power take-off at the shaft is accomplished by means of a newly-designed heavy-duty enclosed chain drive at each of the 6 vibrating shoes. Use of this chain drive is claimed to eliminate belt slippage when the shoes move over the ground, greatly increasing compacting efficiency under most operating conditions.

The six 435-lb. shoes give the combined vibrating and tamping effect. Total compact area of the shoes is 18 sq. ft. Travel rate ranges from 16 ft. per min. to ½ mph. Compacting force, according to studies made at Rutgers University, penetrates to a depth of 3 ft. in granular material. The shoes are hydraulically raised to vertical non-operating position for travel off the job. Manufacturer is International Vibrating Co.

951

Rugged new Diamond vibrating screens on the market

A rugged, new model Diamond 5-ft. wide vibrating screen series which has been undergoing rigid field tests for the last 2 yr., is now in production, and is available in 10-, 12-, and 14-ft. lengths. Adaptable for any installation, there is a choice of 1, 2, 2½, or 3 decks. A new method of reinforcing the side plates at the shaft is reported to eliminate vibration. With a positive vibrating action due to 4-bearing construction, plus plenty of headroom between decks, faster separation of material over the entire screen area is assured. The aggregate moves quickly from top to bottom of the screen, using gravity plus vibration as the propelling forces.

Specifications include Timken double row roller bearings, rubber-mounted main bearing cages, adjustable



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ring balance cups, and screen clamp bars over the center supports. The screens can be driven with either "V" or flat-belt drive and can be easily equipped with spray bars for washing sand and gravel during the screening operation. Manufacturer is **Diamond Iron Works, Inc.**

952

EECO rock drill gives faster, more profitable results

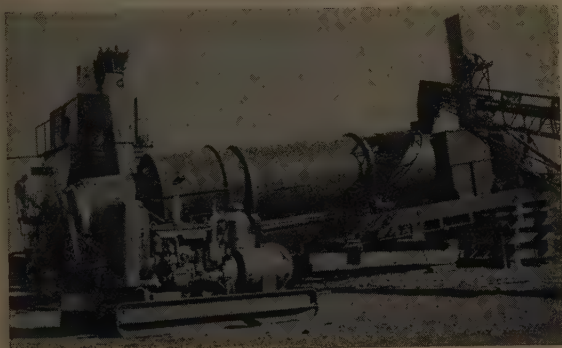


Everyone in the construction, quarry and mining fields—all users of rock drilling equipment—should be interested in this new tractor-mounted self-contained unit which furnishes faster and more profitable results in drilling operations. Known as the EECO rock drill, its self-contained compressor, drill and feed, air lines, and motive power make it completely independent. A long (20 ft., 6 in.) feed which assures continuous drilling for 20 ft. with one steel, converts your work stoppage to drill footage. Its flexible, easily positioned boom is designed to drill in any selected direction or angle without delay. The operator-directed air power gives maximum production with minimum manpower. Safe drilling is achieved by a movable control panel which allows the operator to stay away from the face, and dust can be eliminated to comply with regulations. A new method known as flotation drilling prevents stuck steel and lost holes, and eliminates drilling delays from blowing. With a total weight of about 46,000 lb., the unit has average drilling speeds of 30 to 100 ft. per hr. It may be mounted on any standard make tractor with sufficient power to drive a standard 400 cfm. compressor. Manufacturer is **Eugene Engineering Co.**

953

Pioneer has a new portable bituminous plant

Model 81, a medium-sized central hot mix bituminous plant operating on the continuous process principle, re-



cently has been announced by **Pioneer Engineering Works**, subsidiary of **Poor & Co.** Featuring portability and all-electric drive, Model 81 has a rated capacity of 60 to 80 yd. per hr., utilizing a 72-in. x 24-ft. drier. It consists of two main units, one containing the burner, combustion chamber, drier, dust-collector, and fan; the other containing the gradation screen, three-aggregate-compartment bin, continuous apron feeder, mixer elevator, and pugmill. Each unit is mounted on a single pneumatic-tired chassis. The feeder (three types are available), hot elevator, and cold elevator can be moved on their own wheels or can be readily loaded on a truck for quick transportation. The entire plant is driven by electric motors, with individual, totally-enclosed, fan-cooled motors for each functioning unit. They are controlled from two push-button stations; one on the mixer platform, the other at the base of the drier. About 150 total hp. is required to operate the plant. The mixer unit weighs about 32,500 lb., the drier-dust collector unit about 49,000 lb.

954

Hydraulic control operates blade of new concrete saw

Hydraulic control for lowering the blade is utilized in the new Eveready concrete saw as a means of providing longer blade life. The operator can lower the blade gently into the cut at a controlled rate of speed, eliminating the danger of dropping or bouncing the blade against the



material and thereby wearing out the expensive diamond blades used in concrete sawing. With a few short, quick strokes of the Hydra-Eze blade control the operator can lift the blade straight from the cut with no twisting or binding. Other new features include Tri-Matic blade alignment, an automatic "floating action" of the saw wheels which is claimed to prevent binding or tilting of the blade when the saw is operated over uneven or broken surfaces, a dual blade shaft for sawing in corners or confined areas, a depth control lock, a friction-type foot brake which holds the saw on hills or inclines, and dash-board controls which make possible every cutting operation by the operator from his place behind the saw.

This new concrete saw is reported to be ideally suited for the fast, economical sawing of contraction joints in new construction. It is also recommended for use before breaking out concrete or asphalt for plant floor patch work and for cutting utility line trenches. Manufacturer is **Eveready BrikSaw Co.**

V53

New fastener does the job at 1/3 operating cost



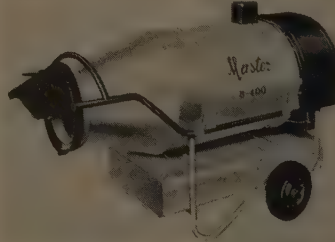
A new Plus-Power Jobmaster powder-actuated fastening tool is reported to do medium-duty fastening into steel and concrete at 1/3 less operating cost than any heavy-duty tool on the market. The unit has a barrel diameter of 3/8 in., compared with 1/2 in. for the regular Jobmaster. Moreover, the new barrel is available as a separate lower assembly so that it may be fitted to Jobmaster tools already in use, thus enabling the operator to use the two barrels interchangeably. Teamed with the Plus-Power Jobmaster, which weighs 6 3/4 lb. and is operated with only one hand, are special flat head drive pins and adjusted utility head treaded studs. The operator can set pins and studs into steel and concrete at an average speed of

at least 2 per min. Especially useful for securing exterior and interior sills to concrete, it is manufactured by Ramset Fasteners Div., Olin Industries, Inc.

V56

Streamlined space heaters have increased Btu

Claimed to be tested as the safest open-cycle heaters, a new line of space heaters feature increased Btu



and streamlined appearance. They are designed for use with kerosene or No. 1 or 2 fuel oil, providing quick, economical heat without expensive ducting for various applications requiring portable heating plants. Model B-400 has a capacity of 400 Btu per hr. with a hot air output of 3,500 cfm. with both fuel tank and burner safety controls. Model B-160 has 160 Btu capacity. All models have pneumatic tires

and full automatic thermostat temperature control. Fuel consumption ranges from 1.14 gal. per hr. for the smaller model to 2.85 gal. per hr. for the B-400. Manufacturer is Master Vibrator Co.

V57

New tool simplifies handling of masonry blocks

Lay-Level, a new tool designed for handling of concrete and cinder blocks, is provided with case-hardened metal teeth which grip the block in its opening so that it can be ca-



ried easily. Beneath the handle of this new tool is a release bar which operates by fingertip control. Two spirit levels aid the bricklayer in setting

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U.S. Highway Guard Rail and Supporting Post

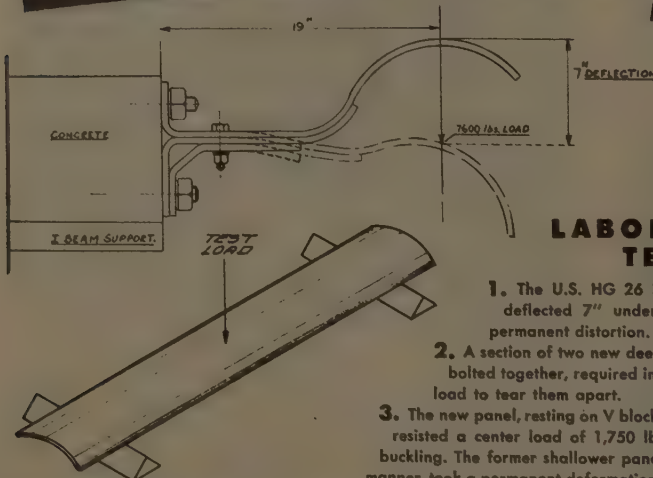
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blocks. One level in the handle gives the reading for the fore and aft setting of the block while the other shows position of the block sides. Lightweight, its design is so simple that the only maintenance required is the oiling of moving parts. The manufacturer claims that it will eliminate wrist and back strain and mashed fingers. Manufacturer is Lay-Level, Inc.

75E

Conveyor belting incorporates rubber cleats

A rubber conveyor belting with rubber cleats incorporated as integral parts of the belt itself recently has been developed. Known as Sky Kleet, advantages it has over the usual angle-iron riveted- or bolted-on cleats include freedom from breakage or



pulling off of the cleats, plus consequent replacement costs and no damage to the products being conveyed. The cleats, themselves, costing less

than patented metal cleats, can be built on any grade of belting ordered by the customer. Thoroughly field tested, this new product is available from Goodall Rubber Co.

75J

New truck crane has 4-ton capacity, 25-ft. boom



Pitman Crane Model 80, a new highly mobile truck-crane, features a capacity up to 4 tons on a 25-ft. boom, with additional boom lengths up to 59 ft. Designed for installation on 2½-ton trucks or larger, precision operation, ability to use the truck it is mounted on for more than a single purpose, quick set-up time, and ease of control are additional features. A versatile loadline winch, which can be operated with power-up, power-down or free spooling, allows the operator

either to let the load down under full power or to slip it down as fast as he wants with a foot brake. A fifth wheel can be installed on Model 80's sub-frame on a long wheelbase truck, allowing the owner to use the same truck on which the crane is mounted to haul a trailer. Manufacturer is Pitman Manufacturing Co.

76E

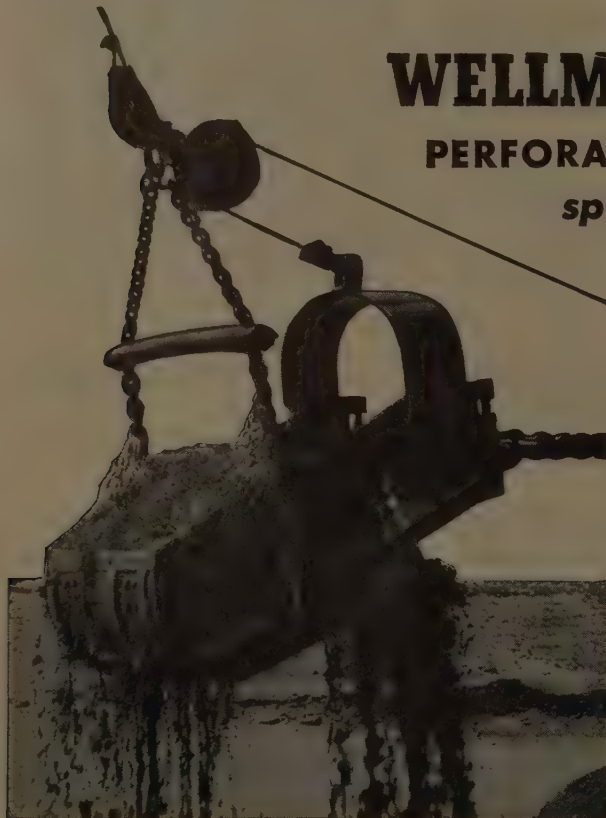
Power-shiftable moldboard available on Adams graders

Adams motor graders are now available with power-shiftable moldboard, a feature which enables the operator to get extreme blade positions for cutting high banks, for cutting low, flat backslopes, and to get



wide reaches outside the line of wheels for shoulder finishing, casting material over embankments, etc. Hydraulic power, operated through a convenient control in the cab, enables quick shift of the blade outward or inward, and also permits the grader

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● You get big loads fast with this Wellman Perforated Dragline Bucket because excess water goes out while gravel stays in on jobs such as illustrated.

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CALIFORNIA—Coast Equipment Company
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OREGON—P. L. Crooks & Co., Inc.
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WASHINGTON—Construction Equipment Corp., Spokane
Clyde Equipment Company, Seattle, Wash.

THE WELLMAN ENGINEERING COMPANY

7000 Central Avenue • Cleveland 4, Ohio

erator to dodge culvert heads, pits, and stakes without altering the angle or plane of the blade or changing the direction of grader travel. A lift of 26½ in. to either right or left center position can be made in 10 seconds. Manufacturer is J. D. Adams Manufacturing Co.

761

Low refraction seismic equipment announced

Acquisition of a complete set of low refraction seismic equipment has been announced by Fisher Research Laboratory, Inc., of Palo Alto, Calif. This special equipment was built for use by Midwestern Geophysical Laboratory and will be used as an exploratory tool for obtaining depth to bedrock and other subsurface data for foundation and construction work.

762

Hole-A-Matic cuts down digging time

The Super Hole-A-Matic, a self-powered portable hole-digging and tunneling machine, digs holes at any angle from 4 to 8 in. in diameter and



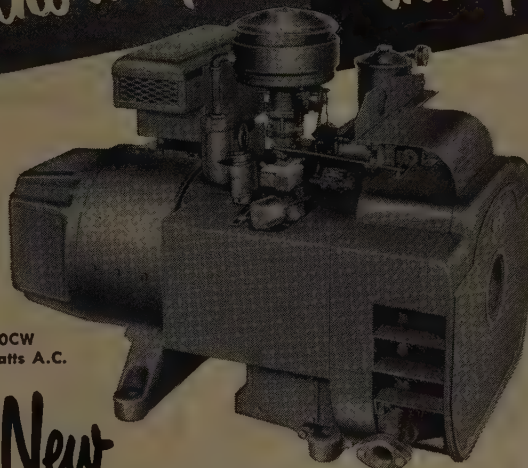
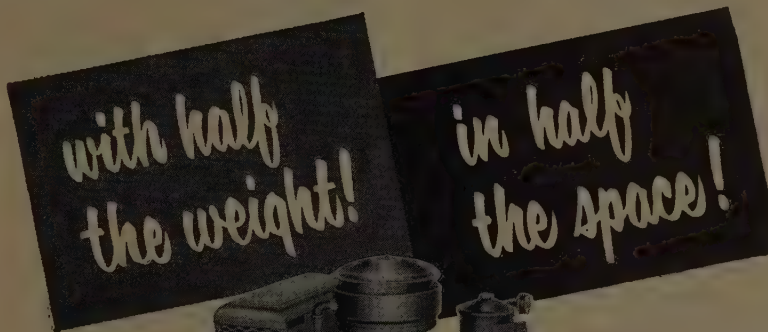
up to 6 ft. deep with a shaft extension, and for pipe installations it will tunnel up to 12 ft. It takes just one minute to dig post holes, holes for sign installations, and concrete pier holes. According to the manufacturer, the specially-designed blades work with a pulverizing, grinding action, and will not bend, break or throw the operator when obstructions are encountered. The power unit can be used on a 115-volt AC or AC (60 cycles or less) power source, or it can operate in a remote location from a 1.25-kw. (or more) AC or DC generator. Manufacturer is Multi-Matic Corp.

763

Heavy-duty automatic welding machine on the market

A rugged new heavy-duty automatic welding machine, Model 650, has been developed for use by aggregate crushing companies, steel mills,

10,000 WATTS A.C.



MODEL 10CW
10,000 watts A.C.

the New ONAN "10 CW" Electric Plant

Check these advantages!

- ★ High capacity for big jobs.
- ★ Twin-cylinder, horizontally-opposed, air-cooled, alternate-firing engine.
- ★ Aluminum-alloy cylinder heads.
- ★ Extra-large, replaceable bearings.
- ★ Full-pressure lubrication, 6-quart oil capacity, oil filter.
- ★ Impulse-coupled, high-tension magneto ignition; radio suppressed.
- ★ Quiet, vacuum air cooling of generator and engine.
- ★ Excellent accessibility; snap-off housings.
- ★ Extremely quiet running.
- ★ High performance generators.
- ★ Completely equipped with controls and instruments.

Costs less than any other complete electric plant!

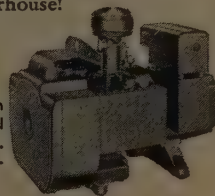
You can't match it anywhere in performance, equipment or value. The sensational new Onan 10CW gives you everything you've wanted in an electric plant plus exceptional mobility for a unit of its capacity.

On large construction jobs, where wattage requirements for power tools are high, or where floodlighting of extensive work areas is essential, the Onan 10CW delivers all the electric power you need.

Before you buy another electric plant for any purpose, take a good look at this new low-cost powerhouse!

Model 5CW 5,000 watts

Same advanced design as the 10CW with all its exclusive advantages. Built for heavy duty, economical operation.



AUTHORIZED DISTRIBUTORS:

ETS-HOKIN & GALVAN
551 Mission St., San Francisco, Calif.
218 N. Avalon Blvd., Wilmington, Calif.

FREMONT ELECTRIC COMPANY
744 North 34th, Seattle, Washington

SPARKS AND WILLS COMPANY
1624 S.E. Grand Avenue, Portland, Oregon



and the general construction field. It features a consolidated finger-tip control panel; dual, adjustable, spring-braked rod-reel holders; an 8-ft. cross arm with side beam carriage; a welding head complete with assorted contact tips, tip extensions, and adjustable rod feed rollers. All incidental wiring is harnessed to allow 3-phase, 220/440-v., 150/75-amp. connection at point of installation. Manufacturer is Leader Welding & Manufacturing Co.

764

Heavy-duty dump body designed to haul abrasive materials

Designed to withstand the hard shock of power shovel, chute and conveyor loading, a new "rock" type dump body is now available in 5- to



15-yd. sizes from Galion Allsteel Body Co. The body is constructed of high tensile steel plate and features extra wide box-type side bracing, both horizontal and vertical, on the head sheet and sides. According to the manufacturer, the new design eliminates the side bulging which is the most common cause of heavy-duty body failures. The "rock" body sides fold into the reinforced body floor at a 45-deg. angle to prevent material from lodging in corners.

Need for a tailgate is eliminated by a 15-deg. angle scow-type rear end which packs the load firmly in place. Dumping is handled by Galion heavy-duty hoist models 880, 1000, and 77353, applied in accordance with load requirements. The driver's compartment is protected by a sturdy, box-braced, full size cab protector.

765

New series gas burners range to 11,520,000 Btu

A new series multiple-section, up-shot gas burner is available in stock sizes ranging from 450,000 Btu input to 11,520,000 Btu or more. Easily installed through the ash pit door, the numerous possible combinations of burner heads enable one to apply the burner for the most effective use of the fire-box area. Individual Venturi mixing tubes for each burner head

assure uniform mixture to all parts of the burning area. Primary air entrainment is high, and adjustment is provided for various types of fuel gas. When recommended controls are used, the burner is step-acting and modulated so that the various burner sections come on in sequence instead of all at once. Manufacturer is Petro.

966

One-part scaffolding lowers cost and erection time

A new steel scaffolding system, consisting of one basic part, a standard tubular steel frame, is reported to offer major savings in scaffolding costs and erection time in the full range of scaffolding applications. Four of the standardized frames form



Want to S-T-R-E-T-C-H your maintenance dollar?

101 UTILITY SPRAY TANK



LITTLEFORD 101 UTILITY SPRAY TANKS SOLD BY:

EDWARD R. BACON COMPANY.....	San Francisco 10, California
SHRIVER MACHINERY COMPANY.....	Phoenix, Arizona
SMITH BOOTH USHER COMPANY.....	Los Angeles, California
YUKON EQUIPMENT COMPANY.....	Seattle, Washington
FEENAUGHTY MACHINERY COMPANY.....	Portland 3, Oregon,
Seattle 4, Washington, Spokane 2, Washington, Boise, Idaho	
HALL-PERRY MACHINERY COMPANY.....	Butte, Montana
LUND MACHINERY COMPANY.....	Salt Lake City, Utah



You'll need a 101 Utility Spray Tank to do it! Because here's a combination of 3 Units all done up in one package. The Model 101 is designed to give Highway Departments and Contractors a Utility unit that will do a variety of road maintenance jobs economically. The 101 Utility Spray Tank has a Spray Bar for small application work, Hand Spray Attachment for patch work and Pouring Pot Outlet for crack filling work. This 101

Utility unit will handle Asphalt, Tar Emulsion, Road Oil and Cut-Back. Has a fast heating system with Vaporizing Torch Type Burners. The 101 is made in both Truck Mounted and Trailer Mounted Models, sizes ranging from 400 to 1000 gallons. If you want your maintenance dollar to stretch here's the unit for the job. For further details write for Bulletin No. 5.

4-ft. square section 4 ft. high, and multiples of such sections form ladders, long runs of scaffolding, or any structure desired. An exclusive one-fit design permits one frame to be inserted into another without the use of fasteners. No tools are required for erection. In addition, the compact design permits stacking in a small space and simplifies transportation. Manufacturer is Brainard Steel Div., Shastana Steel Corp.

767

Heavy-duty trench hoe boom available for Gar Wood 75 Series excavators

Designed for rugged excavation, cross-country pipeline and other extreme operations, a new 8,500-lb. heavy-duty trench hoe boom is now available for Gar Wood 75 Series ex-



cavators. It is easily removed for conversion to shovel, crane, dragline, clamshell, pile-driver and the exclusive foundation borer attachments on the 75A, the heavy-duty 75B, and the TBT truck crane. Manufacturer is Gar Wood Industries, Inc.

768

Schield Bantam new crawler shovel-crane available

Model C-35, a new 3/4-yd., 5-ton crawler-mounted line of cranes, track hoes, draglines, shovels, clamshells, pile drivers and magnet cranes, has been announced by Schield Bantam Co. Selling for only \$9,350, it is reported to be the lowest priced machine of its kind. Many important en-



gineering features are incorporated in its design: two-speed independent travel, enabling the operator to work a front-end attachment while traveling and swinging the machine; heavy-duty main frame and deep, rigid side rails on undercarriage; 6 track rollers which provide even distribution of load weight over entire track assembly; a "twin-swinging" drive attachment, plus fast-acting mechanical controls and jaw clutches which enables the operator to enter turns with a split-second pause return to straight-line travel after turn without stopping. Equipped with 16-in. pads, it has an overall width of 94 in. It weighs 15,522 lb., including 1,400-lb.

counterweight, but without a front-end attachment. A power boom hoist is standard equipment. The wide range of front-end attachments which are available for this new Model C-35 are interchangeable for use on either the C-35 crawler or the T-35 truck-mounted machine. Equipped with a streamlined basic unit cab, it incorporates other standard Bantam features.

769

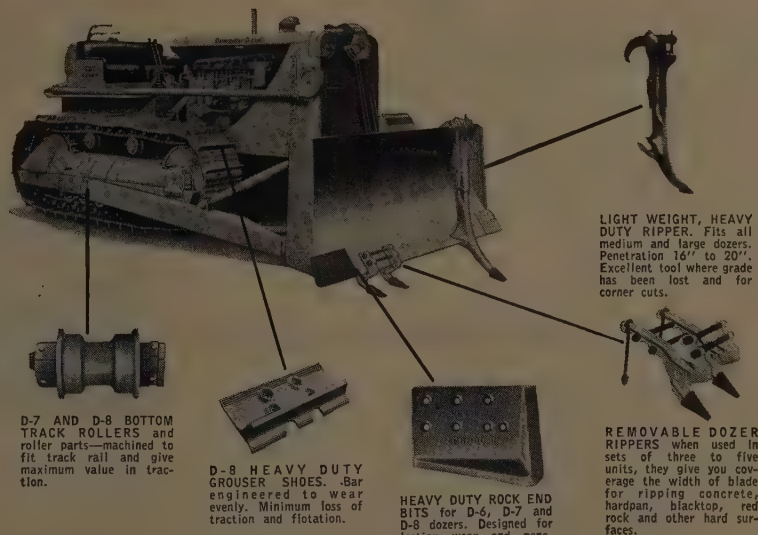
Wire braid air hose designed for heavy duty

Commander, a new heavy-duty air hose suitable for working pressures up to 400 lb. per sq. in., is designed

HENSLEY MAKES ROAD BUILDING EASIER...



When the going is TOUGH!



INCREASE YOUR TRACTOR'S WORKING POWER

... WITH THESE, AND OTHER ITEMS AVAILABLE AT YOUR HENSLEY DEALER:

Dozer brush rakes, scraper rippers, scarifier shanks and teeth, overlay end bits, hitch blocks, D-8 water pump shafts and impellers.



EQUIPMENT COMPANY

215-YAIA AVENUE • OAKLAND 3, CALIFORNIA

Write for the name of your nearest HENSLEY Dealer

for service where high working pressures are required or where the hose cover is subjected to severe abrasion. It is reinforced with a single braid of high tensile steel wire and is said to be more flexible than other types of heavy-duty air hose. Manufacturer is B. F. Goodrich Co.

970

New concrete block machine available

From 400 to 500 standard 8 x 8 x 16-in. blocks per hr. is the production rate of this new FMC-400 fully automatic concrete block machine. Employing 5 motors totaling 11 hp., the machine is hydraulic and uses no compressed air. One set of plain steel pallets produces all masonry units. The operator may adapt the machine to moisture content of the concrete as well as to the various types of aggregates. Made by Fleming Manufacturing Co.

971

Covered glass reticles permit safe cleaning of surveying instruments

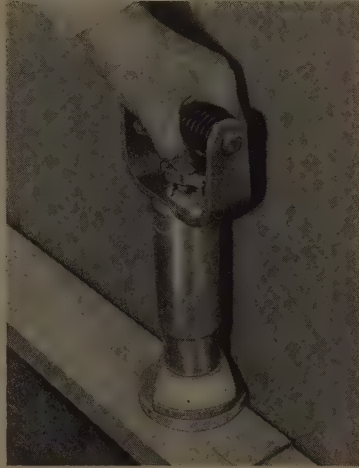
Now a feature of Gurley transit and levels, covered glass reticles permit cleaning of surveying instrument reticles without danger of destroying the fine lines. With the covered glass reticle in place, any dust which may drop on the surface of the glass will

not be in the focal plane of the cross-line, so that there can be no effect of a spotted reticle. The Gurley cover glass is cemented in place over the pattern. Manufacturer is W. & L. E. Gurley.

972

Protective shield featured on tool for setting studs in concrete or steel

A permanently-attached spall or protective shield is the special feature of the Velocity-Power Driver, a cartridge-actuated tool for setting studs

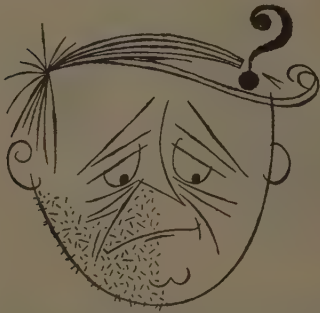


in concrete or steel. For close-to-the-wall jobs, a section of the spall shield may be lifted and turned out of the way. Time, labor, and money are saved with this new unit because the worker simply loads, positions, and fires it. Use of an integral cartridge eliminates the need for matching and fitting, and either 1/4-in. or 3/8-in. stud may be driven with the same unit because of its interchangeable barrels. A spring-loaded safety arm and center-fire cartridges avoid accidental discharge and assure correct load for the job. Manufacturer is Velocity Power Tool Co.

973

Cleveland Model 92 trencher now equipped with 4-speed transmission

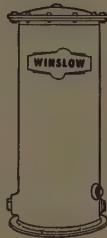
Easier shifting is now possible by use of the four-speed motor transmission which has been developed for the Cleveland Model 92 Baby Digger trencher. While providing for a more evenly graduated progression of usable speed combinations, the new unit doubles the number of digging wheel and traction speeds previously available in the Model 92. For each of the 4 speeds (4 forward and 1 reverse) there are 12 crawler speeds, the 48 combinations thus developed providing 30 or more smoothly-balanced, digging speed combinations ranging from .45 to 34.6 F.P.M. Contained in



**WOULD
YOU
CLEAN
ONLY**

PART OF YOUR FACE?

No, of course, you wouldn't! Then why clean only part of the oil in your engine? Why be satisfied with anything less than the best protection you can give your engine's moving parts? Keep *all* your oil clean, and all the moving parts of your engine protected, with warranted Winslow Full-Flow Filters!

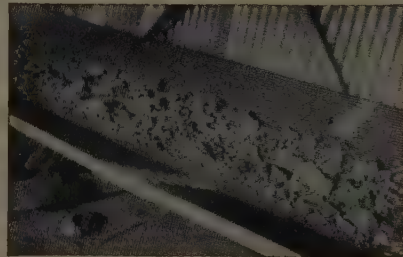


WINSLOW FILTERS

Winslow Engineering Company • 4069 Hollis St., Oakland 8, Calif.

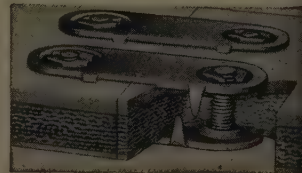
FLEXCO
®

**BELT
FASTENERS
and RIP PLATES**



**FOR HEAVY
CONVEYOR
AND
ELEVATOR
BELTS OF
ANY WIDTH**

- ★ FLEXCO Fasteners make tight butt joints of great strength and durability.
- ★ Trough naturally, operate smoothly through take-up pulleys.
- ★ Distribute pull or tension uniformly.
- ★ Made of Steel, Monel, Stainless, Everdur.
- ★ Also Promal top plates.
- ★ FLEXCO Rip Plates are for bridging soft spots and FLEXCO Fasteners for patching or joining clean straight rips.



Compression Grip distributes strain over whole plate area

Order From Your Supply House. Ask for Bulletin F-100

FLEXIBLE STEEL LACING CO.

4704 Lexington St., Chicago 44, Illinois

aldded steel, oil-tight housing, and
pped with anti-friction bearings,
unit is available from Cleveland
acher Co.

974

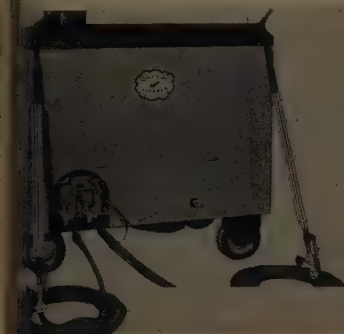
Mechanical hand-winch has 100-lb. low gear capacity

uitable for construction uses
re heavy pulling or lifting is re-
ed, the Stampco Handiwinch is a
mechanical hand-winch with low gear
capacities up to 10,000 lb. It is
table and its all-steel electric weld
struction combines strength with
t weight. The jam-proof brake
ign allows for safe, accurate load
tting. Manufacturer is St. An-
ny Machine Products Co.

975

ant steam cleaner erates two steam-guns

There is now available a new giant-
e steam-cleaner with increased
acity for heavy-duty cleaning.



arge enough to operate two steam-
ins, it will deliver 200 gal. of com-
ned, saturated steam and cleaning
tergent per hr. A force of 130 lb.
ressure drives forth this cleaning
ray. Full steam is generated from
old water in only 2 min. Safe and
mple to operate, two electrical
vitches are the only controls. Avail-
le either as a stationary or port-
le unit. Manufacturer is Quick
harge, Inc.

976

igid lightweight screed peeds production

A new extra-rigid, lightweight
screed with retractable wheels is said
to reduce finishing time and greatly
improve compaction. High frequency
vibration with up to 9,600 vibrations
per min. provides uniform compac-
tion over the entire length of the
longest screed beam. Increased height
of the screed beam results in the elim-
ination of the need for the former
heavy-welded, box-type section on
the flange of the beam, and moreover
it increases the rigidity to assure users
a more accurate strike-off than was
possible previously. The new wheels
allow the operator to roll back the
screed for as many passes as desired.
Manufacturer is Master Vibrator Co.



12 CARCO WINCHES speed up jobs for Houston Construction Company



IN PREPARING THE BED on a 40-mile stretch of a 158-mile, 30-inch pipeline from Texas to Tennessee, the Houston Construction Company used one of their 12 Carco GO winches to tow a 30-ton ditcher. This ditcher has a 12-foot cutting wheel that cuts about one mile of bed, 5½ ft. wide by 6 ft. deep, every 12 hours.

Carco GO winches were specified because this winch was designed and built for pipeline and oil field work. It's a two-speed winch . . . a slow speed with high line pull for the hard, steady pulls needed in towing heavy machinery, rescuing mired and ditched equipment and pulling long pipe sections . . . and another speed for lighter winching jobs such as loading, unloading, lifting pipe, and general construction and oil field uses.

The Carco GO winch has an extra large cable capacity for the "long reach." It mounts on tractors in the 76- to 100-horsepower range. A four-roller fairlead, which maintains maximum line pull regardless of the direction of the load, can be easily attached. See your nearest Carco dealer. PACIFIC CAR AND FOUNDRY COMPANY, Renton, Washington. Branches at Portland, Oregon and Franklin Park, Illinois.

**WINCHES FOR ALL
INDUSTRIAL TRACTORS**



TRUCE CONDITIONS in Korea will not lessen the demand for construction equipment, but distributors and contractors in the Pacific Coast area must intensify their plans to meet increased competition with more efficient use of their dollar supply, according to E. H. Thrower, vice president of C. I. T. Corp. in charge of the San Francisco Regional Office.

Population increases and the geographic shifting of population will boost the economy, Thrower said, particularly in the construction industry, since these factors will call for more housing, schools, roads, airports, public utilities, and the like. Overall demand for construction equipment will stay about where it is now and the supply of construction equipment will be relatively more plentiful for civilian use.

"This means a large, fast turnover market lies ahead, but good business won't mean better profits for contractors and equipment distributors unless they maintain a fast dollar turnover," Thrower added.

From the equipment distributors' standpoint, Thrower pointed out that five major features cause dollar "stag-

nation": fixed assets in plant and shop equipment, equipment and parts inventory, rental fleets, open accounts receivable, and self-financing of instalment receivables.

Self-financing of instalment receivables, Thrower said, is the "part of a business, more than any other, that can slow up dollars in their turnover. There is no valid reason why a distributor should provide his business with so many dollars that he can be banker to all his customers. A financial institution can much better provide the substantial and, from time to time, fluctuating, quantities of dollars needed to finance instalment receivables."

Thrower also suggested that some distributors are writing contracts for equipment purchases that are too short as to terms. He said this often happens because the distributor does not realize that independent financial institutions are equipped to extend the longer terms needed by many contractors.

"With higher priced equipment built to last longer, we are now prepared to consider terms of 36 months where the kind of equipment, the

credit worthiness of the contract and his requirements are such as make it sound business."

"It is equally important," Thrower said, "for the contractor to turn dollars over rapidly if he is to do sufficient business and make substantial profits. The contractor cannot do this successfully unless he keeps his financial condition liquid so he is able to carry payroll, materials, and other preparation and work costs for a period of time between acceptance of his bid and the payment of estimate."

"To keep working capital liquid at the same time to purchase sufficient cost-saving equipment to do the job efficiently means that the contractor should fund his equipment purchases for a period long enough to be suitable to his jobs on hand and his anticipated income. Contractors in consultation with distributors and financial institutions can secure equipment finance terms of from 6 to 36 months depending on their individual needs."

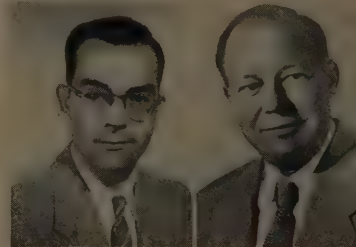
According to Thrower, contractors who are well supplied with equipment but who need additional working capital for job preparation can use their equipment fleets as a borrowing base for additional working capital needs and are well advised to do so if they have sufficient profitable work on hand or ready to bid.

Link-Belt Co. promotions

Harvey V. Eastling, formerly general sales manager, Pacific Division, Link-Belt Co., is now assistant general manager, Pacific Division. Donald E. Thal, formerly Eastling's assistant, has replaced him at his former post, with headquarters in San Francisco.

Jack Holland opens own construction supply house

Jack Holland, sales manager and director of Foulger Equipment Co. Salt Lake City, has resigned and will open a construction and industrial supply business in Salt Lake. Holland had been with Foulger six years and is well known in the Western construction industry.



Holland

Vincent

New sales mgr. for Foulger

C. G. Vincent is named sales manager for Foulger Equipment Co., Salt Lake City, Utah. The appointment made public by B. L. Foulger, president and general manager, is effective



**POWER
TO FIT THE POWER
MACHINE TO FIT THE
JOB**

**WISCONSIN-Powered
VIBRATOR**

WYCO

This Wyco Concrete Vibrator, made by Wyzenbeek & Staff, Inc., Chicago, Ill., is powered by a 4-cycle single cylinder Wisconsin Air-Cooled Engine... delivering 7000 to 8000 vibrations per minute, operating through a jackshaft at a 2-to-1 ratio.

Working in stiff concrete mixtures to settle and fill foundation forms without voids or rough, porous spots in the wall calls for dependable, hard-hitting power... such as supplied by this Wisconsin Engine. Timken tapered roller bearings at BOTH ends of the crankshaft carry the load and an outside-mounted high tension magnet with impulse coupling provides quick, easy starts in any weather.

For dependable, heavy-duty service and lowest maintenance costs... specify Wisconsin Air-Cooled Engines (3 to 36 hp.) for Your equipment.



WISCONSIN MOTOR CORPORATION

World's Largest Builders of Heavy-Duty Air-Cooled Engines

MILWAUKEE 36, WISCONSIN

must 1. Vincent, a salesman for the for the past four years, will di- the entire sales organization. He formerly assigned to the terri- of southern Utah and eastern ada. Vincent replaces Jack Hol- l, recently resigned.

nt. distributor for
A Lubricant Co., Inc.

George Ripley, formerly with Nash- vis Machinery Co., Billings, Mont., v represents D-A Lubricant Co.,



George Ripley
of
D-A Lubricant

ce., manufacturer of lubrication for avy-duty machinery and oil for avy-duty engines and transmis- ns, in Montana.

ll Bush joins So. Calif. Equip.

Bill Bush has recently become a member of the sales staff of Southern California Equipment Co., according Lon Millar, sales manager. Bush as formerly with Minneapolis-Mo- ne Co. and served as industrial super- sor for this company in the Western ates. He is well known in construc- on circles and has the good wishes his many friends.

ew field rep for Peterson

Ed Cryer is the newly-appointed special field representative on parts and service for Peterson Tractor & Equipment Co., according to Howard Peterson, head of the San Leandro, Calif., firm which distributes Cater- illar and John Deere products in the ve counties of the Bay Area. Cryer's experience includes several years in the parts and service departments of Caterpillar Tractor Co., and two with their Western distributors.



Cryer



Sandham

Regional manager for Cummins

Wilmot Sandham, formerly an auto- motive and service engineer for General Petroleum Corp., is now Cum- mins Engine Co.'s Southwestern re- gional manager, with headquarters at Los Angeles, replacing A. S. Leonard

who recently resigned the regional post to take over the Southwest deal- ership in New Mexico. Sandham will represent Cummins in California, Ne- vada, Arizona, and New Mexico.

Hensley names new dealerships

Hensley Equipment Co., Oakland, Calif., manufacturer of dozer rippers and brush rakes, end bits, D-7 and D-8 track rollers, scraper rippers, scarifier shanks and teeth and allied tractor at- tachments, announces the following exclusive dealerships in their particu- lar areas: Loggers & Mill Supply, Ar- cata, Calif.; Lowry Euiptment Co., Redding, Calif.; S & M Supply Co., Grand Junction, Colo.; Gossman

Scraper Works, Monte Vista, Colo.; Joe Smith Machinery Co., Denver, Colo.; Elko Blacksmith Shop, Elko, Nev.; Fowler Engineering Sales, Ashland, Ore., and Western Equip- ment Co., Eugene and Portland, Ore.

Casey-Metcalf new
All Purpose rep.

Casey-Metcalf Machinery Co., Inc., of Los Angeles has been appointed Southern California distributor for the All Purpose Spreader Co., Elyria, Ohio, manufacturer of wideners, rollers and bituminous pavers. This is an important addition to the well known accounts handled by Casey-Metcalf, such as Insley Mfg. Co., Lull Mfg.



Get all the
"on-the-job"
PROOF!

LOW-COST
MORE DURABLE
CONCRETE

MORE UNIFORM
MORE WORKABLE

— at mixer
— at point of
placement

The only catalyzed
air entraining
agent specifically
formulated for
your concrete job!

Proof plenty. Look at big concrete jobs with multiple, intricate forms, heavily reinforced. Contractors used low slump concrete and needed work- ability. Answer—DAREX AEA because of low cost and outstanding uniform- ity, not only at mixer but at point of placement.

CHARLES R. WATTS & CO.
4121 - 6th Avenue N.W., Seattle 7, Wash.

Darex AEA Distributors for Dewey & Almy Chemical Co. in 11 Western States, Alaska and Hawaiian Islands.



Darex is another Dewey & Almy
product doing a better job for less

ASK YOUR NEAREST DEALER
ABOUT DAREX:

Pacific Coast Aggregates, San Fran- cisco; Blue Diamond Corporation, Los Angeles; C. E. Mitcham, Salt Lake City; Baker-Thomas Lime & Cement Co., Phoenix; Ray Corson Machinery Co., Denver; Mason's Supply Co., Portland; Miller-Richardson, Helena; Hawaii Builders Supply Co., Honolulu.

CHARLES R.
Watts & Co.

4121 Sixth Ave. N.W. • HEMlock 8400
SEATTLE, WASHINGTON

Co., Meili-Blumberg Corp., Minneapolis-Moline Co., etc.

E. S. Jenison dies

E. S. Jenison, well known president of Jenison Machinery Co., San Francisco, was drowned August 1 in a boating accident off the coast of San Francisco. Jenison's first business experience began after his graduation from the University of Michigan in 1909 when he went to Puerto Rico for the Otto Engine Co. About 1913 he joined the Goulds organization at their Montreal office, later going to Philadelphia and Seneca Falls, N. Y., for the firm. In 1925 he came to California as vice president in charge of Smith Booth Usher Co.'s San Francisco office. In May 1928 he organized the Jenison Machinery Co. which succeeded Smith Booth Usher Co. there. Jenison was past president of CED, past president of San Francisco Machinery Dealers and a director of AED.

Business at Jenison Machinery Co. is being continued as before. H. L. Davis, vice president and secretary, is in charge of construction sales, and T. F. Pimper, vice president, is in charge of machine tools and wood-working.

Lima appoints Heiner in Salt Lake

Heiner Equipment & Supply Co. is named distributor for "Lima" shovels, cranes, draglines and pull shovels, handling the account for the entire state of Utah. Heiner's sales and service facilities are located at 501 West Seventh South, in Salt Lake City.

So. Calif. Equip. Co. receives Hiab dealership

Lon Millar, sales manager of Southern California Equipment Co., Los Angeles, announces the company has taken on the distribution of Hiab truck cranes for its territory.

Bailey named new Telsmith rep.

Announcement of the appointment of Robert S. Bailey as representative for Southern California is made by The Smith Engineering Works, Milwaukee, Wis., manufacturer of "Telsmith" crushers and other equipment

for gravel pits, quarries, mines and contractors. All the counties south of and including San Luis Obispo, Kern and Inyo will be under the jurisdiction of this new office located at 816 West Fifth St., Los Angeles 17. Bailey is an engineer with a background of many years of experience in machinery sales throughout the United States and is qualified to be of real service to aggregate producers in Southern California.

LeTourneau-Westinghouse reorganizes sales territories

Reorganization of sales territories into Eastern and Western has now been effected. J. A. Vincent continues as Eastern division sales manager, and F. W. Duke, former district sales representative for the company, has been appointed Western division sales



F. W. Duke
Western
Division
sales
manager

manager. Under the reorganized setup, there has been some re-assignment of district sales representatives and distributors they serve. Western district representatives and their distributors are: L. E. Jorgenson—Bay Cities Equipment, Inc., Oakland, Calif.; Crook Company, Los Angeles and Bakersfield, Calif.; and Sierra Machinery Co., Inc., Reno, Nev. A. W. Travis—Loggers & Contractors Machinery Co., Portland and Eugene, Ore.; Modern Machinery Co., Inc., Spokane and Seattle, Wash.; Vancouver Equipment Corp., Ltd., Vancouver, B. C., Canada and State of Idaho. H. W. Murphy—Arizona Equipment Sales, Inc., Phoenix, Ariz.; Contractors' Equipment & Supply Co., Albuquerque, New Mex.; Contractors' Equipment & Supply Co., El Paso, Tex.; Rocky Mountain Machinery Co., Salt Lake City, Utah,

and Pocatello, Idaho; states of Colorado and Wyoming. A. M. Krider—Contractors' Supplies Limited, Regina, Sask., Canada; Costello Equipment Co., Ltd., Calgary and Edmonton in Alberta, Canada; Myhra Equipment Co., Inc., Fargo, N. Dak.; Prairie Equipment & Radiators Limited, Winnipeg, Manitoba, Canada, and Western Construction Equipment Co., Billings and Missoula, Mont.

Detroit Diesel reps in the West

Several changes in the assignments of its field sales and service personnel have been announced by Detroit Diesel Engine Division, General Motors Corp. A. W. Anderson, formerly factory sales representative in the New Orleans area, is now in Los Angeles in the same capacity, succeeding Charles Howell, who was transferred to the Tulsa sales office.

Iowa Mfg. has new district rep.

The appointment of Kenneth V. Turner as a district representative for the "Cedarapids" line of aggregate producing and bituminous mixing equipment is announced by the Iowa Manufacturing Co., Cedar Rapids, Ia. With headquarters in Dallas, Turner's territory includes the state of New Mexico, as well as Texas, Oklahoma, Arkansas and Louisiana. He is well known throughout the construction machinery manufacturing industry and before joining the Iowa organization was domestic sales manager for the former LaPlant-Choate Co.

Wright elevates Woodland

Wright Power Saw & Tool Corp., Stratford, Conn., manufacturer of the Wright air saw, announces the promotion of I. F. Woodland from Western district manager to sales manager. In his new position, Woodland will guide the expanding sales organization and the distribution of new products for construction industry.

Faulkner joins Power Equip.

According to an announcement by Jack Munroe, president of Power Equipment Co., Denver, Colo., William J. Faulkner recently joined the company and has a major interest in the firm. He was formerly industrial sales manager of the tractor division of Allis-Chalmers and more recently vice president and general manager of an A-C distributorship.

New line for Four Wheel Drive

Four Wheel Drive Pacific Co., San Francisco distributor, announces addition in August of a new line, Pettibone-Mulliken Corp., and its subsidiary lines, The Universal Engineering Corp. and Rome grader. Territory for Four Wheel Drive Pacific, with regard to the new line, includes coastal areas of northern California, and the entire state below San Luis Obispo, Kern and Inyo counties.

NEW HEADQUARTERS of Star Machinery Co. at 241 Lander St., Seattle. The \$800,000 building houses a modern display floor, offices, service shop, a large parts department and heated warehouse. Floor space totals 74,800 sq. ft. This expansion is the result of the growth and industrial development in the Northwest. The firm, headed by Victor E. Rabel, operates branches both at Portland and Spokane.



NEWS OF MANUFACTURERS

lf named Pioneer
p. and sales mgr.

Carl R. Rolf is appointed vice president in charge of sales of Pioneer Engineering Works, Minneapolis, Minn., according to an announcement by O. Ellertson, president.

Rolf entered the employ of Russell Lader Co. as factory sales and service representative in 1922, covering the Northwest area. In 1929, after sale of the Russell company to Caterpillar, he became Caterpillar dealer in Minot, N. Dak. He became associated with Pioneer shortly after Pioneer bought the gravel crushing business from Caterpillar, and became district sales representative for the Western states. From 1940 until the present Rolf has held positions with Pioneer as assistant sales manager, assistant secretary and sales manager and as vice president and sales manager.



Rolf



Hill

Lyster appoints new sales chief

Election of Philip S. Hill to vice president in charge of all sales by the Lyster Company is announced by Ernest G. Swigert, president. With the company for more than twenty years, he was at one time eastern division sales manager and has been general sales manager for the past several years at Portland, Ore., the company's headquarters and where one of its several factories is located. Appointment of Jack Lewis, former chief production engineer, to the position of vice president in charge of all production was announced simultaneously.

Ramset gets sales mgr.

Clarke Tryon has been appointed sales manager of Ramset Fasteners, Inc.

Ralph Dunn of Caterpillar dies

Ralph G. Dunn, assistant general service manager of Caterpillar Tractor Co. at Peoria, Ill., since 1934, died July 3 at the age of 64. Dunn began his business career in San Francisco when he became a draftsman with Willis Polk, architect, later becoming associated with Stabler & Dunn, a contracting firm at Redding, Calif. He joined the Holt Manufacturing Co.,

one of Caterpillar's predecessors, at Stockton in 1915. He moved to Peoria, Ill., in 1929 as service manager at Caterpillar's plant and in 1934 became assistant general service manager.

New Air Placement affiliate

Airplaco Manufacturing Company, Inc., Kansas City, Mo., has been formed to manufacture pneumatic and construction machinery for air placement of concrete as an affiliate firm of Air Placement Equipment Co. The new firm's officers are Ralph Cronmeyer, president; Milton G. Parke, vice president, and Hal Kalousek, secretary-treasurer.

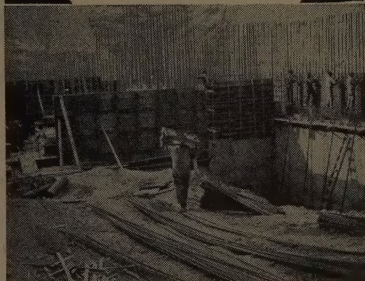
New Universal prexy

J. A. Kirkpatrick, vice president and general manager of Universal Manufacturing Corp., has been elected president. Bernard W. Carbeau was named vice president and Robert L. Carbeau, treasurer, became assistant to the president.

New AISI officers

New officers were elected at the annual meeting of the American Iron and Steel Institute by the board of directors. They include: Max D. Howell, executive vice president; B. F. Fairless and Ben Moreel, vice presidents; George S. Rose, secretary, E. O. Sommer, Jr., treasurer, and C. M. Parker, assistant vice president.

Reduce costs and
INCREASE PROFITS
by renting these metal
forms for concrete



Economy Metal Forms save time, labor and material. They quickly lock together with a simple twist of a clamp. Standard units fit most jobs. Where needed, special forms can be fabricated to specification.

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Cincinnati, Ohio • Pittsburgh, Pa. • Metuchen, N. J.
Springfield, Mass. • Decatur, Ga. • Dallas, Texas
Los Angeles, Calif. • Oakland, Calif. • Denver, Colo.

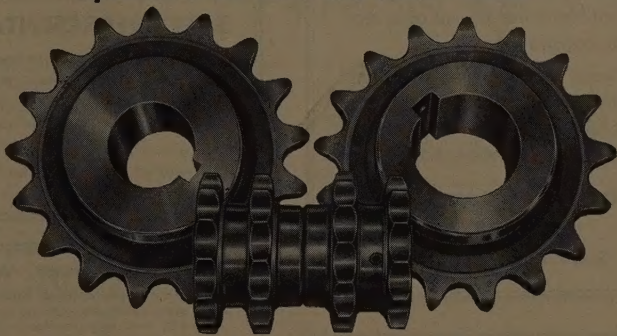
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Sprockets for Mill and Roller Chain



YUBA-Schrock sprockets are flame cut from steel plate. Patented cam-generated action produces sprocket teeth guaranteed to fit standard mill or roller chain with wearing qualities equal to sprockets made by other manufacturing methods. "Special" sprockets with "non-standard" number of teeth readily cut to order without penalty charges. Most emergency orders filled in 24 hours.

Phone, write or wire, nearest office
NOW for quotations and deliveries.



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EXbrook 2-0274

Benicia, Calif. Phone 628

Stockton Iron Works • Stockton 7-7091

Space is sold as advertisers' inches. All advertisements in this section are 1/4 in. short of contracted space to allow for borders and composition.

CLASSIFIED SECTION

Rates are \$8.50 a column inch. Copy should be sent in by the 20th of preceding month if proofs are required, by the 23rd if no proofs are required.

POSITION OPEN

WANTED: TRANSMISSION LINE ENGINEER

Must be able to pilot Beechcraft Bonanza airplane, and also must be capable of typewriting.

Will travel in five states: North Dakota, South Dakota, Wisconsin, Michigan, and Minnesota.

References required. Contact

RICHARD ORLANDO

ORLANDO CONSTRUCTION COMPANY

Coleman, Wisconsin

Phone 862

HELP WANTED

SENIOR FIELD ENGINEERS ELECTRICAL CIVIL MECHANICAL

Graduate engineers with responsible field experience on steam power plants or related heavy industrial projects. Require experience in directing the mechanical, electrical or civil-structural phase of a major construction project.

Please write giving complete qualifications, references, and salary requirements. Your reply will be confidential.

Bechtel Corporation

220 Bush Street
San Francisco, California

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Mechanical Engineer preferred, with broad background in mechanical installation and operation. Must have responsible experience as Inspector of mechanical installations on large industrial projects. Central station steam power plant experience desirable.

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HELP WANTED

ENGINEERS

Structural, mechanical, and electrical for work on hydro-electric power developments. Write giving full experience record and qualifications.

HARZA ENGINEERING COMPANY

400 West Madison Street
Chicago, Illinois

SALES REPRESENTATIVE

To sell a line of temporary heating units to construction equipment distributors. Units are used throughout construction and industry in all parts of the country. Write giving territory covered and other lines handled. Box 90, Western Construction, 609 Mission St., San Francisco 5, Calif.

Construction Supt. Wanted

Construction Superintendent experienced in heavy construction and concrete construction. Apply by letter only. Replies confidential.

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Learn latest methods to organize and run work. Prepare for the top jobs. Send post card for details.

GEO. E. DEATHERAGE & SON

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Read and Use Western Construction
Classified Ads for Better Results

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Top man, organizer, experienced dams, R. R., levees, canals, highways; individual and joint venture projects. Best references. Experienced pilot. Will travel. Available now. Write or wire Box 91, Western Construction, 609 Mission St., San Francisco 5, California.

TEMPORARY BRIDGES FALSEWORK TRUSSES

Bailey Bridge Equipment Co.
206 Bank of America Bldg.
San Luis Obispo, Calif.

LOW COST INSTALLATION AND OPERATION

FOR DAMS
BRIDGES
BREAKWATERS
FILTRATION AND
SEWERAGE PLANTS

CABLEWAYS
IMMEDIATE SHIPMENT
ELECTRIC, STEAM OR DIESEL
CAPACITY 5 TO 20 TONS
SELL, RENT OR BUY
AMBURSEN DAM CO. INC.
295 MADISON AVE. NEW YORK

FOR
SPEED
ECONOMY
EFFICIENT
FLOOD SAFETY
LABOR REDUCTION

FOR SALE GOOD USED EQUIPMENT

CONCRETE MIXER

Smith, 2 cu. yd. capacity, tilting type with 30 HP motor.

STEEL HOPPER

Smith, 2 cu. yd. capacity.

WEIGHT BATCHER

Blaw Knox, 2 cu. yd. capacity with 3-beam balance scales.

CEMENT BATCHER

Noble, with weighing bin, balance scales, controls and 10 HP electric motor.

COMPRESSOR

110 cu. ft. with 25 HP electric motor and air receiver.

BIN

3 compartment, 13'x26 1/2'x10 1/2'

BUCKET LINE

76', with 15 HP electric gear motor.

VIBRATING SCREENS

2 2-deck 1 3-deck 1 4-deck

DULIEN STEEL PRODUCTS, Inc.
of Washington
9265 E. MARGINAL WAY - LANDER 6000 - SEATTLE 8, WASH.

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Johnston Stainless Welding Rods

Practical, Down-to-Earth Welding Rods
Alloys as they are supposed to be

Corrosion Resistant—
Clean metal

Strong—
Low in cracking

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1845 E. 57th St., Los Angeles 58

BACKFILL, uncompacted

Memo to newspapers

[NOTE: This text is being sent to every major newspaper in the West.—Editor.]

We think the general public deserves to be informed as adequately as possible about engineering and construction projects. Don't believe it? See the discussion of public relations on pp. 68-71 of this issue!

We believe the daily newspaper is the most effective medium for transmitting such information. We also know that your stories are written and re-written in unbelievably short time. Finally, we realize that your headlines are done fast, and cannot reflect exactly all meanings of the story.

But we urge this note of caution. Please understand that the "One" and the "Two" of an engineer's report (or even his conversation) may gain their validity only when qualified by "Three." It works the other way, too. The engineer's conclusion, "Three," depends entirely on "One" and "Two." **You gotta get 'em all in!**

For instance: A news story recently to be reported by you concerned the WASHO test road in Idaho. Fact One is that the road was built to test various thicknesses and combinations of asphaltic paving under controlled traffic comparable to actual road conditions. Fact Two is that trucks rolled over the test road last fall, and have run again since April of this year. Fact Three is that some 6-in. pavement sections—thinest of them all—have started to break up, as expected and openly predicted by designers of the road.

As news men you interviewed (through a wire service representative) an engineer who was in a position to give you the facts about this break-up. But you failed when you turned to reporting these facts to laymen. Proof? We have read reports appearing in three Western newspapers that fail to say the break-up was expected! In addition, the headlines for the items are as false as they are sensationalized: "New Test Road Parts Crumble," says one; "Western Test Road Fails," says another.

A statement undoubtedly made by the engineer spokesman at the end of the interview was the one that you should have put first in your stories—the fact that this was an anticipated failure. Our hat is off to Bill Snyder, *Wyoming State Tribune* staff writer, the only one we've come across who reported accurately. His headline: "Predicted Failures Mark Highway Test." And his story fits the headline—probably made possible the accuracy of the headline.

One more word of caution. Engi-

neers use many words to communicate precise and limited meanings to other engineers. Among laymen, these same words may have broader meanings, and even broader connotations. When the test road spokesman said that portions of the road had "failed," he meant that a "structural breakdown had occurred as the direct result of stresses (applied loads or forces) imposed repeatedly to cause strain (deformation) beyond the designed limits." We are sure that those are his approximate words explaining the "failure" to your news reporters. We are sorry that you failed to transmit this information accurately to your readers.

We're in the air age

We've heard of (but never seen) bids being delivered to openings by pigeons, police escorts and pin-up girls, but dropping them by "bomb" from an airplane is a new one.

Seems that George Miller, Reno contractor, was fairly anxious to pick up the contract for 3 mi. of asphaltic paving in Sierra County, Calif. Being a busy man, he figured he'd fly his plane to Downieville and arrive at the courthouse there with time to spare. Too late, he learned that there isn't an airport within 35 mi. of his destination. A frantic phone call to the county supervisors signaled his next action. Minutes before the deadline he swooped his plane low over the courthouse and it was "bids away!" He missed his target by a few feet, but a county supervisor was able to grab the sealed packet from a street just north of the courthouse and deliver it to the supervisors' room 60 seconds ahead of deadline.

In best short story tradition, we'd like to have a happy ending for this piece, but we'll have to stick to facts. Harms Brothers of Sacramento was awarded the contract with a bid of \$20,300. George Miller was second low, and the only other bidder for the job.

How many Manitowocs per truck?

Not long ago we had an article on this business of balancing equipment—how many trucks should there be in a given situation to keep one shovel busy. Well, things got fouled up around here and the headline came out, "How many shovels per truck?"

We thought of that when we heard from Arthur Irwin the other day. He's an operator working for Heckett Engineering, Inc., at Provo, Utah, where his firm is doing scrap iron recovery at the Geneva Steel Plant.

Twenty-five years ago in Western Construction

"On Saturday afternoon, August 11, before an attentive audience of 70,000 in the colorful setting of the Stanford University stadium, . . . Herbert Hoover, engineer, delivered his speech of acceptance of the Republican nomination for President of the United States."

* * *

"M. M. O'Shaughnessy, city engineer [San Francisco], has recommended the construction of a traffic tunnel on Broadway from Mason to Larkin streets, at an estimated cost of \$1,520,000."

* * *

"R. B. Randall, for nearly twenty years engaged in the clamshell and dragline-bucket industry, has been appointed manager of the Pacific Coast division for the crane and shovel department of Link-Belt Co."

* * *

"The Brown-Bevis Co., Inc., Los Angeles, announce the removal of their offices and warehouse from their old location at 470 East Third Street to their new building located at 49th and Santa Fe Avenue."

* * *

"The Caterpillar Tractor Co. announces the 'Caterpillar' Ten Tractor for production and sale about the first of 1929. Prices and specifications . . . will be announced later. . . . It is known at this time, however, that the new model offers 10 hp. at the drawbar and 14 hp. on the belt."

Irwin listed the major equipment units on the job. He started out with one Manitowoc 4500 combination crane-dragline-magnet rig. Then he named four other Manitowoc magnet cranes, and a dragline.

They must be playing musical chairs with those rigs. The only other equipment included a pair of D8's and a 14-yd. rear-dump Euc. It sure must travel!

Interesting operation, though. A 3½-yd. dragline feeds a portable separator with slag and scrap. Feed first goes over a shaker, then a revolving magnet, and finally a revolving screen. They have a perforated tumbling barrel (square type) for dislodging and separating slag and waste from iron up to 4 tons. They feed it with an 8-coil heavy duty Ohio magnet.

By THE EDITORS