

WESTERN CONSTRUCTION NEWS

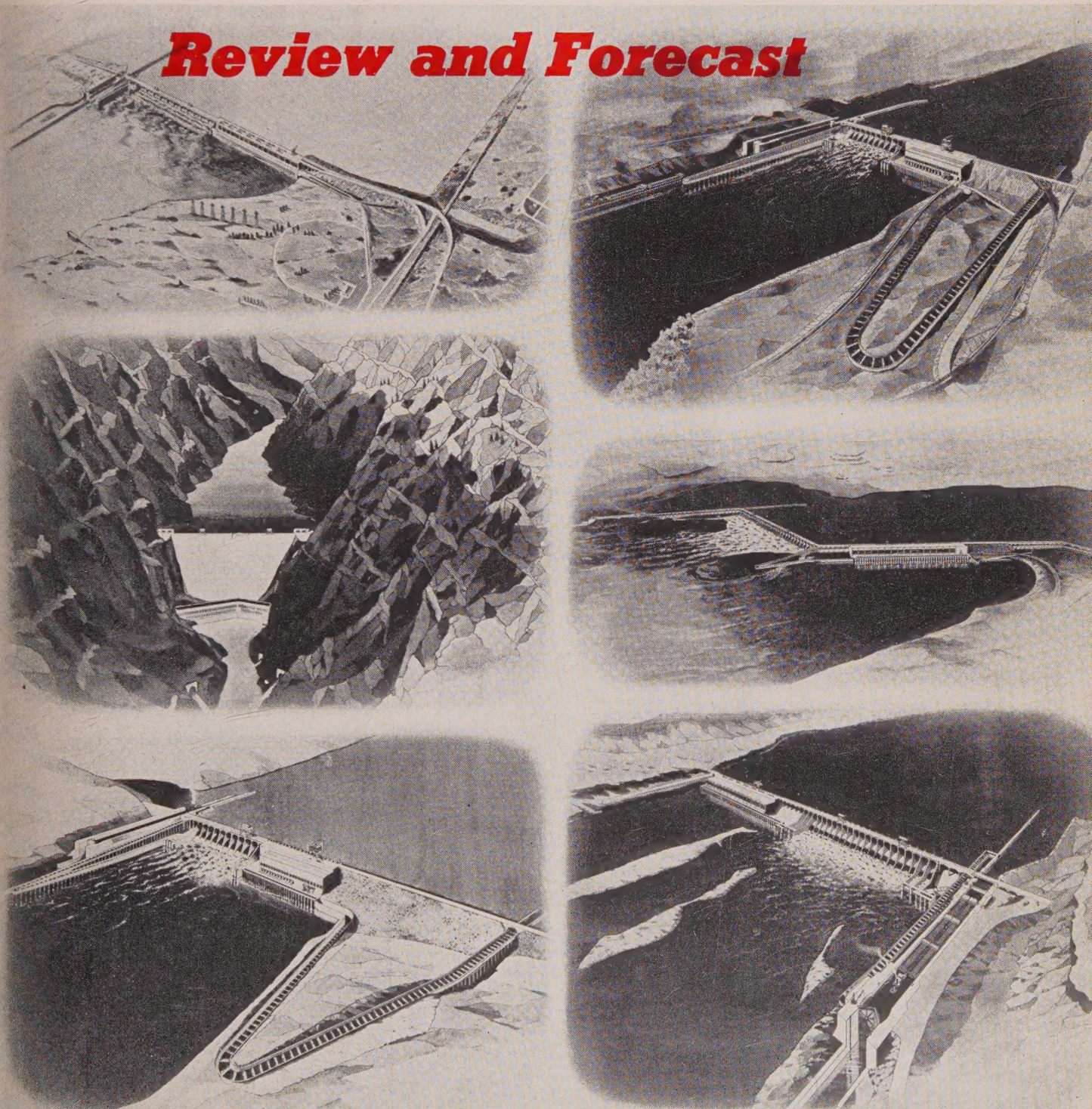
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Review and Forecast



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The Editor's Mail . . .

Reclamationists React

Dear Mr. Server:

I find the pages of your issue for December relating the recent convention of the National Reclamation Association extremely interesting.

The editorial, "MANDATE—1948," I find especially important in its deflation of the Straus ego. The fact that Democrat found the things to say that you quote from the Smith paper should impress every reader.

I shall not attempt to evaluate your news story. Perhaps you are right in saying that the program was indecisive and the delegates confused. My own feeling on everything was swallowed in resentment over Commissioner Straus's slick and untruthful charges that the Association and its policies are dominated by private power interests. The charge came too late in the meeting to give opportunity for a reply on the spot but you are right, I am sure, when you say that the Krug message shocked the convention into unity.

I resented the Krug message, as well, for in it, as regular in the past, his reference to the 160-acre limitation issue was designed to make it appear that the Association was wrong when, as a matter of fact, its approach to the matter in my presidency was on Straus's invitation and request and after he suggested that certain changes in the law might be made.

Sincerely yours,

ROBERT W. SAWYER
former president

National Reclamation Association

Bend, Oregon

Dear Sir:

I have read with interest your December issue, especially the report of the National Reclamation Association convention.

The whole Straus matter, I do not think, helped any but surprisingly, very few comments were made about it. The only thing that I disagree with you about is the fact that you call our twenty-six resolutions "innocuous, harmless resolutions." It seems to me that our resolutions represented a pretty detailed course of work for the coming year.

The Resolutions Committee refrained from stooping low enough to call people bad names and definitely indicated the desire of the Association to work for a sound program of Western development.

Sincerely yours,

DON McBRIDE

Secretary-Manager

Washington, D. C.

National Reclamation Association

"Condensed" Praise

Dear Sir:

Many thanks for sending me the article which you published in *Western Construction News* on the bay crossing. I think it was well done and most complete. I only wish it could have condensed my report as well!

Sincerely yours,

RALPH A. TUDOR

Chief Engineer,

Division of San Francisco
Bay Toll Crossings.

San Francisco

That Fresh Western Coverage

Dear Sir:

Believe it or not, there are so many *Western Construction News* here in the Forest Service office that I no longer need to subscribe as I've been doing for almost a generation. They quit coming over my desk between western trips, so I have to do something about it for that fresh western coverage is something I couldn't be without.

Cordially,

CLIFFORD A. BETTS
U. S. Forest Service

Washington, D. C.

January 15, 1949

J. M. SERVER, JR. Editor
J. J. TIMMER Managing Editor
R. C. CLARK Assistant Editor

Good Report, Half Done

LAST MONTH *Western Construction News* was happy to present a full review of the findings and report of the Division of Bay Toll Crossings of the California Department of Public Works, which after much and careful study found that a second parallel and virtually duplicate bridge should be constructed across San Francisco Bay to relieve the crowded traffic conditions on the present monumental structure.

The study was very detailed, well-organized, and well-presented by Ralph Tudor, chief engineer of the Division. Several years' time (one full year by this Division) and two million dollars were spent. Mr. Tudor informs us that he was specifically instructed not to consider the Reber Plan for over-all development of the Bay area, or any other suggestions for crossings, but to confine his investigations very narrowly to the parallel crossing proposed by the Department of Public Works and the so-called southern crossing suggested by a 1946 Army-Navy Board. In other words, it is actually but half a report. *Western Construction News* is proud to say, "I told you so," for it predicted in December, 1947, that the report would favor the parallel bridge.

The report is a thorough-going document, but it carries a few weak spots. It is not to be overlooked, of course, that an added bond load of \$155,000,000 on the existing and new bridges, is not going to be easy to market. That trebles the financial burden of the two structures, and the only source of revenue is from tolls (the bridges are subsidized by the state to the extent of all operating and maintenance charges.) It will almost inevitably be necessary to raise tolls, and traffic may be reduced as a result. Financing through interest-bearing revenue bonds is all carefully calculated in the report, but actually finding purchasers for the bonds may be another matter.

Next there is the matter of steel, which is one of the nation's short items, and in view of defense, rehabilitation, and construction demands, seems destined to remain so for some time. No estimate of tonnage was found in the report, but the original structure required about 200,000 tons and the new one would probably take more rather than less. The impact of this demand on an already over-burdened industry is not considered in the report.

Defense, however, appears to be the weakest element of the report. First, it states that the bridges would not be logical primary targets for enemy action; we feel sure that the disruption of civilian and military traffic in this vital military and shipping zone would be the first objective of an attack—in Germany and France they definitely were primary targets. Second, the atomic bomb is dismissed in a few words. Third, it is claimed that the great super-block-buster, 11-ton bombs, are effective against bridge members not further than 65 ft. from the center of explosion; we don't know, of course, but if true, one may strongly criticize the Army publicity people for telling of the destruction of whole blocks at a time upon the burst of one of these weapons. Fourth, it is stated that the bridges would be difficult targets from the air; again, if true, the public has been sold a bill of goods by Army and Navy publicists, who have talked so much about bomb sights and "pin-point bombing." Finally, the report states that it would be easy to guard against sabotage; it seems to us that adequate protection could be had only by careful examination of every car, truck, and person who crossed the bridge, an obviously impossible task.

We were amused by a recent statement by Charles E. DeLeuw, noted Chicago planning engineer, who has just completed a thorough traffic and transit survey of San Francisco, but who probably doesn't know San Franciscans very well. Said DeLeuw, "The state has designed the bridge on the basis of present needs and has missed the point of future growth."

Mr. DeLeuw, competent engineer that he is (1) doesn't realize that his fine report, having been presented to the city fathers, will rest in the municipal pigeon holes with 20 or 30 other similar studies which have proposed improvements to the muddled San Francisco problems, and (2) doesn't know how right he is about the State missing the point. The Reber Plan, which will not only solve the transportation problem better than either or any bridge, but will break through even greater bottlenecks to future Bay area growth—fresh water, industrial expansion, and military security—was not even considered. The State missed the point so far, Mr. DeLeuw, that it actually ordered Mr. Tudor to deliberately avoid any consideration of the Reber proposal.

We said that this magazine had predicted a year ago what the report would recommend. We'll go further out on the limb and predict that the parallel span will actually be built, steel shortages, costs, military safety, Mr. DeLeuw's point, and common sense all to the contrary notwithstanding. And we'll go even further out on the same limb to assert that it is absolutely inevitable that the Reber Plan will one day be built, possibly not within the lifetime of this editor, unless another war brings its indispensability again before military authorities, but as surely as the tide forever follows the moon, it will one day be constructed to unlock to California and the world the great potentialities of the area which are now restricted through lack of planning, jealousy, shortsightedness, and lethargy.

Election of Surveyors

THE STUPIDITY of selecting a county or city engineer by popular vote was never more beautifully illustrated than in the case of Frank W. Sullivan, elected in the recent general election as County Surveyor of Nez Perce County, Idaho. He is an insurance man by profession and has not the slightest idea of the science of surveying or the administrative functions of his office, as he freely admits.

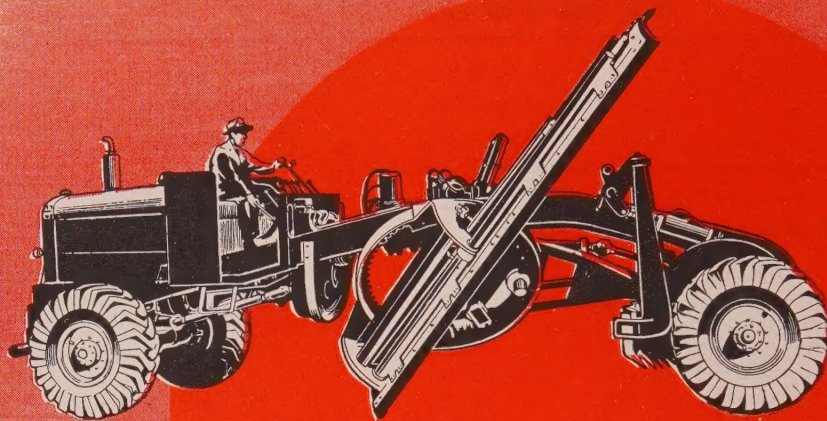
Even in those states where some sort of pre-qualification is required, the idea of subjecting a technical professional man to the expense and indignity of a race for votes is repulsive. In the majority of cases, fine and thoroughly capable men have been elected, but there is always the possibility that men with very little qualification may win the contest. Many of the highest type engineers will not offer themselves under such circumstances.

We feel that selection through fairly-conducted competitive civil service practices is the only satisfactory method of filling these important offices.

More About Mandates

PROBABLY if you called Messrs. Krug and Straus of the U. S. Department of Interior friends of Argentina's President Juan D. Peron, you'd have a fight on your hands. The misunderstanding could come about, of course, because the views of the extreme "left" and the extreme "right" are so similar. But we note one great similarity. Sr. Peron won an election and declared it to be a "mandate to rewrite the national bill of rights" and to give him the right to succeed himself. The party of our Interior boys also won an election and we can't forget how they were tossing the same words, "mandate" around the Reclamation Association convention.

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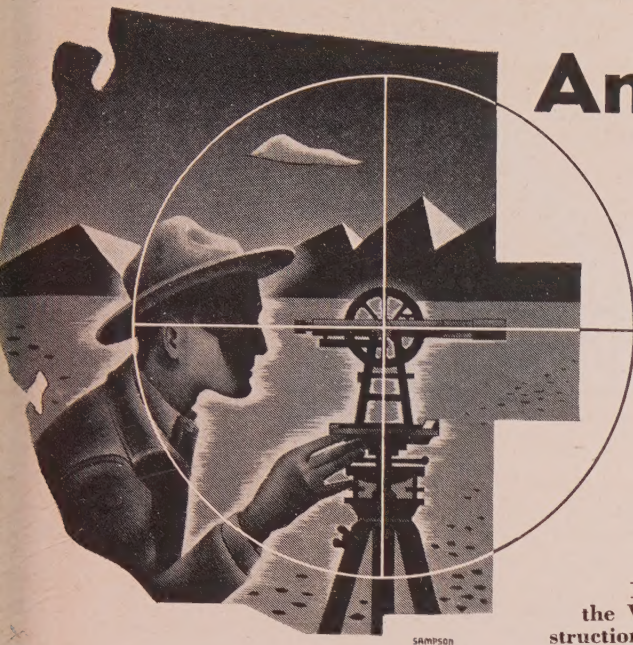
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JANUARY 15 • 1949



Annual Review Number

A Survey of 1948

CONTRACT AWARDS for 1948, totalling \$1,546,000 in the West, indicate greatest construction year, excepting war period.

By JOHN M. SERVER, Jr.
Editor
Western Construction News

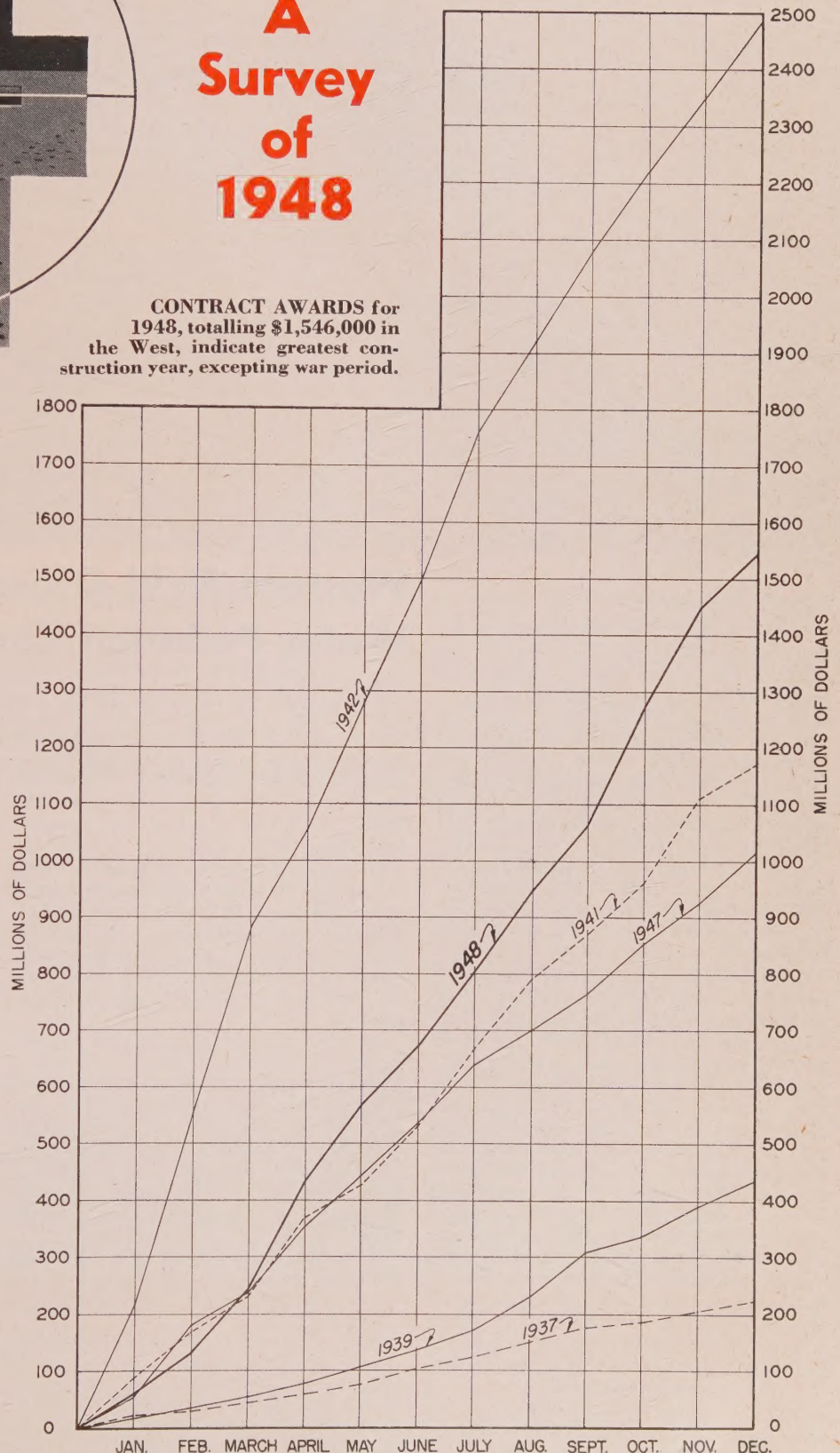
THIS BUSINESS of totaling up construction is a peculiar one. It's so full of intangibles and unknowns that, in all honesty, the results shown are, at the very best, only an "educated guess." *Western Construction News* presents herewith a graph showing the results of the most careful tabulation of construction in the Western half of the United States which its staff can prepare. We are firm in the belief that it is as accurate as it is possible to be, yet for reasons to be discussed a little later, we must admit it is but the aforementioned "educated guess."

It shows that during 1948 more money was spent in the West for heavy construction than in any other peacetime year. It was only exceeded by 1942, the first war year, and possibly 1943.

It is probable, too, that a similar ratio existed in house-building or light construction during the year, though *Western Construction News* makes no effort to tabulate construction of that type except those mass housing projects constructed by the normally "heavy" contractor as, for example, the Pueblo Gardens project of Del E. Webb at Tucson, Ariz. Reports are that housing construction, freed from government controls and restraints, had one of its best years, falling off a little, however, in the last two months. There is some indication that although demand still seems to be immense, the supply of housing may one day suddenly catch up and houses will be in over supply. Exactly when that will be we cannot forecast with firmness, but suspect it may occur in 1950 in most areas.

Most near Pacific Coast

Generally speaking, the distribution



of construction remains about the same in the Western States as it has been for a number of years: California, roughly 50% of the total; Washington, roughly 20%; Oregon, about 6%, and the rest split up among the other states. A few large contracts have tended to vary the normal balance slightly, such as Hungry Horse Dam in Montana, Garrison Dam in North Dakota, Sandia, Los Alamos and other special defense activities in New Mexico, but in total these have effected very little change. California has actually been carried slightly over the normal 50% due to the extensive construction program of Pacific Gas & Electric Co. on the Feather River and at several steam generating plants, the Central Valley Project's Friant-Kern and Delta-Mendota canal work, weapons testing bases at Inyokern and Point Mugu, and a greatly expanded State Highway program.

We repeat, however, that it is utterly impossible for any magazine, Government statistical agency, or other tabulator, to give an absolutely accurate total of dollars spent in construction. Particularly was this true during the war when many contracts were not announced at all (the atomic bomb plant at Hanford, Wash., for instance) and others were given as "between \$500,000 and \$1,000,000" or "between \$1,000,000 and \$5,000,000." Only by averaging the two limits could anything like a fair guess be made, and while it presumably is about right over all the contracts awarded, it certainly is not checkable.

Factors to consider

Nor is it to be supposed that even today complete accuracy is attainable. For instance, there are still a number of secret or restricted defense projects, such as the atomic works at Hanford and Los Alamos, and the testing bases mentioned before. Then, the figures given represent only contracts awarded during the year, and not the value of actual construction work carried out. Many of these contracts will run for several years, but the credit all appears under the year 1948. True, numerous 1947 and 1946 contracts were still under way during 1948, which tends to equalize that factor.

Then, too, many agencies, particularly privately-owned public utilities have adopted a policy of declining to announce the amounts of awards, or do so in only large lump sums, which represent total cost of every kind involved in the job. The factor of force account work is a very uncertain one. "Change orders" may very noticeably affect the value of a given contract, as for instance at Davis Dam, where the change orders formed a larger book than the original specifications, and are said to have increased the cost of the structure by about \$6,000,000. Further, it is almost impossible to tabulate and evaluate all the small street resurfacing, or short sewer or water extensions, or one-block lighting projects, etc., which occur in all the small cities and towns.

Some of these uncertainties can be evaluated by applying correction factors. Others can be approximated by

studying total appropriations for the agencies involved. Others can be estimated. Finally, we present what we firmly believe to be the most accurate review of Western construction published by any agency. We confidently believe that whatever error does appear is on the conservative side, and that the actual dollar volume of construction is in excess of the \$1,546,000,000 figure at which we have arrived.

1949 predictions

Estimates by the Departments of Commerce and Labor predict that national construction activity for 1949 will increase about 5% over 1948. They believe the total volume of construction, nationally, in 1948, will amount to \$17.8 billion, this figure including housing, farm construction, maintenance, and military, as well as normal heavy construction. For 1949, they foresee a volume of \$18.75 billion.

Western Construction News forecasts, however, that heavy construction in the West will increase by well over the 5% forecast by the Government departments. Probably light construction will remain about level or perhaps even fall off a little. A few of the factors influencing an accelerated heavy construction program, however, are: the Bureau of Reclamation, operating exclusively in the West, and spending its greatest appropriation in history (a quarter billion dollars) will ask for twice that much for

the coming year, and will undoubtedly receive most of its request; every state highway department in the West planning an accelerated program, asking for greater gas tax, and otherwise expanding so that nearly \$400,000,000 will be spent for this work alone; water shortages are getting constantly more severe and the need for sewage treatment is almost a scandal in numerous places—these conditions must be remedied; defense construction, both in the Western States and Alaska, is bound to increase; unchecked growth in Western populations brings daily greater need for municipal, state and federal services.

Don't be misled!

One must not be misled, however, by towering dollar totals. It must be remembered that costs are at least double those of pre-war days; furthermore, it is an indisputable fact that the productivity of labor has declined between 20 and 50 per cent, a condition only partially equalized by greater and more efficient mechanization. It is doubtful, therefore, whether the huge total of money being expended and to be expended is actually producing a much larger volume of physical construction than in earlier years.

At any rate, there is no conceivable doubt that the West is today the greatest market for heavy construction, and that the demand for it is nowhere near satiated.

Western Field Offices Located for Water Pollution Control Activities

THE FEDERAL Works Agency and the Federal Security Agency have jointly announced the location of field and basin offices through which water pollution control activities of the two agencies will be carried out under the Water Pollution Control Act enacted last June.

Under this law the Surgeon General of the Public Health Service under the supervision and direction of the Federal Security Administrator, will provide financial and technical assistance to the states in the formulation and execution of their water pollution control programs.

The Bureau of Community Facilities, Federal Works Agency, will administer Federal grants to aid in preparation of plans and the loans for planning or construction of treatment works. A project must first be approved by the state water pollution control agency and by the Surgeon General of the Public Health Service before such a grant or loan may be made.

The exact procedures for obtaining financial assistance for planning and constructing treatment works are now being drafted.

The Surgeon General will organize water pollution control activities on the basis of drainage basin areas. Fourteen river basin offices will be set up to implement the program in their respective watersheds. Headquarters of the pro-

gram will be in the Water Pollution Control Division of the Public Health Service, Washington, D. C.

The basin offices, however, will be the operating centers from which Public Health Service representatives will cooperate with state and interstate agencies, the municipalities, and industry.

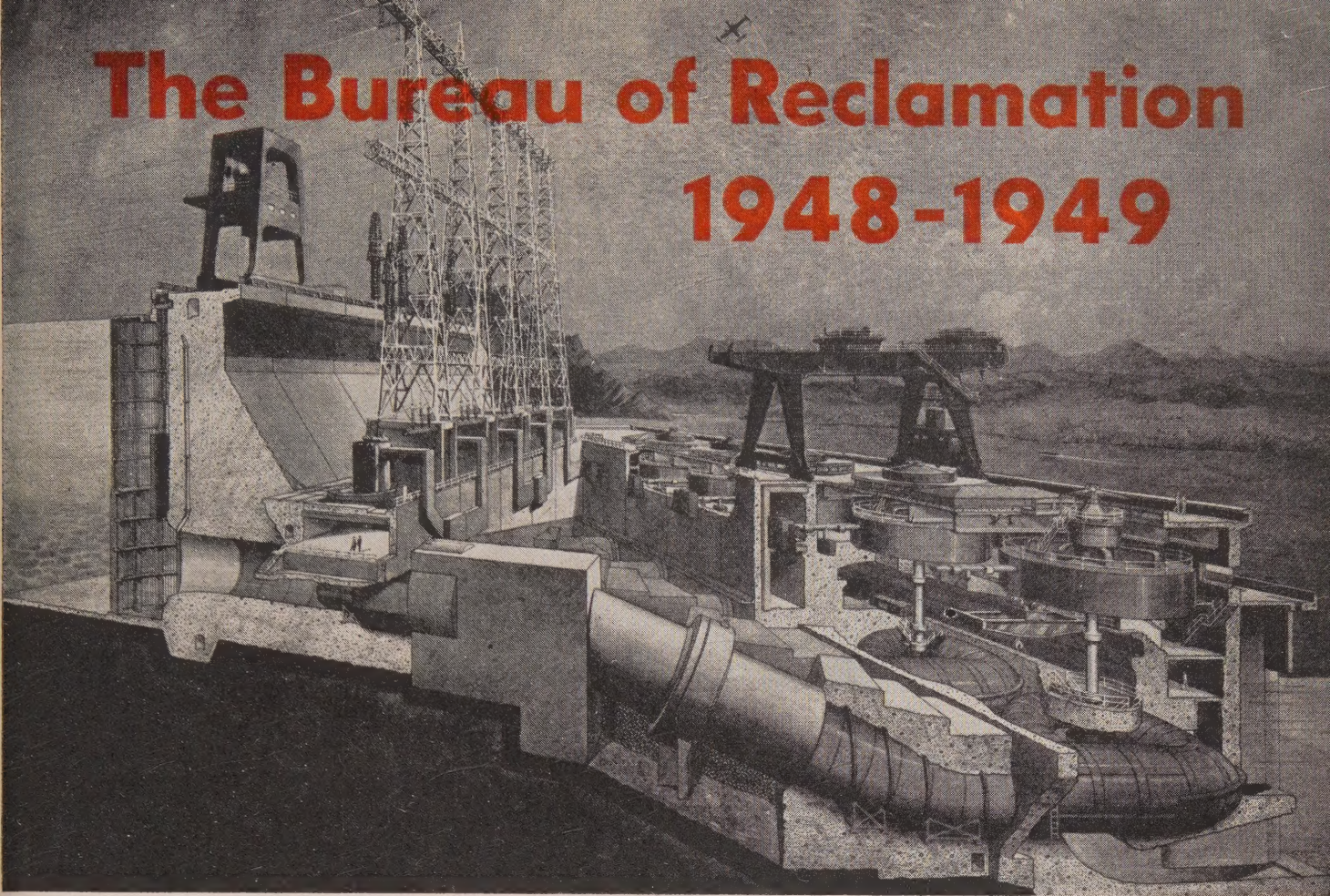
The nine Division Offices of the Bureau of Community Facilities will administer those functions of the law which are the responsibility of FWA.

The Western PHS basin areas and office locations are as follows: Missouri River, Kansas City, Mo.; Southwest Lower Mississippi, Little Rock, Ark.; Western Gulf, Dallas, Tex.; Colorado River, Boulder City, Nev.; Great Basin, San Francisco, Calif.; California (except Great Basin), San Francisco, Calif.; and Pacific Northwest, Portland, Ore.

The Western Division offices of the Bureau of Community Facilities and their chiefs, are: Kansas City, Mo., C. W. Anderson, including Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Fort Worth, Tex., W. H. Sindt, including Arkansas, Louisiana, Oklahoma, Texas. San Francisco, Calif., Wright L. Felt, including Arizona, California, Hawaii, Nevada, Seattle, Wash., L. R. Durkee, including Alaska, Idaho, Montana, Oregon, Washington. Denver, Colo., William P. Cheney, including Colorado, New Mexico, Utah, Wyoming.

The Bureau of Reclamation

1948-1949



Both present and future construction programs of Bureau of Reclamation in 17 Western states will be record-breaking—Appropriation of \$424,000,000 for construction alone will be asked of Congress for the next fiscal year—Here's a brief summary of the current and proposed construction

AN ALL-TIME RECORD construction program for expanding irrigation and hydroelectric resources in 17 Western states was undertaken by the Bureau of Reclamation this current fiscal year (July 1, 1948, to June 30, 1949). This accelerated program includes the start of major construction activity at Hungry Horse Dam; the continued rapid progress of construction on the largest of the basin-wide developments—the Missouri River Basin Project, on which more than a score of dams are under construction or are to be placed under contract during 1949; and continuance of construction on major features of the Columbia Basin, Central Valley, Colorado-Big Thompson, and other projects.

An estimate of the Bureau's contemplated construction program for fiscal year 1950 (July 1, 1949—June 30, 1950) was made by Reclamation Commissioner Michael W. Straus in justifying the current fiscal year appropriations before the House Subcommittee in 1948. Commissioner Straus stated that an estimated appropriation of about \$424,000,000 for construction alone would be re-

quired, not counting such additional work as Congress might consider should be undertaken for fiscal year 1950.

The following is a brief summary of the current construction work on Bureau projects in the seven regions of the Bureau, as well as work that is planned for the remainder of the fiscal year.

Region 1

Columbia Basin Project, Washington

With construction for the development of the Columbia Basin Project passing the halfway mark in the summer of 1948, work on the project is being directed towards the completion of major features of the irrigation system, which will bring water to about 1,000,000 ac. of land in south central Washington, and development of the Grand Coulee Power Plant hydroelectric facilities to an ultimate capacity of 2,300,000 kw.

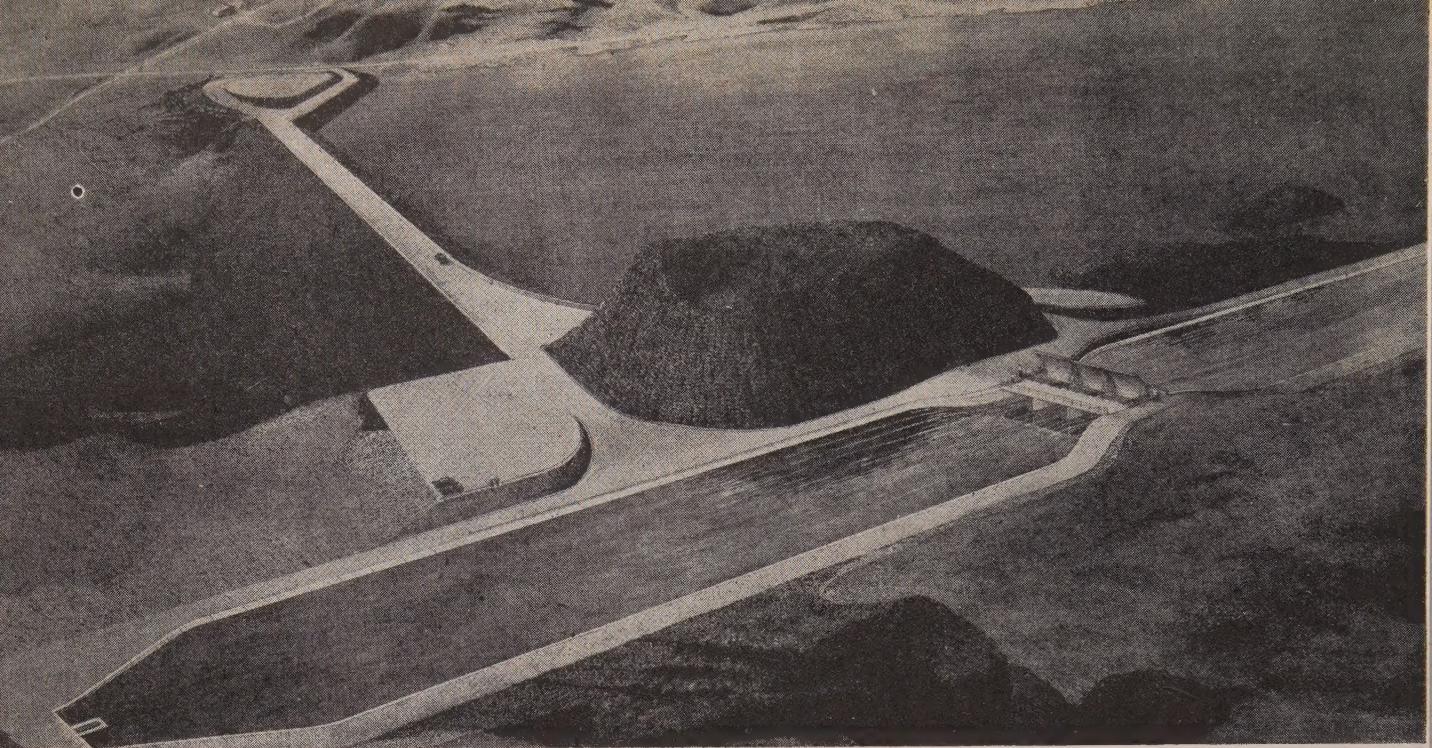
DAVIS DAM outlet works and power plant, top of page, will go under construction in 1949 to bolster short power supplies in the states of Arizona, Nevada, and California.

Completion of Grand Coulee Pumping Plant is to be accomplished under a contract awarded in Oct., 1948. This 600-ft. long, 195-ft. high reinforced concrete structure will enclose the world's largest pumping installation—12 vertical shaft centrifugal pumps that will have a rated capacity of 1,350 cfs. each at a pumping head of 310 ft., and will be driven by 65,000-h.p. motors. Contracts for six of the pumps and motors were awarded during 1946, and present plans call for operation of the first pumping unit in Dec., 1951.

Construction of about $\frac{2}{3}$ mi. of the 2-mi. long, 16,000-cfs. Feeder Canal is now under contract and the remainder is to be awarded this spring. Bids are to be invited in the near future for construction of the North Dam and work is expected to start in a few months.

With the exception of Bacon Tunnel and Bacon Siphon, the Main Canal (initial capacity, 13,200 cfs.) above Long Lake is completed, and the siphon and tunnel are expected to be completed in June, 1949. Long Lake Dam is scheduled for completion by June, 1949. A contract was awarded in Oct., 1948 for construction of the remainder of the Main Canal below Long Lake and completion of this work is expected in 1950.

The first section of the West Canal (5,100-cfs. capacity), about $6\frac{1}{2}$ mi. long, is under construction and completion is expected by June, 1949. It is anticipated that construction on the second section of the canal, about 14 mi. long, will be started this spring. Present plans call for construction of the third section,



NORTH DAM, 1,350-ft. long earthfill structure on the Columbia Basin Project, will be advertised for bids early in 1949.

about 14½ mi. long, to start in Sept., 1949. A \$7,614,728 contract for construction of the **Soap Lake Siphon** was awarded on Dec. 7, 1948. The siphon is to be a 25-ft. diameter steel-lined reinforced concrete structure, 12,900 ft. long.

The first section of **East Low Canal**, about 12 mi. in length, is now under construction and is expected to be completed by June, 1949. It is anticipated that a contract for construction of the second section, to be about 14½ mi. long, will be awarded early this year. Construction of the third section is to follow during the latter half of the year.

Earthfill operations on **O'Sullivan Dam** are well advanced, and completion of this structure is expected by July. Bids are to be invited for construction of the first section of the **Potholes East Canal**, about 7 mi. in length, this spring.

The left power plant at **Coulee Dam** is virtually completed. The last of the nine 108,000-kw. main generating units was placed in operation in April, 1948. Six of the nine generating units for the right power plant are now under contract and it is expected that award of a contract for the remaining three units will be made in the near future. Scheduled operation dates for the first three units of the right power plant are April 15, July 15, and Oct. 15, 1949. Work on installation of the auxiliary equipment for operation of the right power plant will continue during the next year to meet operating dates for all units.

Bids have been asked for construction of river improvements and repair of the spillway face and spillway bucket at Grand Coulee Dam. Facilities to carry out the repairs on the spillway bucket, including a floating caisson and caisson drydock, are substantially complete. The first work of river channel dredging and obstruction removal is expected to start this spring.

F. A. Banks is District Manager for the Columbia River District; H. A.

Parker is Supervising Engineer for the Irrigation Division; and Alvin Darland is Supervising Engineer for the Coulee Dam Division.

Boise Project, Idaho

Construction of **Cascade Dam**, an earth- and rock-fill structure 90 ft. in height and about 700 ft. in length at the crest, located on the Payette River near Cascade, Ida., is virtually completed. Earl Harmon is Construction Engineer for the dam and R. W. Adams is Construction Engineer for the distribution system.

Construction of **Anderson Ranch Dam** on the South Fork of the Boise River about 40 mi. southeast of Boise, Ida., is completed except for construction of the spillway. The dam is the highest earthfill dam in the world and sixth highest of any type. It is 456 ft. in height above rock foundation and 1,350 ft. in crest length. The power plant is to house two 15,000-kva. generating units, and provision for future installation of a third 15,000-kva. unit has been made. Work was started on the power plant in April, 1948. The fabrication of the first two generators is expected to be completed by the end of Jan., 1949, and it is anticipated that the turbines and governors will be delivered by July, 1949. Construction Engineer is Donald S. Walter.

Hungry Horse Project, Montana

Construction of **Hungry Horse Dam**, which is to be a concrete arch structure about 530 ft. above foundation and 2,000 ft. long at the crest, was started in June, 1948. The dam is planned to be completed by Dec., 1953. A contract for the four 75,000-kva. generating units for the power plant was awarded in May,

1948. Initial operation of the first generating unit was planned for June, 1952. The dam, located on the South Fork of the Flathead River about 12 mi. east of Columbia Falls, Mont., will store water for power generation, flood control, and future irrigation needs. It will also provide partial regulation of the Columbia River and increase firm power production in hydroelectric plants downstream. Construction Engineer is Clyde H. Spencer.

Deschutes Project, Oregon

Construction on the project is practically complete. Work remaining to be done during the coming year consists of seepage loss investigation of the **Crane Prairie Reservoir**, completion of reservoir clearing operations, and channel improvements on the Deschutes River. Planning of a drainage program will also continue. J. W. Taylor is Construction Engineer.

Yakima Project, Washington

The entire main canal and wasteway system and gravity laterals have been completed. Under construction are 17 pumping plants scheduled for completion during the current fiscal year. Provisions have been made on the main canal for the construction of a 10,000-kw. power plant to furnish power for 16 pumping plants. Designs and specifications for powerhouse, penstocks, generators, turbines, and miscellaneous electrical equipment are to be completed this summer. Harold W. Pease is Construction Engineer.

Palisades Project, Idaho

Construction is proposed to begin this year on **Palisades Dam** to make available supplemental water for lands in the Snake River Valley, provide supplies to new lands, and produce hydroelectric power and flood control benefits. The

dam is to be a principal feature of the project and is to be an earthfill structure about 260 ft. in height above stream bed and 2,300 ft. long at the crest. It is located on the Snake River about 65 mi. east of Idaho Falls. The power plant will have an initial installation of two 20,000-kva. generating units, and space is to be provided for a third unit of the same capacity. Present activities include relocation of highways, and preparations of designs and specifications. I. Donald Jerman is Project Engineer.

Lewiston Orchards Project, Idaho

Features of this project completed during the last year included reconstruction of the **Webb Creek Diversion Dam**, replacement of the Webb Creek wood flume with 30-in. concrete pipe, and replacement of the Sweetwater Siphon with a similar structure of larger capacity. Irrigation and domestic water distribution systems are now under construction. Designs and specifications are substantially complete for construction of a filter plant and Clearwater Reservoir. Construction Engineer is W. L. Karrer.

Region 2

Central Valley Project, California

Major construction activity on this project during the past year has been directed toward completion of canals and pumping plants for the irrigation systems. Authorized by Congress in 1935, the principal objectives of the project established were: regulation and diversion of the Sacramento and San Joaquin Rivers for irrigation purposes; repelling tidal salinity encroachment upon the Delta region; improvement of navigation facilities; production of electric power; and flood control. Project features include more than 350 mi. of large canals, three dams, two power plants, and several transmission lines and pumping plants. Now in the twelfth year of construction, Shasta and Friant Dams, the major structures of the project are virtually completed, and work is

progressing rapidly on the canals and pumping plants.

About 26 mi. of the first reach of the 117-mi. **Delta-Mendota Canal** is completed. Construction of the 4,600 cfs. **Tracy Pumping Plant**, a key structure in the irrigation system, and an additional 29 mi. of the Delta-Mendota Canal are under contract. It is anticipated that specifications for the five 1,520-cfs. pumps for the **Delta Cross Channel Pumping Plant** will be issued by July. Studies are now being made on the location of the **Delta Cross Channel** between the Sacramento River at Walnut Grove and the inlets to the Tracy Pumping Plant. Construction Engineer is O. G. Boden.

About 70 mi. of the first reach of the 156-mi. long **Friant-Kern Canal** (initial capacity 5,000 cfs.), now under construction, are expected to be completed by spring. With the installation of the eight Friant-Kern outlet valves by June, 1949, work on **Friant Dam** is to be virtually completed. R. K. Durant is Construction Engineer.

During 1949 the **Shasta Dam** river outlet gates are to be installed. The relocated highway between Shasta Dam and Summit City and installation of the two remaining 75,000-kw. generating units are to be completed. Specifications have been issued for the completion in 1950 of **Keswick Dam**, power plant, and switchyard. Construction Engineer is W. V. McCrystle.

Transmission lines from Shasta Power Plant to the Shasta Substation and Keswick Power Plant are to be completed early in 1949. Construction of 18.3 mi. of the Elverta to Tracy double-circuit, 230-kv. transmission line and stringing of the single-circuit 230-kv. conductor from Oroville to Elverta are expected to be started this summer. The 69-kv. transmission line from the Contra Costa Pumping Plant to the Clayton and Ygnacio Pumping Plants has been

HUNGRY HORSE DAM, whose contract money value is exceeded only by Hoover Dam, will be the scene of increased activity.

placed under construction for completion by this summer. H. W. Thomson is Construction Engineer.

Klamath Project, California-Oregon

Flood protection facilities involving channel rectification in the Poe and Langell Valleys, enlargement of the **Lost River Diversion Channel**, and enlargement of Pumping Plants "D" and "F" are expected to be mostly completed in 1949. Acting Project Manager is E. L. Stephens.

Santa Barbara Project, California

Construction of the **Tecolote Tunnel** between Cachuma Reservoir and Glen Ann Equalizing Reservoir is to be started this spring, and construction of the **Goleta Conduit**, **Cachuma Dam**, and **Lauro Dam** is expected to begin next fall. E. R. Crocker is Project Manager.

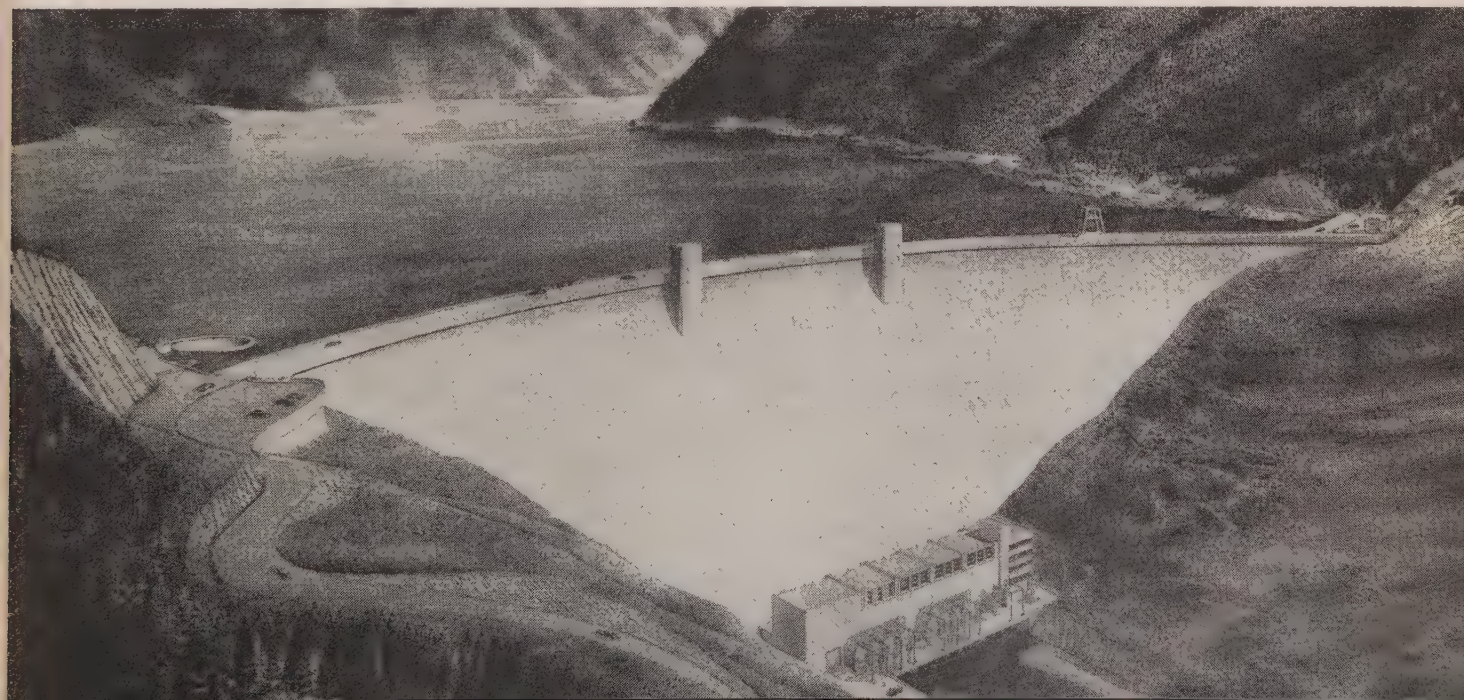
Region 3

Davis Dam Project, Arizona-Nevada

During 1948 construction of the diversion channel, forebay and spillway, and outlet works at **Davis Dam** had progressed sufficiently to allow diversion of the Colorado River. The site of the dam proper was unwatered, the cut-off trench excavated, and backfill of impervious material was begun in 1948. The dam is to be essentially completed by October, 1949, and construction of the power plant is to start in 1949.

Davis Dam is located on the Colorado River, 67 mi. downstream from Hoover Dam. It is to be an earth- and rock-fill structure, about 138 ft. in height above the river bed and about 1,600 ft. long at the crest. The power plant is to accommodate five 45,000-kw. generators. Through interconnection with the Hoover and Parker Power Plants, Davis Dam power will supply pumping plants on the Gila Project in southwestern Arizona and power markets in central and southern Arizona, southern Nevada, and southern California.

Construction is to continue on the following transmission lines: Second



Phoenix-Tucson, 115-kv., 115 mi.; Davis-Parker, 230-kv., 70 mi.; and Second Parker-Gila, 161-kv., 128 mi. Construction is planned to start in 1949 on the following transmission lines: Tucson-Cochise, 115-kv., 74 mi.; Davis-Hoover, 230-kv., 70 mi.; Davis-Prescott, 230-kv., 145 mi. Work will begin also on substations near Blythe, Calif., and at Prescott, Mesa, Coolidge, and Maricopa, Ariz. H. F. Bahmeier is Construction Engineer for Davis Dam. Construction of the transmission lines and substations is under the supervision of S. A. McWilliams, Project Engineer for Parker Dam Power Project.

Gila Project, Arizona

Construction of the 18-mi. long **Wellton-Mohawk Canal** and three pumping plants on the Wellton-Mohawk Division has recently been initiated. Under present plans it is anticipated that construction of the canal and pumping plants will be completed in 1952. Murray Miller is Construction Engineer.

Boulder Canyon Project, Arizona-Nevada

The recent award of contracts for the manufacture and installation of two 82,500-kva. generators for **Hoover Dam Power Plant** will provide an increase in total capacity of the plant from 1,034,800 kw. to 1,199,800 kw. With the installation of these two additional units, which are to be completed and installed by May, 1952, only two spaces for generating units will be unoccupied. C. P. Christensen is Director of Power.

All-American Canal System, Boulder Canyon Project, California

Continuance of construction of 182 mi. of concrete pipe laterals ranging in size from 10 to 84 in., and start of construction of an additional 90 mi. of concrete pipe laterals are programmed for the current fiscal year. It is expected that construction of detention dikes and wasteways to afford flood protection for the main Coachella Canal (which was completed in June, 1948) will be com-

pleted by this summer. C. S. Hale is Construction Engineer for the Coachella Division.

Colorado River Front Work and Levee System Project

During the past year construction was begun on a floating dredge and attendant barges and power propulsion boats which are to be used in channel rectification work on the Lower Colorado River. The dredge is to be completed so that dredging of channels in the Needles-Topock area may start this year. Construction is under the supervision of the Regional Director at Boulder City, Nevada. C. P. Vetter is Chief, Office of River Control.

Region 4

Mancos Project, Colorado

Construction is about completed on the **Jackson Gulch Dam** inlet and outlet canals. David R. May is Construction Engineer.

Newton Project, Utah

An award for construction of the **Newton Dam** spillway was made in August, 1948 and this work is scheduled for completion by February, 1949.

Paonia Project, Colorado

Construction of **Spring Creek Dam**, an earthfill structure about 130 ft. high and 1,300 ft. long on the East Muddy Creek, about 20 mi. northeast of Paonia, Colo., has been deferred pending re-issue of specifications this spring. Begun in the fall of 1948, construction is continuing on the **Fire Mountain Canal** enlargement. Construction of the Overland Canal is expected to begin this summer. Robert W. Jennings is Construction Engineer.

Preston Bench Project, Idaho

Completion of 15.6 mi. of the Mink

CONCEPTION of completed Davis Dam structures. Diversion of Colorado River around dams site was one of 1948 highlights.

Creek Canal and 1,280 ft. of the **Station Creek Tunnel**, construction on which was begun in the fall of 1948, is expected next summer.

Provo River Project, Utah

Construction is continuing on the last 7.8 mi. of the **Salt Lake Aqueduct** in Salt Lake County, the **Murdock Diversion Dam**, and the remainder of the **Duchesne Tunnel**. It is anticipated that construction of the **Jordan Narrows Pumping Plant** and **Jordan Narrows Siphon** will be completed in the summer of 1949. Project Engineer is L. R. Dunkley.

Region 5

W. C. Austin Project, Oklahoma

Installation of spillway gates and bridge at **Altus Dam**, undertaken in 1948 and expected to be completed in 1949, will complete the dam. During 1948 construction was continued on the canal and lateral systems on the project. Completion of all construction on canals, laterals, and drains is planned by July. James A. Callan is Project Engineer.

Rio Grande Project, New Mexico-Texas

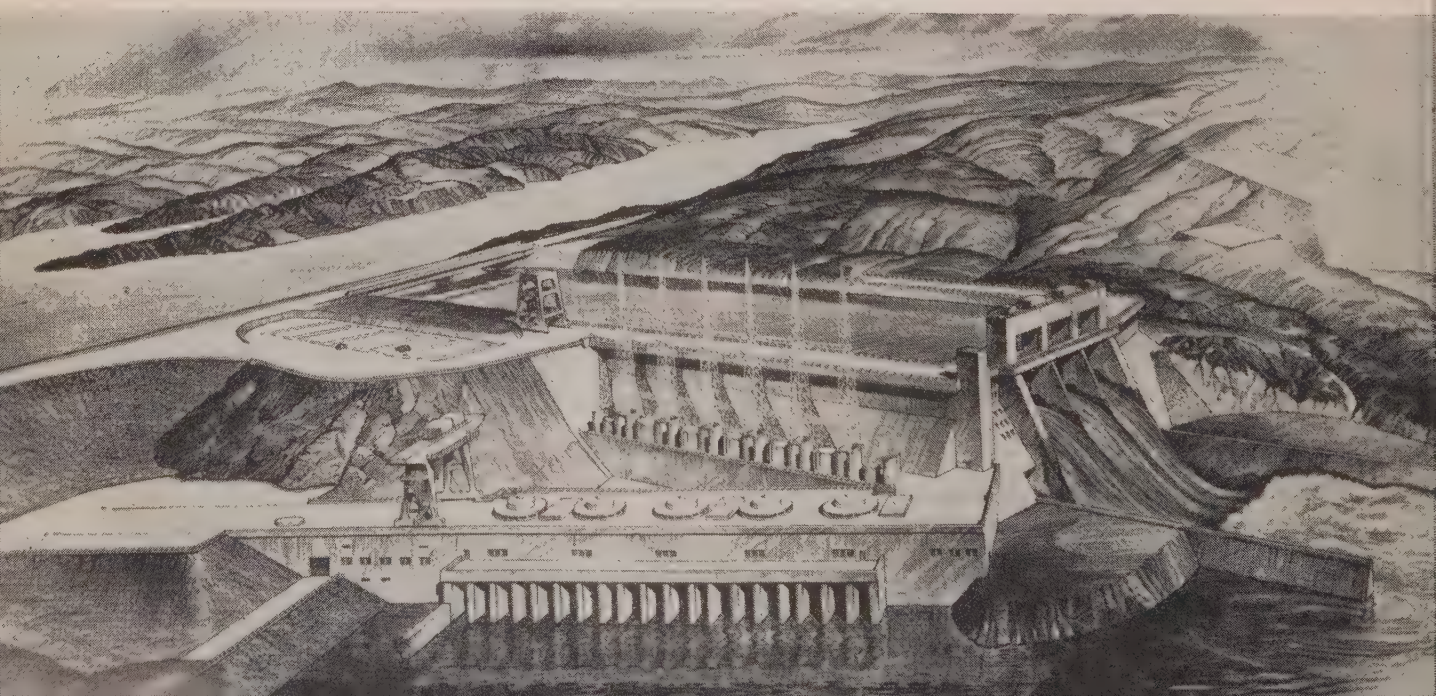
During 1948, development of the **Elephant Butte Power System** was continued, including start of construction of the 115-kv., 71-mi. **Elephant Butte-Socorro Transmission Line**, and the 3,000-kv. **Socorro Substation**. Labon Backer is Division Superintendent.

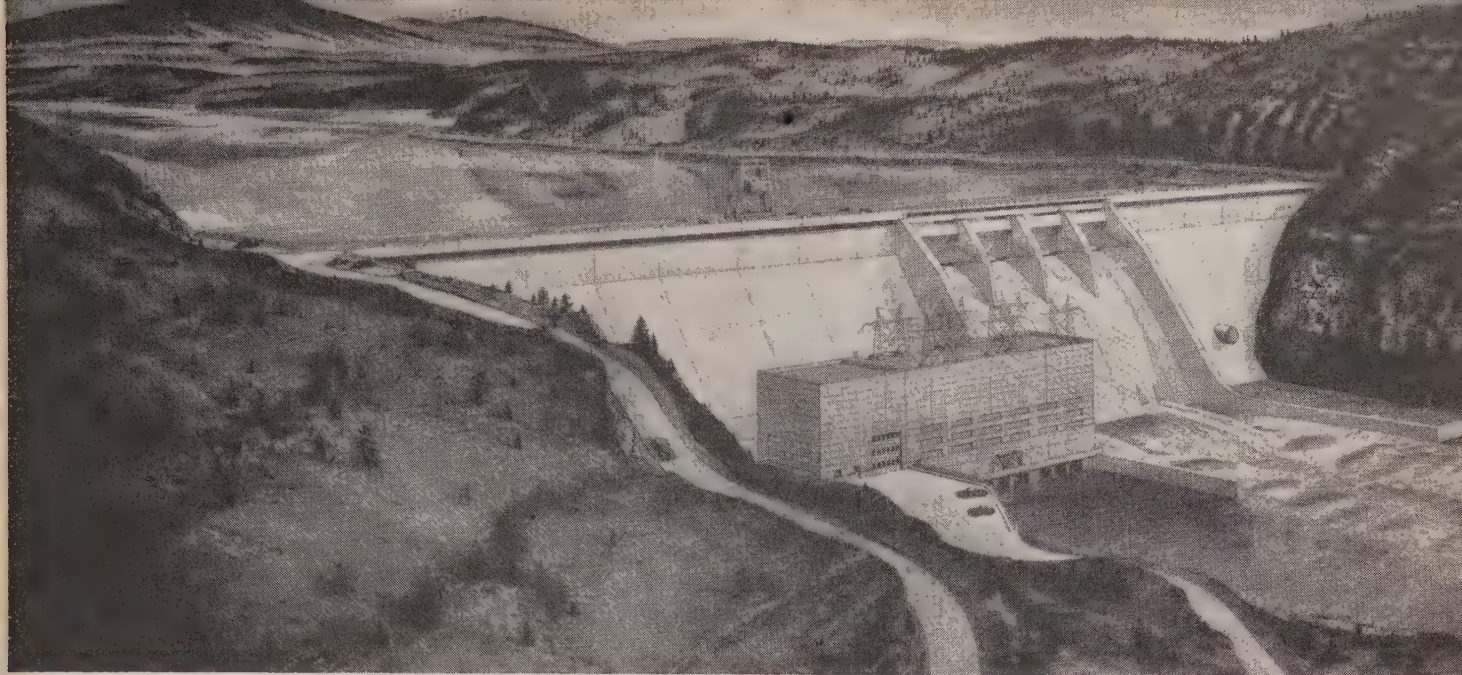
San Luis Valley Project, Colorado

It is expected that construction on **Platoro Dam**, the first feature of the project, will start early in 1949. The dam, located near the headwaters of Conejos Creek, 40 mi. southwest of Alamosa, Colo., is to be an earthfill structure having a height of 150 ft. above stream bed and a crest length of about 1,500 ft. Ernest Puckett is Construction Engineer.

Tucumcari Project, New Mexico

During 1948, construction on the canal and lateral system has continued and





completion of the canals, laterals, and drainage systems is now planned in 1949. Walter Bierce is Acting Construction Engineer.

Regions 6 and 7

Missouri River Basin Project

The current program provides for continuance of intensified construction activity on the largest of the basin-wide developments of the Bureau of Reclamation—the Missouri River Basin Project. Already under construction are seven dams, and an additional 15 dams are to be placed under construction in 1949 to further develop the overall plan which is to bring flood control, irrigation, and other benefits to the vast basin area, approximately one-sixth of the total area of the continental United States. Presently under construction are:

Boysen Dam and Power Plant located on the Big Horn River about 17 mi. south of Thermopolis, Wyo., which have been under construction since the latter part of 1947, and are scheduled for completion in 1952. The principal features involved in the construction of the dam are: an earth and rock-fill dam about 150 ft. in height above the bed of the river and about 1,100 ft. long at the crest; a spillway channel through the right abutment controlled by two 30-by 25-ft. radial gates; and enlargement of an existing railroad tunnel through the right abutment to provide for installation of two 126-in. diameter steel penstocks to the power plant. The power plant is to be a reinforced concrete structure and will house two main 7,500-kva. generating units. It is expected that concrete for the spillway floor will be placed and most of the work on the tunnel for the relocated railroad will be completed by July, 1949. Project Engineer is R. S. Lieurance.

Kortes Dam and Power Plant, Wyo. The dam is to be a concrete gravity dam across the North Platte River approximately 440-ft. long at the crest and about

CANYON FERRY DAM and power plant on the Missouri River in Montana will be under construction by early spring of 1949.

200 ft. in height above the bed of the river. The power plant is to be a reinforced concrete structure and is to accommodate three main 12,000-kw. generating units. Construction of the dam and power plant is about 60 per cent complete. Charles S. Rippon is Construction Engineer.

Angostura Dam, located on the Cheyenne River about 6 mi. southeast of Hot Springs, S. Dak., consists of a 960-ft. long concrete-gravity type structure extending from the left abutment across the river channel and an earth embankment about 1,000 ft. long extending along the right abutment. The total crest length will be about 2,000 ft. and the maximum height above the river bed is to be about 180 ft. Approximately 70 per cent of the concrete has been placed in the dam. Completion of the dam is scheduled for July, 1950. H. V. Hubbell is Project Engineer.

The contract for the construction of **Heart Butte Dam** on the Heart River, about 18 mi. south of Glen Ullin, N. Dak. is scheduled for completion in 1951. The dam is to be an earthfill structure about 1,850 ft. long at the crest and will have a maximum height of about 135 ft. above the river channel. W. W. Brenner is Construction Engineer.

Construction of **Medicine Creek Dam** 6 mi. northwest of Cambridge, Neb., an earthfill structure, which is to be about 4,000 ft. long at the crest and is to have a maximum height of about 102 ft. above the bed of the creek, was started in March, 1948. It is anticipated that approximately 50 per cent of the construction will be completed by July, 1949. The main dam embankment is about one-third complete. Construction Engineer is C. L. Mutch.

Enders Dam, on Frenchman Creek, Neb., is to be an earthfill structure approximately 2,570 ft. long at the crest

and is to have a maximum height of about 100 ft. above the bed of the creek. All work on the dam should be completed by the fall of 1949. Construction Engineer is U. V. Engstrom.

Bonny Dam, an earthfill structure on the South Fork of the Republican River near Hale, Colo., was started in December, 1948. It is to be 9,300 ft. long at the crest and 130 ft. in height above the stream bed. Construction Engineer is Wayne S. Byrne.

Construction on the following dams in the project is scheduled to begin in 1949:

Dickinson Dam on the Heart River at Dickinson, N. D. An award for construction of the dam which is to be an earthfill structure approximately 50 ft. high and 2,275 ft. long, was made in December. W. W. Brenner is Construction Engineer.

Contract for **Shadehill Dam** on the Grand River, 20 mi. south of Lemmon, S. Dak., is expected to be awarded in January. The dam is to be an earthfill structure about 145 ft. in height above the lowest foundation and about 12,900 ft. long at the crest. Construction Engineer is D. M. Forester.

Cedar Bluff Dam is located on the Smoky Hill River about 14 mi. south of Ogallah, Kans. Invitations for bids for construction of the dam were issued in November, 1948, and it is expected construction will start about March of this year. The dam is to be an earthfill structure about 134 ft. in height above stream bed and about 12,500 ft. long at the crest. Construction Engineer is R. J. Walter, Jr.

Bids have been received on **Canyon Ferry Dam** on the main stem of the Missouri River about 17 mi. east of Helena, Mont. It is expected the contract for Canyon Ferry Dam and Power Plant will be awarded soon and that excavation will start as soon as weather permits in the spring. The dam is to be a concrete gravity structure about 220 ft. in height above the stream bed and about

1,000 ft. long at the crest. The power plant is to be of reinforced concrete construction. The purpose of the dam and power plant is to provide power, irrigation, and flood control benefits. Construction Engineer is W. P. Price, Jr.

Superior-Courtland Diversion Dam on the Republican River, 2 mi. west of Guide Rock, Neb. It is expected that construction on the dam, which is to be a 300-ft. long concrete gravity overflow structure, will start in the spring. Paul E. Strouse is Construction Engineer.

Present plans call for the construction of the **Missouri River Diversion Dam**, located 6 mi. downstream from Fort Peck Dam in Montana, to begin by early summer. This dam is to be 650 ft. long and is to consist of fourteen 42- by 18-ft. radial gates. The purpose of the dam is to divert part of the Missouri River into the Missouri Canal for irrigation of large areas of eastern Montana and northern North Dakota.

The contract for construction of **Keyhole Dam** on the Belle Fourche River, about 13 mi. northeast of Moorcroft, Wyo., is expected to be awarded this spring. The present designs indicate that the dam is to be an earthfill structure about 127 ft. high above streambed and about 3,300 ft. long at the crest. Keyhole Dam is being designed to provide supplemental water to the Belle Fourche Project for irrigation and for flood control. Construction Engineer is F. E. Goehring.

Construction on **Cannonball Dam** on the Cannonball River about 4 mi. from Elgin, N. Dak., is expected to be started by June. As presently planned, the dam will be an earthfill structure to provide both irrigation and flood control benefits. Construction Engineer is Floyd M. Jensen.

Moorhead Dam an earthfill structure on the Powder River about 40 mi. southwest of Broadus, Mont., is expected to be under construction this summer. Walter A. Sanford is Acting Construction Engineer.

Construction of **Bixby Dam** on the Moreau River, about 40 mi. northwest of Faith, S. Dak., is expected to begin this summer. The present designs call for an earthfill structure about 115 ft. high above stream bed and about 6,700 ft. long at the crest, and two earthfill dikes about 950 ft. and 3,150 ft. long, respectively, adjacent to the dam. Harold M. Crowell is Construction Engineer.

A contract for construction of **Anchor Dam** on Owl Creek, a tributary of the Big Horn River, approximately 40 mi. west of Thermopolis, Wyo., is expected to be awarded this summer. This dam is to be a concrete arch structure about 190 ft. in height above the lowest point of the foundation and about 550 ft. long at the crest. Project Engineer is R. S. Lieurance.

Construction of **Tiber Dam** on the Marias River, about 25 mi. south of Chester, Mont., is scheduled to be started

by early summer. Tentative designs call for an earthfill structure about 180 ft. high above stream bed and about 3,300 ft. long at the crest. The dam is to provide irrigation and water storage. T. R. Smith is Project Engineer.

Culbertson Dam is located on the main stem of the Republican River about 2 mi. west of Trenton, Neb. It is anticipated that specifications for the dam are to be issued about April of this year and that construction will start by summer. It is to be an earthfill structure about 100 ft. in height above stream bed and about 8,000 ft. long at the crest. Ellis L. Armstrong is Construction Engineer.

Glendo Dam is located on the North Platte River about 5 mi. southeast of Glendo, Wyo. Present plans indicate that construction on this earthfill structure, will start this summer. Murel M. Starr is Construction Engineer.

A plan for issuance of specifications for construction of the outlet works prior to construction of **Narrows Dam** on the South Platte River near Fort Morgan, Colo., which is to be an earthfill structure, is under consideration. If this plan is followed, the outlet works specifications will probably be issued by early summer. Charles P. Seger is Construction Engineer.

Construction on the **Cambridge Diversion Dam** on the Republican River near Cambridge, Neb., was completed in July, 1948, except for installation of radial gates. Construction of the Oxford Siphon was begun in June, 1948, and was completed in October of the same year. Construction of the first 12.5 mi. of the Cambridge Canal was begun late in September, 1948, and is to be completed in 1950. It is planned that specifications for an additional 8 mi. of the canal will be issued in the spring. C. M. Jackson is Construction Engineer.

Colorado-Big Thompson Project, Colorado

An estimated 3 years of construction remains to be accomplished on this transmountain diversion project, which is to furnish supplemental water to about 600,000 ac. of land in northeastern Colorado from the western slopes of the Rocky Mountains.

Construction on the **Granby Pumping Plant** is continuing and will be about 60 per cent completed by the end of January. The pumping plant is a heavily reinforced concrete building 187.5 ft. high and is to house three vertical-shaft pumps which are to be driven by 6,000 h.p. motors. The function of the pumping plant is to lift water a maximum of 186 ft. from the 550,000-ac. ft. Granby Reservoir to the Granby Pump Canal.

All work on the 2.1-mile-long **Granby Pump Canal**, except for about 2,700 ft., is expected to be completed by the end of January. Construction of the remaining section of the canal will be started by this spring.

Dikes No. 1, 2, and 4 adjacent to **Granby Dam** were completed in September,

1948. Construction on Granby Dam and Dike No. 3 is continuing. The dam is an earthfill structure on the Colorado River about 232 ft. in height above the stream bed and about 185 ft. long at the crest. George R. Highley is Construction Engineer for the Granby area.

Spring Canyon Dam, one of four earthfill dams that are to form the Horsetooth Reservoir, was completed in September, 1948. The other three dams, **Horsetooth Dam**, **Dixon Canyon Dam**, and **Soldier Canyon Dam** are now expected to be completed this summer. R. B. Ward is Construction Engineer.

Construction is continuing on the **Marys Lake Power Plant** and Switchyard and on the **Estes Park Power Plant** and Switchyard. The completion of the structures is expected in 1951. Rams Horn and Prospect Mountain Tunnels were completed in June, 1948, and Aspen Creek Siphon was completed in October, 1948. Prospect Mountain Conduit and Marys Lake Dike are expected to be completed soon. **Olympus Dam**, an earthfill structure about 56 ft. high and 1,800 ft. long, is about complete. Road and highway relocations are to be completed by early summer. F. K. Matejka is Construction Engineer.

Riverton Project, Wyoming

Portions of the **Wyoming Canal** and laterals in the vicinity of Pavillion, Wyo., have been under construction and are expected to be completed by summer. Additional portions of the canal and laterals, including Muddy Ridge Tunnel, were placed under construction in October, 1948. T. A. Clark is Construction Engineer.

Kendrick Project, Wyoming

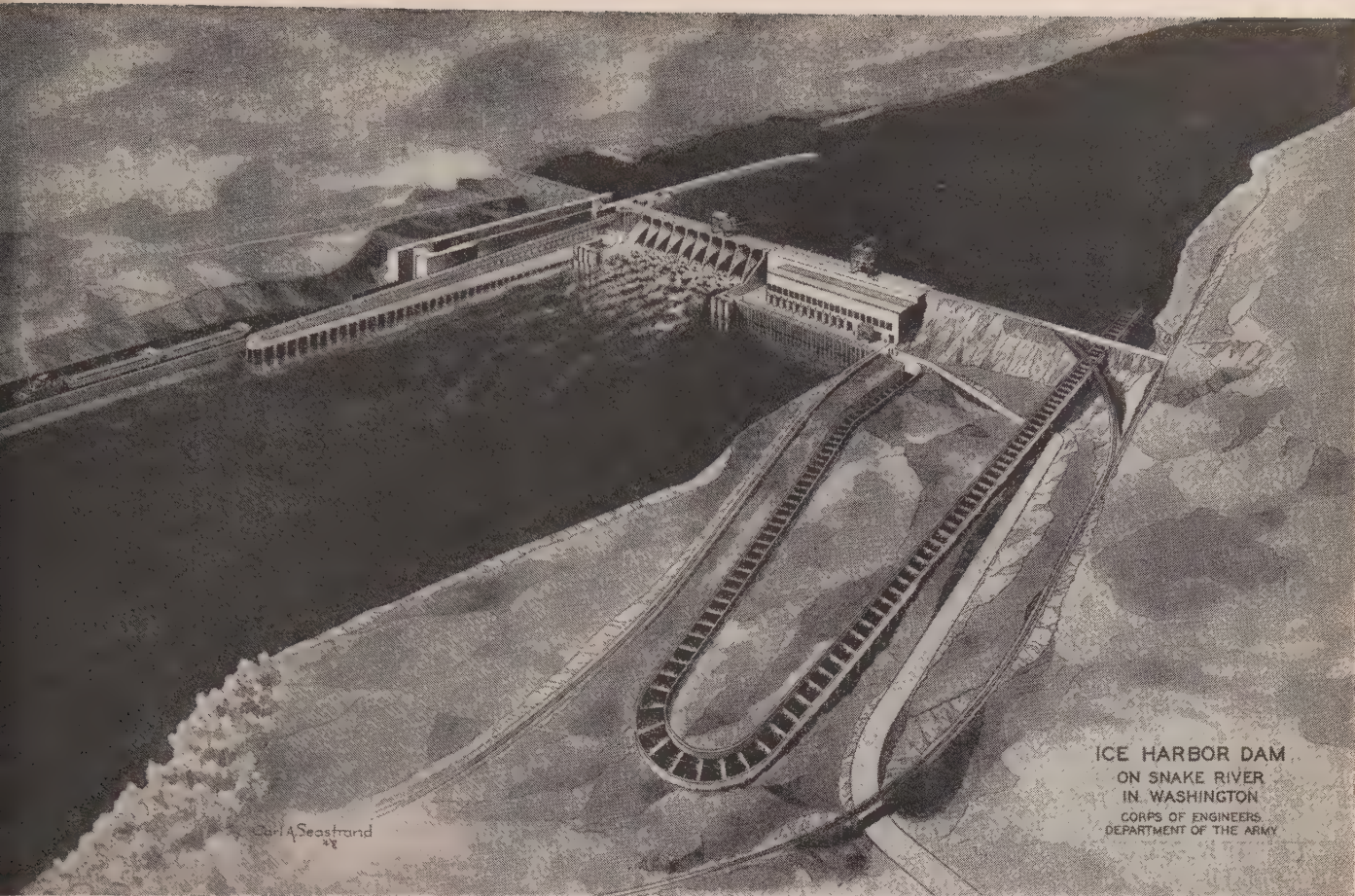
Clearing of **Seminole Reservoir** area is to start in the spring and is to be completed by fall of 1949. The Medicine Bow to Hanna Transmission Line, a 34.5-kv., 17-mi. long line, was completed in Sept., 1948. Construction on the Casper Substation was begun in October, 1948, and is expected to be completed by spring. The Casper-Kortes-Seminole 115-kv., 49-mi. long transmission line was started in Sept., 1948. Construction of the Medicine Bow Substation is to start soon and it is planned that an addition to the Cheyenne Substation will be started this summer. District Manager is I. J. Matthews.

Mirage Flats Project, Nebraska

All work on the project is to be completed during the current fiscal year. An award was made on Nov. 5, 1948, for an extension of the **Cottonwood Creek Siphon**; this structure is scheduled for completion before the 1949 irrigation season begins. Acting Construction Engineer is Fred C. Krauss.

Organization

Operations of the Bureau of Reclamation are under the direction of Michael W. Straus, Commissioner, Washington, D. C. Design and Construction activities are under the supervision of L. N. McClellan, Chief Engineer, Denver, Colo.



ICE HARBOR DAM
ON SNAKE RIVER
IN WASHINGTON
CORPS OF ENGINEERS
DEPARTMENT OF THE ARMY

Corps of Engineers— Achieves Greatest Year of Progress

With more funds available than in any previous year, the Corps of Engineers is making great strides in its comprehensive program of flood control and water conservation in the West

THE YEAR 1948 has been significant one in the execution of the comprehensive Civil Works program assigned by Congress to the Corps of Engineers. Funds appropriated for navigation improvements and flood control work during this period exceeded the appropriations of any previous year.

Congress appropriated 573 million dollars for Corps of Engineers' Civil Works operations during the current fiscal year. Flood control, with auxiliary benefits which include the conservation of water for reclamation, was granted 166 million dollars of the total. The remaining 167 million dollars was allotted for river and harbor improvements. Under specific direction from Congress, 133 million dollars was to be expended for new construction. This sum is now being applied to 277 river and harbor and flood control projects in 44 states and Alaska. The balance of the funds is allotted to maintenance, operation and

By **LT. GEN. R. A. WHEELER**
Chief of Engineers
Washington, D. C.

care, preliminary examinations and surveys, advance planning, and miscellaneous items.

Record appropriation

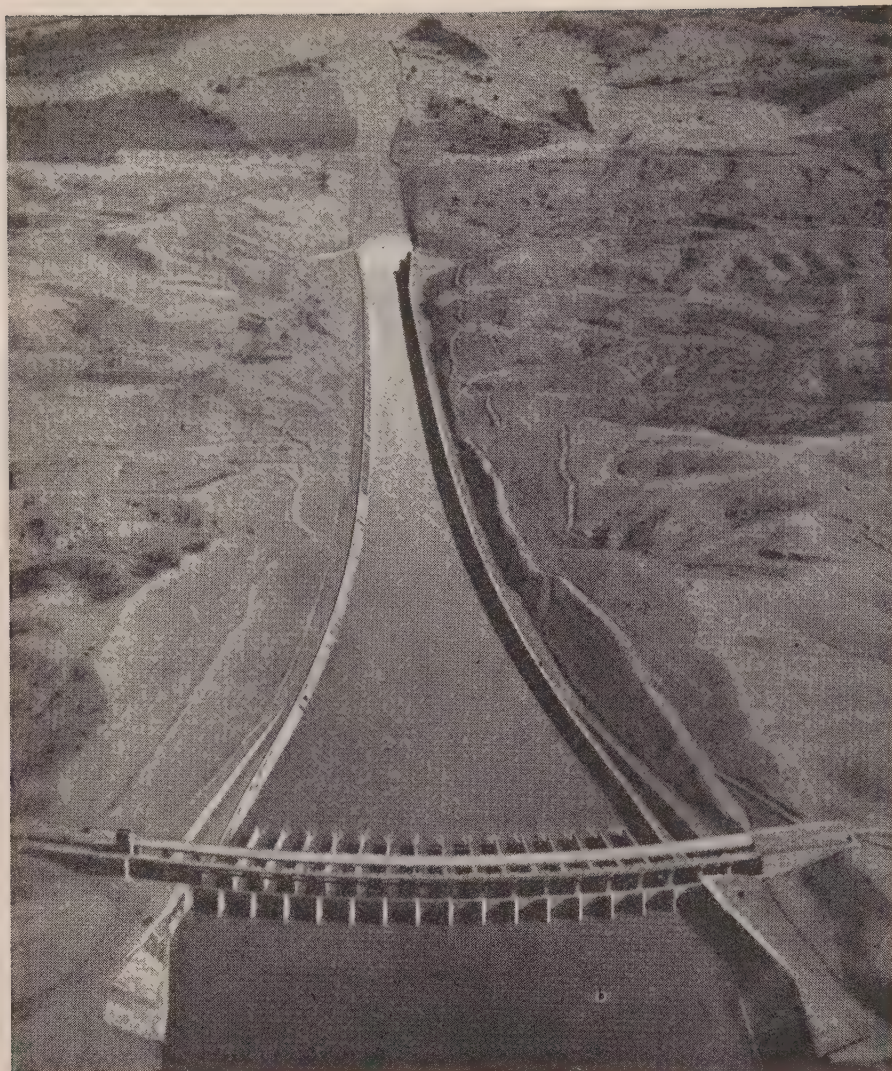
As a result of this record appropriation, the Corps of Engineers has been able to achieve one of the greatest years of progress yet attained under its Civil Works program. Though sufficiently flexible to meet new conditions, the over-all, inter-basin program has two definite objectives: (1) a fuller development and use of the nation's waterways, and (2), a greater protection for the American people against recurring floods. It leads to the conservation of flood waters and their subsequent use for important purposes, such as the

reclamation of arid areas in the great Western sections of the country.

The operations which these funds permit are nation-wide. At year's end a total of 226 projects were successfully functioning in the interest of flood control and allied purposes, 21 of which were placed in operation during the calendar year 1948. Construction work during the year was continued on 82 flood control projects of which 35 were reservoirs and 47 were projects which would provide benefits of a local character, such as levees, flood walls, channel improvements, etc. At the same time, construction work was initiated on 42 new flood control projects, of which 9 were dams and reservoirs.

Projects placed in operation

Reservoirs placed in operation during the year included the Big Dry Creek Reservoir, California; the Canton Reservoir, Oklahoma; the Clearwater Reservoir, Missouri; and the Kanopolis Reservoir, Kansas. Local protection projects placed in operation during the year included a portion of the Los Angeles River Channel, the section from Lankershim Blvd. to Niagara St.; a portion of the San Gabriel River Channel, the section from San Gabriel Canyon to



SPILLWAY at Fort Peck Reservoir, a portion of the greatest flood control project in the world, discharges water down a mile-long channel into the Missouri River.

Santa Fe Flood Control Basin; the projects at Jenks, Oklahoma; Fort Smith, Arkansas; near Dardanelle, Arkansas; the Conway County Levee District No. 6, Arkansas; the Roland Drainage District, Arkansas; the Green Bay Levee and Drainage District No. 2, Iowa; the projects at Forsyth, Montana; Hamburg, Iowa; Sebawaing, Michigan; Goldsboro, North Carolina; Lisle, New York; Whitney Point, New York; Addison, New York; Canisteo, New York; and the Codorus Creek Channel in the State of Pennsylvania.

Apart from the Lower Mississippi River Project, which embraces many component items, the largest individual appropriations in the current fiscal year were for two projects in the West. These two projects are Garrison Reservoir in North Dakota, for which 26 million dollars was appropriated, and McNary Dam, on the borders of Oregon and Washington, for which 22 million dollars has been appropriated. The 177-million-dollar Garrison Reservoir is a key unit to the comprehensive program for the Missouri River Basin. The 227-million-dollar McNary Dam is a key project for greater control and use of the Columbia River and its tributaries.

Total new construction funds allotted to projects in the western states this

year is almost 200 million dollars. In addition, these states are sharing in the funds ear-marked for maintenance, preliminary examinations and surveys, and other phases of the work.

The total cost of the general flood control projects already placed in operation by the Corps of Engineers is slightly less than 483 million dollars. Yet the damages prevented by these structures to date are in excess of 500 million dollars—and this in face of the fact that many of the projects have been in operation only a few seasons. They have already repaid their cost; and they will continue to render large economic and social benefits for many years to come.

The splendid performance of two small reservoirs in the West might be cited as an example of the substantial public returns from expenditures on such projects. The Cottage Grove and Fern Ridge reservoirs on the Willamette River in Oregon were constructed at a total cost of \$6,631,000. Since 1942, when they were placed in operation, these two small projects have prevented damages estimated at \$5,917,000. This return in the relatively short period of six years is a very good Federal investment. Furthermore, it does not take into consideration other benefits derived—notably in the recreational use of the reservoirs.

World's greatest project

The general flood control operation outlined above do not include the Lower Mississippi Valley Project—often called the greatest flood control project in the world. The total authorization for this comprehensive project is slightly over one billion dollars. Of this total, Congress has to date appropriated 719 million dollars. However, the damage which the project—though not completed—has already prevented are estimated at close to five billion dollars. A very worthwhile investment, even viewed in the cold, practical light of dollars and cents.

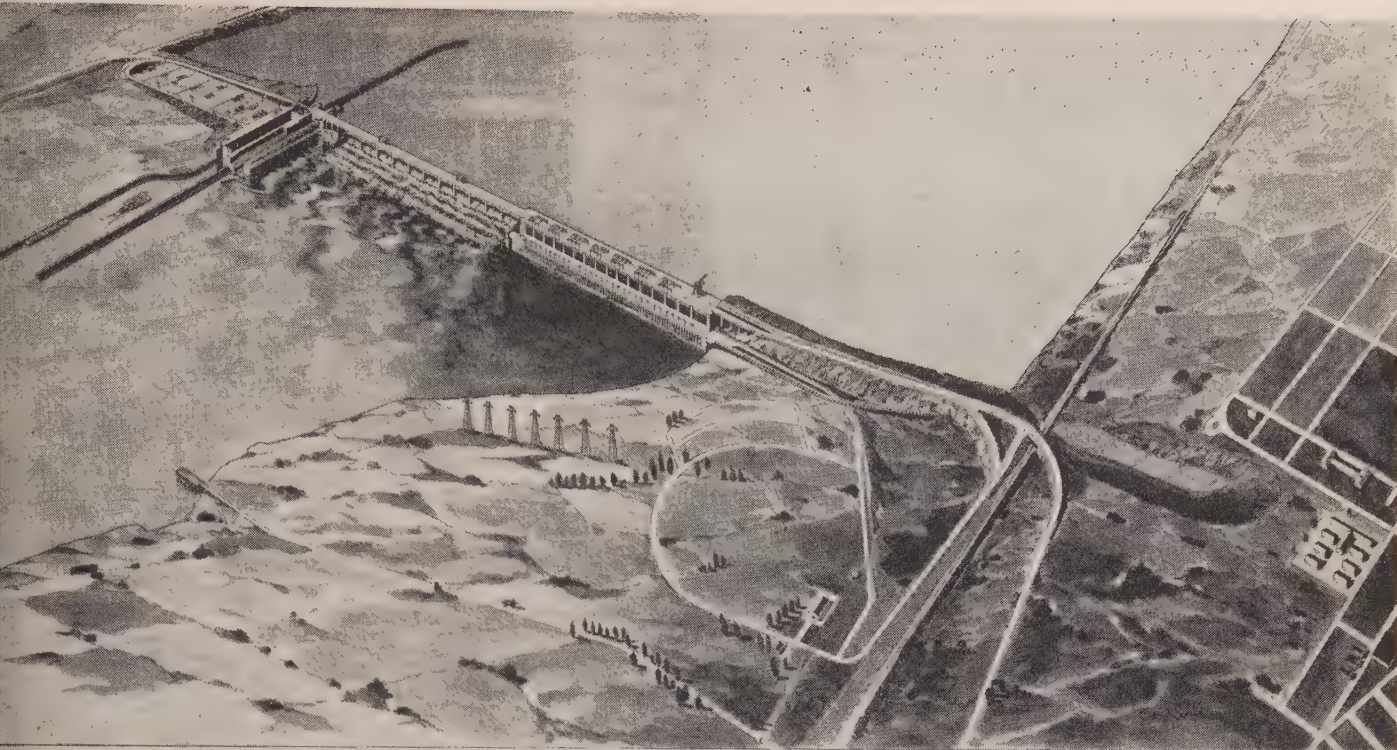
Under the important river and harbor program of the Corps of Engineers, we now have 27,000 mi. of improved navigable waterways, 185 harbors and 40 locks that have been completed and are being maintained and operated. In the last fiscal year, ten projects were completed. In all, maintenance operations were maintained on 326 river and harbor projects.

With the improvement of navigation facilities, waterborne commerce has constantly increased. In the calendar year 1946, the net total waterborne commerce of the United States was 618 million tons, after eliminating all known duplications. In 1922, the total was but 376 million tons. It is noteworthy that the postwar trend toward increased tonnage is continuing, with preliminary reports for 1948 indicating new highs in most areas of the country.

All Corps of Engineers' construction projects are authorized by the Congress of the United States only after thorough preliminary examinations and detailed surveys have been made. The surveys are designed by the Engineers to determine their economic justification; the views of all interested agencies, including local, state and Federal; and the best engineering solution for the problem involved. This year, Congress authorized 72 new projects—or modifications of existing projects—for rivers and harbors and flood control. In addition, Congress authorized 24 new preliminary surveys of proposed projects. Many of these new authorizations are for surveys or construction work in the Western states.

Columbia Basin comprehensive study

Among the investigations and surveys under way in the Western states is a comprehensive study of the Columbia River Basin. The report on this study was recently received in my office from our division and district engineers. The report, which will now go before the Board of Engineers for Rivers and Harbors, contains the results of analysis of projects totalling several billion dollars in cost. It will include recommendation to the Congress for the adoption of a comprehensive, properly coordinated multiple-purpose plan of development for the Columbia River Basin. The initial works to be recommended will provide for urgently needed flood control, relief of the power shortage of the Pacific Northwest, the orderly development of navigation, and the related projects.



McNARY DAM — COLUMBIA RIVER — OREGON AND WASHINGTON — CORPS OF ENGINEERS — U.S. ARMY

grams of other agencies covering irrigation, preservation of fish and wildlife, watershed treatment programs and other activities.

The Columbia River Basin projects, and all projects of the Corps of Engineers, are part of carefully drawn plans of basin-wide development. It is the policy of the Engineers to consider all possible uses of the water resources of the nation, and to present recommendations to the Congress for comprehensive plans which will provide a proper balance of the various possible uses.

Folsom Dam started

On October 2nd of last year, the Corps of Engineers was pleased to participate in ceremonies marking the initiation of construction on another large multiple-purpose reservoir project in the West. This was the Folsom Dam on the American River in California. One of the benefits for which this reservoir has been designated, and is now under construction, is to provide water for irrigation of a large area now without water or with a deficient supply. The Folsom Dam will make an important contribution to the welfare of the nation by preventing destructive floods, by generating electric power and by storing valuable water reserves for beneficial use.

The Engineers are making important progress—valuable progress. But there is yet much hard work to be done, if the nation is to achieve a fuller development and use of our water resources. There is deep satisfaction in investigating a water control—or water use—problem with a view to finding a sound engineering solution. There is a thrill in taking part in the initiation of actual construction on needed projects. But the finest reward is to see these plans developed into worthy and lasting projects for the public good.

Columbia Basin Development Racing With Power Shortage

ACCCELERATED progress in development of water resources of the Columbia Basin appears in sight. The rapidly developing power shortage in the Northwest and the disastrous 1948 Columbia River floods have added a new note of urgency to the situation.

The original major Columbia River projects, Grand Coulee and Bonneville, once considered as isolated super projects, have now been placed in proper perspective as units of a coordinated "Main Control Plan" for the Columbia Basin. This plan, when completed, will produce ten and one-half million kilowatts of firm power, control Kootenai and Columbia River floods, and bring slackwater navigation to Lewiston, Idaho.

The Main Control Plan, together with associated programs for local flood control, irrigation, transmission of power, fisheries development and other purposes, is outlined by the Corps of Engineers in the comprehensive "308" Report

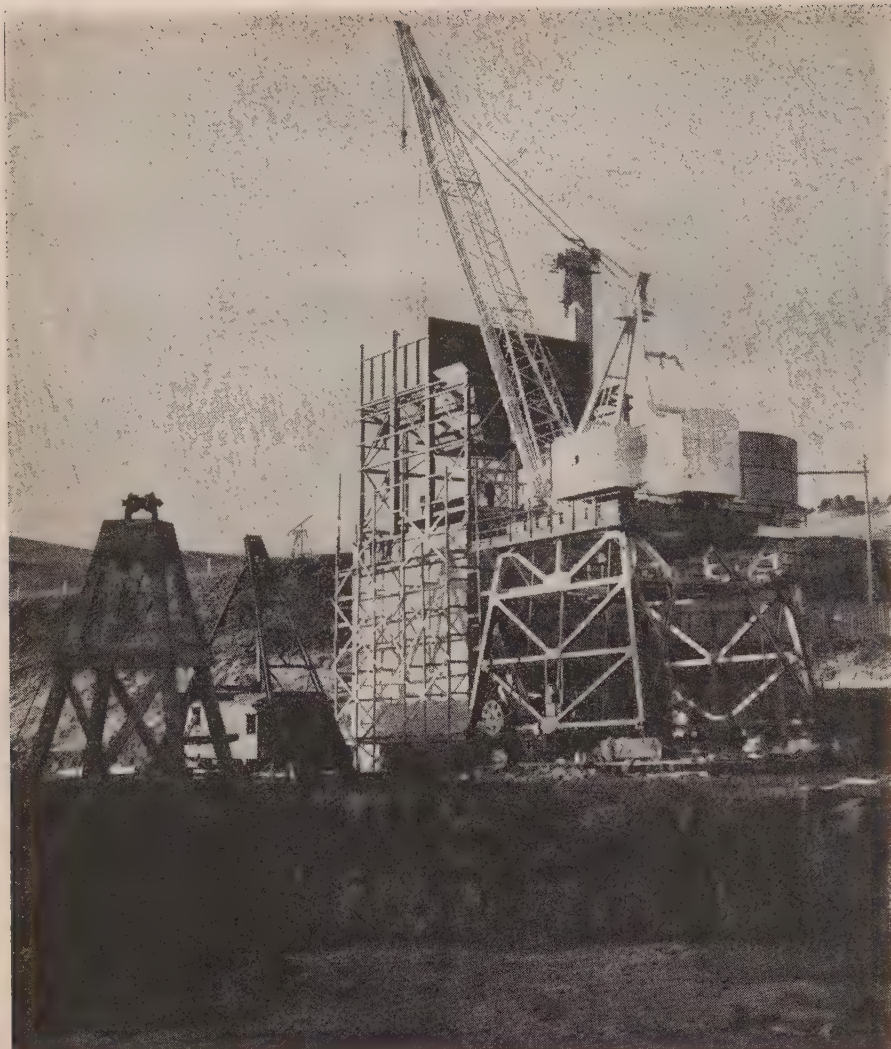
completed in October of 1948 and first made public at a November meeting of the Columbia Basin Inter-Agency Committee. The projects of the recommended plan were chosen from hundreds of alternate possibilities. Project locations have been surveyed, dam sites drilled and economic feasibility determined. Such a comprehensive plan, approved by Congress, is necessary to assure that necessary flood control, navigation and hydroelectric power are obtained with maximum economy and sound engineering.

Sheer magnitude is problem

The largest dam now under construction in the Columbia Basin is McNary, on which the first major construction contract is now well under way. This project, to provide an extension of slackwater navigation and 980,000 kw. of power, was originally scheduled to bring the first generators on the line into operation by December of 1953; but this schedule was set back to December, 1954, because of the scale of appropriations last summer.

In addition to the sheer magnitude of the McNary Dam project, major construction problems include the final closure of the Columbia River by the second step cofferdam, the probability of major floods, and expedients for passing both salmon runs and commercial navigation through the dam during various stages of construction. Main line railway relocations of the Union Pacific and Spokane, Portland & Seattle

FRONT COVER sketches on this issue show six proposed Engineer dams in the Columbia basin. Top to bottom on the left side they are: McNary, Hells Canyon, and Little Goose Dams, the latter two on the Snake River. On the right side, the pictures show Ice Harbor, The Dalles, and John Day Dams. The first of these is on the Snake, the others on the main Columbia. All were drawn by Carl Seastrand.



BATCHING PLANT and one of two electronically-operated cranes at the \$227,000,000 McNary Dam are shown above partially completed. The completed equipment went into use on Dec. 23, 1948, when the first bucket of concrete was tipped into forms for walls of the navigation lock (to be the world's largest single-lift lock). Construction continued during 1948 on 82 flood control projects throughout the country. Typical of these was Mariposa Dam near Merced, Calif. A view looking south and downstream at the Mariposa conduit pipe intake is shown below.



railroads and rail and highway bridges across both the Columbia and Snake Rivers involve auxiliary work of considerable magnitude.

Big ones coming up

The next major project in the Walla Walla district is expected to be Ice Harbor Dam, the lowest of the four Lower Snake dams, construction of which is already authorized. Planning funds were made available by the last Congress, and design, foundation exploration and model studies are progressing. In addition to extending inland navigation further into the wheat country, this project will add 260,000 kw. of power, of which 195,000 kw. can become available shortly after McNary power comes on the line. Power market studies indicate that this power will also be absorbed by the growing market even if the project is completed on the fastest possible schedule.

Among other projects authorized for construction by the Walla Walla district, the most important is Lucky Peak Dam on the Boise River. This project on which construction will start next summer, was authorized in order to provide flood control to the City of Boise and the intensively farmed lower Boise River Valley. However, a joint plan for the utilization of this reservoir is being worked out between the Corps of Engineers, the Bureau of Reclamation, and irrigation interests concerned. By this plan Lucky Peak will be operated jointly with Anderson Ranch and Arrowrock reservoirs to obtain reliable flood control of the Boise River, and at the same time provide increased irrigation benefits to water users.

Dam in country's deepest canyon

The above projects have previously been authorized by Congress. The new comprehensive plan will add additional authority and funds for local flood control and other programs; but the principal new project in the Walla Walla district will be the Hells Canyon Dam. This dam will be a 710-ft. high concrete gravity structure across the Snake River in the deepest canyon in the United States. Even drilling this site was an undertaking of considerable difficulty. The main dam, together with a re-regulating dam downstream, will have almost a million kilowatts installed capacity, at a normal head of 575 ft. In addition, it will firm up low water flows and power output of all dams downstream. Flood control capacity required for main Columbia floods can be provided up to 3,280,000 ac. ft., and if properly planned in conjunction with the other flood control projects, storage will be fully effective for this purpose as well as for power. The dam would also create an attractive lake 89 mi. long through wooded, rugged mountain scenery.

Hells Canyon Dam offers a notable challenge to the boldness and ingenuity of designers and construction men alike. But even this great project of the future will be only one more unit of a master plan for control of the largely untamed and unutilized energy of the Columbia River.

Two-Thirds of Farms Now Electrified

10.9 per cent in 1935—45.7 per cent by 1945—68.6 per cent by 1948—That's the story of progress in rural electrification —The 1948 percentage represents more than 4,000,000 farms connected to newly-constructed power lines — Congress has appropriated \$58,-000,000 to continue Western REA activity, chiefly in the Great Plains states where half of the farms are unelectrified

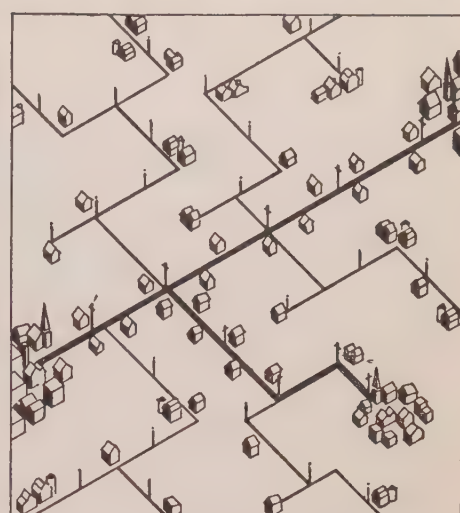
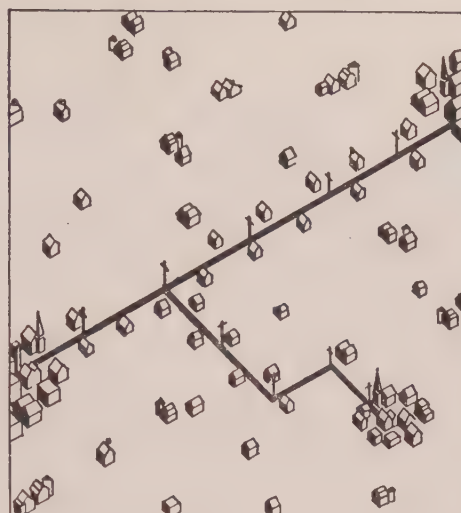
FARM ELECTRIFICATION in the United States has reached 68.6 per cent, the U. S. Department of Agriculture has announced.

It reached that level on June 30, 1948, after a year in which more farms received central station power than in any other year. According to the REA estimate, 4,019,476 farms were electrified by that date, 444,835 more than the estimate for the same date in 1947. Of the newly-connected farms, 320,677 were reached by REA-financed rural power distributors, who placed into operation 119,375 mi. of lines during the year. Despite this unprecedented gain, a formidable job of farm electrification remains, for about 1,840,000 farms still were without electricity.

The Department reported these statistics from the annual unelectrified farm survey of the Rural Electrification Administration. The survey is made to provide a basis for carrying out the provision of the REA Act which requires allotting to the states, in proportion to the number of unelectrified farms in each state, one-half of the loan funds made available annually by Congress. For the fiscal year ending next June 30, \$400,000,000 in loan funds was authorized by the recent Congress; therefore, \$200,000,000 will be allotted or apportioned among the various states on the basis of the survey. The funds so reserved are kept available to meet specific loan applications from the respective states during the fiscal year.

The remaining \$200,000,000 authorized and the \$93,000,000 available in loan funds from fiscal 1948 authorizations, is available without state allotment, except that no more than 10 per cent of these unallotted or so-called "discretionary" funds may be lent in any one state during the year.

The progress in rural electrification since the war is indicated by the record of recent years. A year ago 61 per cent of the farms were electrified, 54.3 per cent in 1946, 45.7 per cent in 1945, and 10.9 per cent in 1935 at the start of the Federal rural electrification program. Approximately 3,275,000 farms have received central station service since 1935 and of these 53.2 per cent are served by REA-financed lines.



THE AREA COVERAGE principle of electric distribution, as outlined by REA, is shown at right. Rather than restrict distribution to major centers, as in old system at left, the new system is calculated to avoid large gaps and fringe areas otherwise by-passed.

REA's survey shows that the greatest gains in the farm electrification during the fiscal year were made in the Southern and Middle Western states. Record loans for construction in the Great Plains area were resulting in greatly accelerated activity there as the year closed.

Ohio with 97.6 per cent of its farms electrified ranked first among the states in percentage of farms electrified. To reach this position REA-financed co-ops and Ohio utilities connected about 17,-000 farms during the year. Texas, with 43,000 new connections, reported the largest number electrified in the 12-month period. Most of the unelectrified farms are located in the Great Plains and in the Southern states, REA's survey shows.

Commenting on the progress of farm electrification, Administrator Claude R. Wickard said:

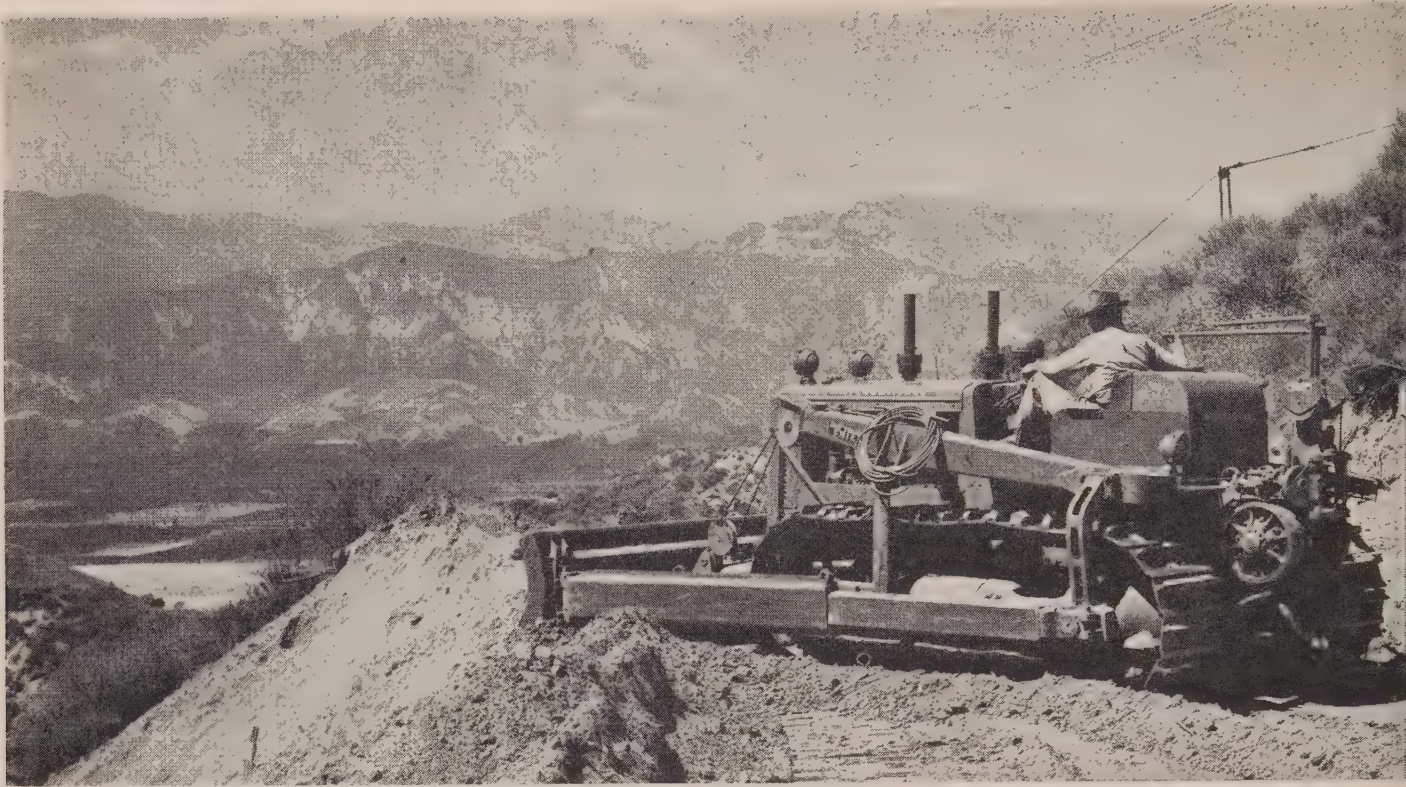
"The progress in 1948 was most gratifying, but we cannot afford to slacken our efforts with 1,800,000 farms and per-

haps as many other rural establishments still without electricity. These unserved people are as much entitled to electric power as those who already have it. But bringing electricity to them will challenge the ingenuity of all engineers and power suppliers interested in this field. Many of the farms are located in sparsely settled areas, and many in areas of rugged terrain.

"The national power shortage is a serious obstacle to expansion of rural power service. Some applications for line construction now pending cannot be approved because there is no power available in the area. REA cooperatives in many areas are finding it impossible to purchase from present suppliers the additional amounts of power they need as the consumption of present consumers increases. This power shortage, judging from its impact upon the rural electrification program, is growing more acute."

In the Western area, \$58,242,020 has been allotted. Statistics of the allotment of funds among the states follow:

	Farms With Electric Service	Farms Without Electric Service	Percentage of Farms Unelectrified	Statutory Allotment for Loans Fiscal 1949
Arizona	10,577	2,565	19.5	278,860
California	131,602	7,315	5.3	795,240
Colorado	38,009	9,609	20.2	1,044,640
Idaho	39,296	2,202	5.3	239,380
Kansas	71,161	70,031	49.6	7,613,340
Montana	18,837	18,910	50.1	2,055,780
Nebraska	48,946	62,810	56.2	6,828,320
Nevada	2,022	1,407	41.0	152,960
New Mexico	13,994	15,701	52.9	1,706,920
North Dakota	15,879	53,641	77.2	5,831,520
Oklahoma	72,669	92,121	55.9	10,014,820
Oregon	60,094	3,031	4.8	329,520
South Dakota	16,405	52,300	76.1	5,685,740
Texas	257,431	127,546	33.1	13,866,000
Utah	21,151	5,171	19.6	562,160
Washington	74,715	5,172	6.5	562,260
Wyoming	6,871	6,205	47.5	674,560



WESTERN road builders face problems of difficult terrain and long distances requiring the best and biggest equipment

Highways for 1949— Western States Budgets Bulging

Arizona

DUE TO the planned program of highway improvements developed during the later years of World War II, Arizona's construction program was ready for action immediately following V-J Day. Therefore the spending of 1944 Highway Act funds together with accumulated state funds began almost immediately.

During the calendar year 1947, \$9,192,914 was expended on highway construction in Arizona and the figure for 1948 will be approximately \$8,650,000.

The lack of any appropriated Federal funds for 1949 will curtail, in a measure, the construction program for the coming year. Arizona will spend a probable \$8,500,000 during 1949 on their highway construction program.

Since 1946-47 one of the new developments in the programming of construction funds has been the much publicized Arizona Sufficiency Rating tables. These tables make possible the selection of specific construction projects on the basis of Condition, Service and Safety factors as related to the entire State System.

Projects that have been approved in the 1948-49 fiscal year budget which are not yet under contract involve approximately \$10,000,000. The new fiscal year budget subject to approval by the Highway Commission July 1, 1949 will cover

additional projects planned for the last half of 1949 involving about \$8,700,000.

Some of the more important jobs contemplated in the programs outlined above include:

Rte. No.	Termini	Approx. Mileage
60	Ehrenberg East	7.5
60	Quartzsite E & W	10.0
66	Topock-Yucca	20.0
66	Ashfork-Ashfork Hill	10.0
66	Pine Springs-Williams	8.0
66	Winona-Canyon Padre	8.0
66	Cedar Pt.-Houck	5.7
69	New River-White Hills	5.0
69	White Hills-Rock Springs	7.0
69	Cordes Jct.-Mayer	10.0
69	Rock Springs-Maggie Mine	2.8
70	Queen Creek Tunnel and Appr.	
70	Globe-Miami Streets	1.7
70	Graham-Greenlee Co. Line E	6.0
80	Ligurta-Wellton	3.9
80	Wellton Overpass	
80	Mohawk-Kim	6.0
80	Oracle Road-Tucson	2.0
80	Tucson Controlled Access Rte.	6.0
84	County Line-Wymola	12.0
84	Tucson-Marana	12.0
86	Sells-Covered Wells	30.0
86	Covered Wells-Gunsight	30.0
86	Benson Bridge and Appr.	.6
89	Nogales City Limits North	10.0
93	Big Sandy North and South	5.0
93	Burro Creek Bridge and Approaches	15.0

This report was prepared by W. C. Lefebvre, State Highway Engineer.

California

EXPENDITURES of approximately \$75,000,000 during 1949 for highways in California are reported by State Highway Engineer George McCoy. His full report on the operation of the State's Burns-Collier Act, through which considerable additional funds have been secured, is shown on page 86, together with his detailed forecast for the 1949 work.

Colorado

WHILE the Colorado highway budget for 1949 has not been approved, the tentative set-up indicates an expenditure of approximately \$20,600,000 as outlined below:

Construction	\$14,200,000
Maintenance and Equipment	3,000,000
State oiling	1,600,000
Non-construction (includes Administration, Engineering, Planning, Traffic, etc.)	1,800,000
Total	\$20,600,000

In addition to the items on the proposed 1949 Budget, there will be a carryover of construction items from previous budgets of approximately \$4,000,

000, making a total for construction in 1949 of approximately \$18,000,000.

Mark U. Watrous is State Highway Engineer for Colorado.

Idaho

THE 1949 highway program of the Idaho Bureau of Highways envisions a total expenditure of \$15,455,000, including \$3,000,000 for maintenance.

Anticipated contract work, according to Roy G. Gartner, staff engineer, will include:

Portland cement concrete pavement	2.2 mi.
Bituminous mixes and treatments	401.9 "
Other types	124.3 "
Seal coating	244.7 "
Stockpiling maintenance material	286,000 tons
Major bridges to be repaired.....	3
Major bridges to be constructed.....	2
Grade separations to be constructed....	2

In a report prepared for the Idaho State Chamber of Commerce by Joe D. Wood, former Director of Highways and now on the Chamber's staff, it is stated that work amounting to \$483,000,000 should be carried out during the next 15 years. This would require an expenditure of \$18,441,040 annually, or roughly \$3,000,000 more than programmed for 1949. This, according to the report, would bring highways only up to a "minimum standard."

Kansas

AN INVESTIGATING committee appointed by Gov. Frank Carlson of Kansas to study the state's road system and make a report of its needs and the costs involved, has completed 18 months of work and reports that 79 per cent of the Kansas road system is deficient in one way or another. It added that the highway system has a backlog of nearly a billion dollars worth of work that needs immediate accomplishment. Further, the committee recommends new highways, bridges and other improvements, which will bring total spending requirements for the next twenty years up to \$1,775,160,000.

The committee recommended certain specific new sources of money to finance the huge program, including two cents additional gas tax, raising registration fees, boosting truck taxes, allocations from general funds, and diversions from liquor, sales, and other taxes.

The proposed average annual outlay for the highway system over the next twenty years is: State highways, \$9,294,000; county and township roads, \$38,850,000; and city streets, \$10,614,000, for an average total of \$88,758,000. Total expenditures for roads in the state during 1947 were \$53,012,424.

Montana

ACCORDING to Morris Griffith, Project Control Engineer for the Montana State Highway Commission, the con-



SEVERAL MOTOR GRADERS on one job typify the trend in Western road-building methods whereby increasing equipment investments are made to speed construction.

struction program on the primary and secondary systems of the state will aggregate \$10,000,000 during 1949. Thus far, however, no detailed program has been compiled, so that a break-down by projects is impossible.

Nebraska

A TWENTY-YEAR highway program to cost in excess of \$200,000,000 was proposed in a report recently made public by the Nebraska governor's highway advisory committee. This program would require \$10,787,000 in new revenue each year, and to meet this need, the committee proposes a one cent increase in gasoline taxes, higher registration fees, through the formation of special road

improvement districts, and a lifting of the present 3½-mill limit on county road levies.

The only extension to the present highway system suggested by the committee was for 308 mi. of new roads in the sand hills of west-central Nebraska. The balance of the funds would be for improvement and modernization of the existing highways.

Nevada

IN NEVADA, according to H. D. Mills, Assistant State Highway Engineer, it is proposed to construct or reconstruct 100 mi. of the Federal-aid primary highway system during 1949, at an estimated cost of \$3,250,000. Work on the Federal-aid secondary system will total approximately 240 mi., at a cost of \$3,000,000. There will be no large bridge projects this year.

New Mexico

IN HIS PROPOSALS to the New Mexico State Legislature for the next biennium, State Highway Engineer Burton Dwyre suggests expenditure of \$14,500,000 on highways, to be added to about \$16,000,000 of Federal-aid funds, for a total of \$30,500,000. Of the state funds, five million would be used for maintenance, a half million for strictly state roads, and nine million for matching funds. Dwyre stated that these figures were very necessary, and that maintenance, deferred during the war, was bringing the funds required for that type of work up to a new high. He proposed that the increased fund requirements be met through an addition of two cents to the state's gasoline tax.

Oklahoma

AWAITING action by the State Legislature, the Oklahoma State Highway



Commission is proceeding with its 1949 program using extreme caution. As announced by State Highway Director H. E. Bailey, the list of planned projects calls for an expenditure of \$14,022,443, a big shrinkage compared to the 1948 highway construction program.

The Commission is limiting many projects until the Legislature has decided on highway department finances at least for the next two years. There is strong support for legislation returning to the highway department approximately \$6,000,000 now diverted annually from vehicle license revenue to public education uses.

Planned projects for 1949 include widening of a number of the state's major highways. If additional revenue is provided, a considerable number of other widening projects are contemplated.

Oregon

OREGON'S highway construction program for the year 1949 is expected to be of about the same total as in 1948. The \$6,000,000 remaining to be contracted under the three-year postwar Federal-aid program will be under contract before the end of June. Contracting of the second postwar Federal-aid program will begin in the early spring and about \$7,500,000 should be under contract before the end of the year. In addition, there will be contracted during the year some \$3,000,000 of state (nonfederal-aid) contracts. Altogether, highway construction contracts should total for the year about \$16,500,000.

The 1949 program is somewhat larger than can be financed from the Highway Department's current revenues for the year. Contracting of the larger amount is made possible by an unexpended balance of funds accumulated during the war years when construction activities were held in abeyance.

Construction costs are holding at a high level due to continued high costs of labor, materials and equipment, but competition among contractors is reasonably keen and no lack of construction capacity on the part of contractors is evidenced. Difficulty in the obtaining of materials and labor is no longer a serious problem although, at times, shortages in these categories operate to retard progress. From a construction standpoint, 1949 should be a good year.

According to W. C. Williams, Assistant State Highway Engineer, it is anticipated that some 55 contracts will be awarded during the first six months of 1949. The majority of these are of course in the less-than \$100,000 bracket, but the major items are a steel bridge at Tillamook St. on Pacific Highway West, with paving and incidentals, \$1,436,000; an underpass and paving at Sundial on the Columbia River Highway, \$700,000; a bridge to Sauvies Island, on a county road, \$772,000; grading and paving on the Tillamook-Pleasant Valley section of the Oregon Coast Highway, \$703,000; two bridges on the Coast Fork of the Willamette River in the vicinity of Cottage Grove, \$363,000; grading and oiling

on the Klamath Falls-Malin highway, \$290,000; an underpass and approaches at Dewey Ave. in Baker, \$473,000; and the Coquille River bridge and approaches at Myrtle Point, \$240,000.

Details of the program after July 1 are not yet worked out.

Texas

TEXAS PLANS to build 1,500 mi. of farm-to-market or land service roads, and 390 mi. of primary highways next year with funds now in sight. Federal-aid money for next year totals \$25,599,000 and when matched with state funds will give approximately \$51,000,000.

Governor Jester has recommended to the Legislature that an additional sum of \$20,000,000 be appropriated from the state general fund to build 2,500 mi. more of secondary roads.

Contracts should be awarded on the following large bridge projects next year:

1. The Sabine River bridge at Orange, a joint undertaking by Texas and Louisiana.

2. The Neches River bridge at Beaumont.

3. A new highway through Waco involving a large bridge across the Brazos River.

4. Several complicated grade separations to be built on U. S. 80 at El Paso.

There is some possibility that two other large bridges will come up next year. They are the Canadian River Bridge at Canadian, and the new International Bridge at Laredo.

The Baytown-LaPorte tunnel will probably be awarded on contract next year. This will be a two lane tunnel under the Houston Ship Channel and will involve some complicated engineering problems.

In addition to these future projects, several large structures should be completed next year. They are the Colorado River bridge at Columbus, the Colorado River bridge at Smithville, the Canadian River bridge at Borger, and the Brazos River bridge between Bosque County and Hill County. Also scheduled for completion are the Pedernales River bridge in Travis County and several bridges across the Trinity River in Dallas and Denton Counties.

D. C. Greer is State Highway Engineer of Texas.

Utah

THE UTAH State Highway Department recently issued a statement that a capital outlay of \$161,000,000, is needed to bring the state's road system up to the standards required by modern traffic. The figure applies to state highways alone and does not include the requirements of city and county roads. By comparison with the above figure, it was pointed out that during the past eight years only \$45,500,000 has actually been spent on state roads. The motor fuel tax in the state produces about \$6,500,000 annually at the present time, and is all spent on highway work.

Washington

A BUDGET has been prepared for submission to the next session of the Washington Legislature which includes approximately \$17,000,000 for highway construction and \$7,500,000 for highway maintenance during 1949. Construction funds include the 1950 fiscal year Federal-Aid apportionment to the state, as follows: Primary Funds, \$3,145,271; Secondary Funds, \$1,064,810; and Urban Funds, \$651,877.

Proposed highway construction for 1949 includes 19 mi. of cement concrete pavement, 108 mi. of bituminous mixed and 672 mi. of other bituminous treated types of surface and 100 mi. of grading and surfacing. It is proposed to construct 37 bridges in excess of 20 ft. in length.

Construction contemplated during 1949 includes the following major projects:

- Primary State Highway No. 1, Castle Rock to Cowlitz-Lewis County Line, 9.8 mi. of grading, 4-lane, and from Longview Wye to Castle Rock, 10.4 mi. of paving.

- Primary State Highway No. 14, Purdy to Point Fosdick Road, 6.2 mi. of grading.

- Primary State Highway No. 15, Monroe to Sultan, 6.6 mi. of grading.

Chapter 111 of the 1947 Session Laws created the Joint Fact Finding Committee on Highways, Streets and Bridges. The services of the Automotive Safety Foundation were made available to the Committee and a basic study was carried out and a report on highway needs was prepared and submitted to the Committee for consideration by the legislature. Should the legislature act favorably on and provide revenue for the construction recommended by the report, the highway construction program will be increased greatly over the current program which is based on present revenue. The recommendations were briefed in the December, 1948 issue of *Western Construction News*.

Clarence B. Shain is Director of Highways for Washington.

Wyoming

J. R. BROMLEY, Superintendent of Highways for Wyoming, reports that it is estimated that the State's 1949 program will involve a total expenditure of approximately \$11,000,000, of which \$8,500,000 is planned for construction of between two and three hundred miles of road. Maintenance of the present highway system will cost around \$2,500,000.

In Wyoming the main effort of the construction program will be concentrated on the older parts of the state highway system. Many of these highways were built fifteen to twenty years ago and are now obsolete. They are in many cases inadequately designed for width, alignment and grade to meet present-day traffic requirements. The base and surface courses on these roads were not originally designed for the heavy truck loads now using the highways.

Federal Highway Program Retarded

Critical labor and material shortages slowing Western states' use of Federal highway funds result in 1948 legislation extending period of availability — Available funds now \$123,000,000

FEDERAL highway funds in the amount of \$202,044,463 have been obligated by the Public Roads Administration in the 11 Western States since Dec. 1, 1945. This includes all projects authorized for construction, under construction and completed. Available funds, to be obligated before Nov. 30, 1950, total \$123,104,961. This figure includes the unprogrammed balance from the 1946, 1947, 1948 and 1950 fiscal-year apportionments to the Western States, and indicates the probable amount that will be authorized for construction expenditures before Nov. 30, 1950. No apportionment was made for fiscal year 1949.

Changing with the "weather"

Public Roads Administration, similar to many other Federal agencies, has found it necessary to readjust its program to meet demands of post-war highway construction needs and to remain within yearly budget allowances. The Federal Highway Act of 1944 authorized the expenditure of \$500,000,000 a year for each of the three post-war years in the following amounts:

Federal-aid Primary System	\$225,000,000
Federal-aid Secondary System	150,000,000
Federal-aid Urban Highways	125,000,000

The first year's authorization was apportioned to the States on January 6, 1945, but in accordance with the provisions of the Act, use of the funds was deferred until after the termination of the emergency. The first year's authorization was released for expenditure on October 9, 1945, for use during the fiscal year 1946. The funds authorized for the two succeeding years have subsequently been apportioned.

The 1944 Act provided that the funds in each authorization would be available for one year following the close of the fiscal year for which the funds were authorized. Due to the critical shortages of labor and materials, the construction program throughout the entire United States did not proceed at the rate anticipated and the period of availability for using the funds was extended to two years by the Act approved June 21, 1947, and later to three years by the Federal Highway Act of 1948.

Many "firsts" in 1944 Act

The following important changes were brought about by the Federal Highway Act of 1944:

1. Provides for the states in cooperation with the Public Roads Administration to establish an Interstate System of

Highways not to exceed 40,000 mi. in the entire United States. This Interstate System has now been designated and was approved by the Federal Works Administrator on August 2, 1947. The approved mileage of this System in the 11 Western States amounts to 10,135 mi. (See Table I.)

2. Provides for the designation of a system of Secondary or Feeder roads to be selected by the State Highway Departments in cooperation with the County Commissioners (or other governing bodies) and the Public Roads Administration. Such a system has been designated in each state in the following mileages:

Arizona	2,719 mi.
California	8,957 "
Colorado	3,567 "
Idaho	3,035 "
Montana	3,063 "
Nevada	1,872 "
New Mexico	3,983 "
Oregon	4,417 "
Utah	2,630 "
Washington	6,042 "
Wyoming	1,496 "
Total	41,781 mi.

3. For the first time provides an independent authorization for the improvement of roads and streets in urban areas with a provision that such funds be used on Federal-aid routes or extensions thereof in urban places. The Act defines an urban area as a municipality of 5,000

ROUTES selected by states for inclusion in national system of interstate highways total 37,681 mi. Approximately one-third of this mileage is in the West (Table I).

or more population to which shall be added adjacent areas having urban characteristics.

4. Permits the use of not to exceed 10 per cent of the combined apportionment for each year to pay the entire cost of installations to eliminate hazards at railway-highway grade crossings. The different classes of projects which may be undertaken are:

- (a) Installation of grade crossing protection devices (flashing light signals).
- (b) Elimination of existing grade crossings by separation of grades.
- (c) Relocation of highway to eliminate existing grade crossing.
- (d) Reconstruction of existing railway-highway grade crossing structures.

5. Provides for cooperation between the Civil Aeronautics Administration, the Public Roads Administration and local governing bodies having jurisdiction of airports in the selection of airport sites.

Funds for different classes

The Federal Aid Highway Act of 1944 also authorized for other than Federal-

**TABLE I
INTERSTATE SYSTEM OF HIGHWAYS**

Approved Mileage in 11 Western States	
State	Total Mileage
Arizona	1,145 mi.
California	1,923 "
Colorado	670 "
Idaho	626 "
Montana	1,236 "
Nevada	539 "
New Mexico	1,011 "
Oregon	694 "
Utah	702 "
Washington	576 "
Wyoming	1,013 "
Total	10,135 mi.



TABLE II
Allotments of Federal Highway Funds to the West for 1948 and 1950

State	1948 Fiscal Year Apportionment				1950 Fiscal Year Apportionment			
	Regular Federal Aid	Secondary or Feeder Roads	Urban Highways	Total	Regular Federal Aid	Secondary or Feeder Roads	Urban Highways	Total
Arizona	\$ 3,200,969	\$ 2,213,711	\$ 258,807	\$ 5,673,487	\$ 2,883,981	\$ 1,994,406	\$ 232,926	\$ 5,111,313
California	8,897,891	5,092,619	8,018,102	22,008,612	8,025,813	4,595,138	7,216,292	19,837,243
Colorado	3,984,738	2,681,454	921,677	7,587,869	3,583,930	2,411,757	829,510	6,825,197
Idaho	2,753,168	1,925,401	209,084	4,887,653	2,478,367	1,733,203	188,176	4,399,746
Montana	4,484,330	3,063,876	303,721	7,851,927	4,048,884	2,766,121	273,348	7,088,353
Nevada	2,829,804	1,896,250	59,836	4,785,890	2,564,998	1,718,707	53,853	4,337,558
New Mexico	3,587,749	2,483,615	253,963	6,325,327	3,234,379	2,238,846	228,567	5,701,792
Oregon	3,683,994	2,513,880	800,477	6,998,351	3,330,486	2,272,391	720,430	6,323,307
Utah	2,505,608	1,668,657	428,170	4,602,435	2,259,221	1,504,566	385,353	4,149,140
Washington	3,490,842	2,363,648	1,448,616	7,303,106	3,145,271	2,129,619	1,303,754	6,578,644
Wyoming	2,759,180	1,872,353	131,343	4,762,876	2,474,161	1,679,067	118,209	4,271,437
Total	\$42,178,273	\$27,775,464	\$12,833,796	\$82,787,533	\$38,029,491	\$25,043,821	\$11,550,418	\$74,623,730

aid highways the following amounts for each of the three fiscal years:

Forest Highways	\$25,000,000
Forest Development Roads and Trails.....	12,500,000
National Park and National Monument Roads	4,250,000
Access roads to Nat. Parks and National Monuments	10,000,000
Indian Reservation Roads	6,000,000

The Federal Highway Act of 1948 authorized funds for Federal-aid highways in reduced amount of \$450,000,000 for each of the fiscal years 1950 and 1951. In addition, it provided funds for continuing construction of all classes of roads for which funds were provided under the 1944 Act as follows:

Federal-aid Primary Highways	\$202,500,000
Federal-aid Secondary or Feeder Roads.....	135,000,000
Federal-aid Urban Highways	112,500,000
Forest Highways	20,000,000
Forest Development Roads and Trails.....	17,500,000
National Park and National Monument Roads	10,000,000
Access Roads to Nat. Parks and National Monuments	10,000,000
Indian Reservation Roads	6,000,000

This Act also provides for the cancellation of \$25,000,000 for Forest Highways authorized for fiscal year 1948 under the 1944 Act.

The funds authorized for Federal-aid construction for fiscal year 1950 were apportioned on September 1, 1948, and the states are proceeding with the programming of projects thereunder.

War effects

At the outbreak of World War II, most of the states had sizeable balances of unexpended Federal-aid funds which were frozen by the Government wartime limitations, and construction was restricted to those roads which would be of direct assistance to furthering the war effort. As a result, some of the states had quite large unexpended balances of these funds at the end of the war. Only \$1,099,610 of the \$78,975,875 apportioned to the 11 Western States for the fiscal years 1941, 1942 and 1943 remains available for future construction.

The Act of July 30, 1947 appropriated the remaining balances of the 1941 and 1942 and all of the 1943 Federal Lands Highway apportionments. The funds authorized for use in the 11 Western States for the three fiscal years amount to \$4,758,002, of which only \$721,142 remains available for future construction.

During the war, highway work was restricted largely to the construction of access roads to Army and Navy establishments and to sources of raw materials (mainly mineral and forest products) necessary in the development and operation of these areas. This work was carried out mainly with special funds authorized under the Defense Highway Act of 1941, and was generally financed entirely from Federal funds.

One important development during the war period was the authorization of the use of Federal-aid funds with state matching funds for surveys and preparation of plans for projects to be constructed in the post-war period. The 1941 Act carried an authorization of \$10,000,000 for this purpose, which was augmented by unexpended balances of prewar funds (1941, 1942, 1943 fiscal years).

This was the first time that Federal funds had been authorized for prelim-

inary engineering. Since then the definition of "construction" has been revised to include preliminary engineering as well as the acquisition of rights of way. The Federal pro rata share of the cost applicable to the acquisition of rights of way is limited to one-third of the cost with adjustments in the Public Land States.

Few Federal Buildings Planned for This Year

THE PUBLIC Buildings Administration has no authorized general construction program for calendar 1949 or fiscal 1950. Only the most essential building projects will be placed on the market during calendar 1949.

In the West, there are but two building projects it is expected can be placed on the market for bids during 1949. Those are the construction of an additional story, etc., for the Terminal Annex in Los Angeles, and the extension and remodeling of the Marine Hospital in San Francisco.

A considerable number of construction projects in the West are eligible for consideration under any future public building program, but at the moment any forecast based on eligibility would be both premature and unreliable.

Program of Water Pollution Control Will Begin in 1949

THE BUREAU of Community Facilities, a constituent unit of the Federal Works Agency, was organized in January, 1945, with the primary objective of assisting state and local governments in the advance planning and in the construction of various community facilities.

The Bureau, in conjunction with the Public Health Service, will embark on a program of water pollution control in 1949. This program is authorized by Public Law 845, 80th Congress, approved June 30, 1948, and an appropriation will be asked of the 81st Congress to enable the program to get under way. The authorizing legislation contemplates the making of loans to state and

(Continued on page 119)

TABLE III
Total Federal Funds Obligated and Available

Dec. 1, 1945 to Nov. 30, 1950		
State	Obligated*	Available†
Arizona	\$ 15,612,988	\$ 6,643,278
California	62,495,917	23,954,371
Colorado	18,025,931	11,760,108
Idaho	8,551,769	10,648,724
Montana	13,481,658	17,377,357
Nevada	10,671,412	8,154,090
New Mexico	14,809,411	10,053,596
Oregon	17,748,920	9,740,622
Utah	10,913,008	7,148,176
Washington	16,256,267	12,418,301
Wyoming	13,477,182	5,206,338
Total	\$202,044,463	\$123,104,961

* Includes all projects authorized for construction, under construction and completed.

† Includes the unprogrammed balance and funds for projects programmed but not authorized for construction.

Municipal Programs for 1949

Post-war municipal construction will reach its peak this year—The phenomenal growth of population in the West is more and more forcing major cities to concentrate their budgets on expansion of sewerage and water supply facilities

Albuquerque

ALBUQUERQUE's expenditures for construction during 1949, as reported by E. O. Betts, Director of Public Works, will amount to \$900,000 for water works expansion, including trunk lines, a reservoir, and new wells; \$500,000 for sewage disposal, including intercepting trunk lines and an addition to the sewage disposal plant; and approximately \$100,000 for block-to-block extension of sanitary sewers.

Boise

BOISE HAS now under construction a sewage disposal plant, activated sludge type, to be completed in December, 1949, at a cost of \$929,374. The equipment to be installed at this plant amounts to an additional \$185,126.

Installation of two collector sewers now under construction is to be completed in April, 1949, at a cost of \$257,344.

Of the work contemplated for next year, one sewer district is fairly well assured, consisting of 2 mi. of 8 to 15-in. sewer line to serve an area in the west end of the city. Another sewer district being considered but not yet decided upon, will consist of 3 to 4 mi. of 8 to 18-in. sewer line. An area of 500 ac. of new additions to the city will want sewers in the near future.

There will be 30 to 40 blocks of streets to be oiled and minor amounts of sidewalk, curb and paving.

A taxiway and parking apron at the Municipal Airport will probably be constructed in the spring, along with some expansion of the facilities at the Terminal Building, according to J. L. Morris, City Engineer.

Cheyenne

ACCORDING to H. G. Watson, City Engineer of Cheyenne, Wyo., that city is planning to construct during 1949 a sewage treatment plant which will cost \$850,000, and 11,000 ft. of 30 x 36-in. outfall sewer, estimated to cost \$200,000, dependent on approval of a revenue bond issue. Storm sewers, sidewalks, pavement, and water mains will account for another \$141,500 in construction work. Further details of the 1949 program are not yet set up.

Denver

PROPOSED construction items to be undertaken by the City and County of Denver during the calendar year 1949, as outlined by Deputy City Engineer Terry J. Owens, include:

First Section Valley Highway, 2.2 mi.	\$3,000,000
Addition to Sewage Disposal plant	1,700,000
6 Sanitary Sewer Districts.....	900,000
5 Alley Paving Districts.....	250,000
2 Street Improvement Districts	250,000
Bridge across Cherry Creek at Grant Street	80,000
Addition to Administration Bldg. at Stapleton Airfield.....	350,000
Municipal Stadium Building.....	1,500,000
Addition to County Hospital Building	500,000
Construction of Fire House.....	125,000
Construction of Fire Alarm Building	172,000
Additions and repairs to recreation facilities	1,000,000
Library Building	2,500,000
Total	\$12,327,000

Fresno

A. SEGEL, City Engineer of Fresno, Calif., reports that the following construction projects are in the planning stage with plans partially completed on

some of the items, and it is contemplated that they will be constructed during 1949:

Widening of Divisadero St. from Thesta St. to North Angus St.	\$ 70,000
Jensen Ave. sanitary trunk sewer	820,000
California Ave. sanitary interceptor sewer	70,000
West Ave. sanitary trunk sewer	80,000
California Ave. storm sewer outfall	325,000
Airport construction, including administration building.....	120,000
Park improvements—Zoo improvements and water mains..	40,000
Total	\$1,525,000

El Paso

W. K. BRADSHAW, Public Works Engineer for the city of El Paso, Texas, states that the city has at present under contract and just beginning and expected to reach total peak in late 1949 the following:

Railroad grade separation project, in which the tracks are depressed for more than one-half mile through town and eight bridges are to be built to carry streets across—\$5,000,000.

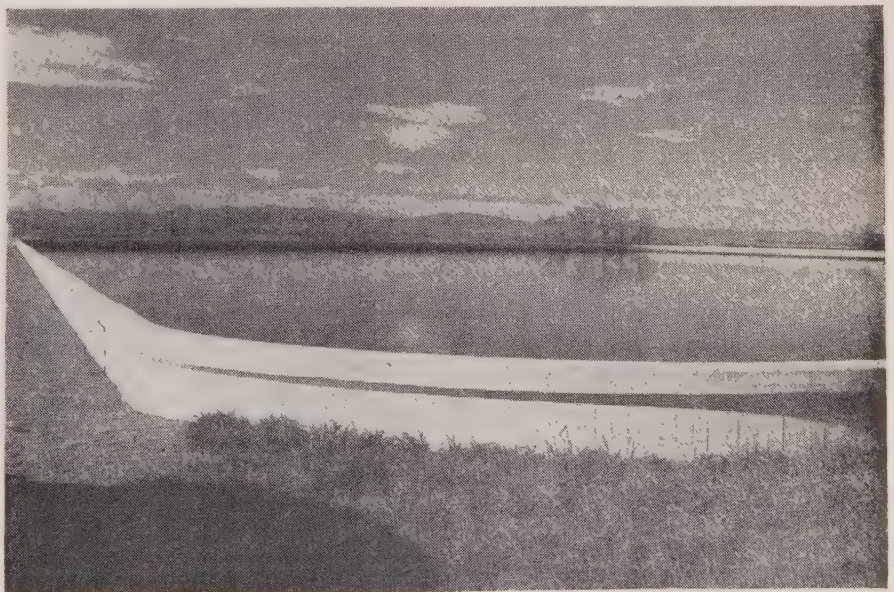
Bids to be received in January for an \$8,000,000 (est.) overpass carrying across railroad yards approximately 1,700 ft. in length.

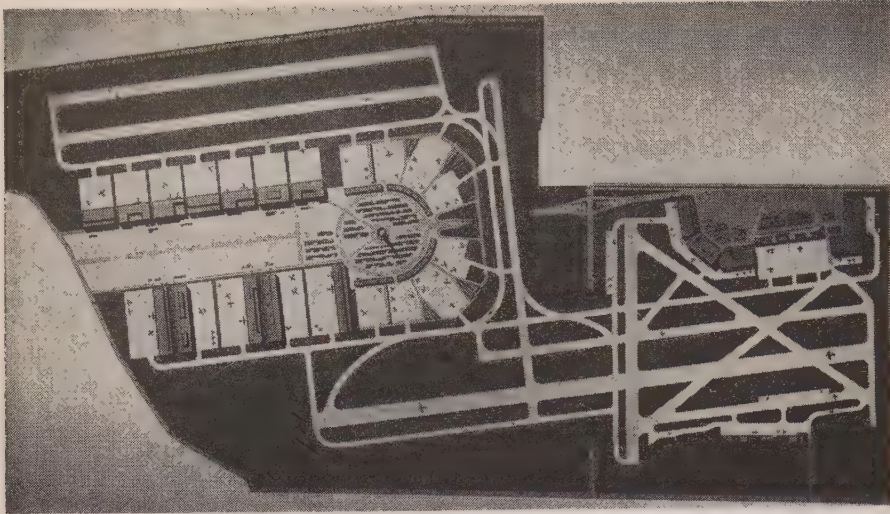
Appurtenant contracts to the Track Depression Project, totalling approximately \$1,500,000 to be let from January through August of 1949.

A system of retention dams and a storm water conduit system contract just awarded—work to begin very shortly and continue through 1949. Total cost \$1,750,000.

A major trunk highway (Paisano Dr.) by-passing the City of El Paso and con-

WATER SUPPLY needs grow with population, so Western cities are busy constructing new reservoirs and distribution systems. Pictured is a new reservoir at Greeley, Colo.





AIRPORTS will continue as a large item on 1949 municipal budgets. New facilities at Los Angeles Municipal Airport, above, will require 11,600,000 cu. yd. of grading.

tinuing through the county with work in progress now and expected to last two more years with a total estimated cost of \$4,000,000.

Improvements to filtration plant and water lines to begin about February, 1949, continuing through 1949. Estimated cost \$50,000.

Construction of filtration system for swimming pool, to cost approximately \$25,000.

Street paving and culvert expansion program for 1949—approximately \$50,000.

Additional ballfield lighting systems, both hardball and softball, and bleacher construction—approximately \$30,000.

New Library—estimated cost \$40,000.

New fire stations, including remodeling of one station, addition to one station and building of one new station—\$50,000.

This program brings estimated construction in the city during 1949 to \$20,545,000.

Los Angeles

REPORTING for the City of Los Angeles, Lloyd Aldrich, City Engineer, states that public improvement work handled by the Bureau of Engineering has been increasing during the past several years. This increase was a natural one, following the curtailment of such operations during the war years, during which period the influx of new residents continued at a rate even higher than previously experienced. The demand for public improvements will undoubtedly continue during the coming year but the actual volume of construction will be limited by the ability of the engineering force to complete the necessary plans.

In general, projects have been included in the following list on the basis that bids will be received and contracts awarded in 1949. However, in some cases where noted, work already under contract has been included.

Bureau of Engineering

Hyperion Treatment Plant (Contracts awarded and now under construction)	\$22,000,000
Hyperion Treatment Plant (Uncompleted portion)	10,090,200
Interceptor and Relief Sewers	3,000,000

Parkways and Structures.....	3,000,000
Streets, Sewers and Storm Drains	13,000,000
	\$51,090,200

Public Buildings

Police Admin. Building.....	\$10,000,000
Fire Stations (10).....	2,000,000
Asphalt Plant	32,000
	\$12,032,000

Parks and Recreation

Swimming Pools, Park and Recreation Buildings	\$ 1,000,000
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Airports

Drainage, Bridges and Dust Palliative	\$ 208,000
Grading	3,363,731
	\$3,571,731

Department of Water and Power, Water System

Projects under construction:	
Los Angeles River Supply, Conduit Extension	\$ 1,500,000
Baldwin Hills Reservoir.....	2,000,000
	\$ 3,500,000

Proposed Construction in 1949:

Baldwin Hills Reservoir, In- let and Outlet Lines.....	\$ 5,000,000
Silver Lake Outlet Lines.....	2,000,000
Minor Tanks and Reservoirs	300,000
	\$ 7,300,000
Total, Water System.....	\$10,800,000

Total, City of Los Angeles..\$78,493,931

Oakland

THE CITY of Oakland, Calif., as reported by City Engineer Walter N. Frickstad and Charles A. Whitton, Director of Architectural and Engineering Services for the city's public schools, will carry out in 1949 one of the heaviest construction programs of any city in the West. School projects will total \$15,760,000, while various other municipal functions will expend \$11,960,000. In addition, there will be a great deal of construction on state highway and freeway projects within the city, outlined in

the report of the State Division of Highways elsewhere in this issue, and on the water supply and sewage disposal programs of the East Bay Municipal Utility District, outlined separately.

The principal items in the city's new year program include construction of 6-lane divided road on East 12th St. from 14th Ave. to Fruitvale Ave., 1.1 mi., \$1,371,000; San Leandro St., six lanes between Seminary Ave. and 98th Ave., 2.1 mi., \$714,000; one mile of Mountain Blvd. as a 4-lane divided highway, Broadway to Bruns Ave., \$1,553,000; 26th St. and Harrison St., 6-lane divided highway, Broadway to Grand Ave., 0.4 mi., \$642,000; five sewage separation projects and eight storm drain projects at a total cost of \$1,540,000; street improvements and sanitary sewer under public proceedings, \$532,000; main library, \$1,250,000, and 7 smaller public buildings, \$370,000; swimming pools and other playground and recreation facilities, \$1,005,000; enlargement of Oakland airport, \$750,000; dredging of San Leandro Bay and filling Portlands, \$600,000; and other small projects.

The Oakland Public Schools presently have construction under way and due to be completed on nine schools. The largest of these contracts is \$1,424,000 for an academic building at San Leandro High School, and the others are for gymnasiums at Elmhurst and Hamilton Junior High Schools, and structures at Burckhalter, Lafayette Markham, and Parker schools, and Lockwood Junior and San Leandro Senior Highs. To be let in 1949 are contracts for construction of various buildings at 16 other schools. The largest anticipated expenditure will be \$1,500,000 at McClymonds Senior High School, but Bella Vista, Boy Scout, Brookfield, Burbank, Cox, Fruitvale, Redwood Heights, Washington, Webster, Montclair, Rockridge Annex, Central Trade, Castlemont Senior High, and Claremont and Bret Harte Junior Highs will all receive new buildings or improvement to existing structures.

East Bay District

EAST BAY Municipal Utility District, which furnishes water to cities along the east side of San Francisco Bay, and is at present constructing a sewage disposal system for the same cities, reports through John S. Longwell, Chief Engineer and General Manager, a \$18,757,000 construction program for next year along the Bay. The program, by projects, is as follows:

Water Projects

Third aqueduct from Claremont Tunnel to Distribution system (15,700 ft. of 30 and 54-in. steel pipe).....	\$ 600,000
Feed line from Upper San Leandro Filter Plant to Distribution system (14,750 ft. of 36 to 60-in. steel pipe).....	610,000
98th Ave. transmission line from Upper San Leandro Filter Plant (4,600 ft. of 24 to 30-in. steel pipe).....	107,000
Peralta Reservoir—3 m.g.....	120,000

Miscellaneous water mains of smaller sizes	900,000
Upper Cragmont Reservoir—2 m.g.	80,000
Seneca Reservoir—28 m.g.	400,000
Alameda Office Building.....	65,000

Total Water Projects..... \$2,882,000

Sewage Disposal Projects

Interceptors	\$6,801,000
Railroad Crossings	125,000
Outfalls	3,001,000
Raw Pumping Plant.....	711,000
Outfall Pumping Plant.....	350,000
50th Ave. Pumping Plant.....	198,000
Treatment Plant	4,689,000

Total Sewage Disposal Projects\$15,875,000

Phoenix

THE CITY of Phoenix recently passed an additional bond issue for public works, and together with the funds available from prior appropriations, will spend approximately the following amounts during 1949:

Spillway gates for Verde River, and Horseshoe Dam to increase available water supply..	\$ 800,000
Water works expansion program, including distribution mains, transmission mains and production works	4,000,000
Sky Harbor Airport expansion..	3,500,000
Fire Department expansion of new stations and equipment....	1,500,000
Public Library and Branch Libraries	1,300,000
Public Parks	1,000,000
Paving and street widening.....	1,000,000
Sanitary sewer extension.....	300,000
Total	\$13,400,000

The foregoing listed items will all be under construction and will reach approximate conclusion of construction during the calendar year of 1949, according to R. G. Baker, City Engineer.

Portland

ROUGH ESTIMATES of cost of construction by the City of Portland in 1949, as reported by Ben S. Morrow, City Engineer, are as follows:

Intercepting Sewer and Sewage Treatment Plant.....	\$3,500,000
Miscellaneous sewer extensions	400,000
Miscellaneous street construction	290,000
Water Works extensions.....	300,000
Parks	267,000
Total	\$4,757,000

Seattle

FOLLOWING is a list of public works construction proposed for the ensuing year, exclusive of Park and Light Department betterments and exclusive of the 7 million dollar Public Safety Building now under contract, as reported by R. W. Finke, City Engineer of Seattle.



NEW FACILITIES for sewage disposal are a "must" in many of the West's municipalities. Los Angeles County's 12-ft. diameter outfall line is their answer.

The projects will involve the expenditure of approximately 10 million dollars, segregated as follows:

Paving	\$3,000,000
Sewers	1,500,000
Grading	200,000
Water Supply and Distribution Lines	1,500,000
Concrete Walks	300,000
Bridges, Viaducts, etc.....	3,500,000

Some of the principal projects are:

Alaskan Way Viaduct. A double deck, six-lane structure along the waterfront, bypassing the business district. It is estimated that one-third of the total cost of \$6,300,000 will be expended in 1949.

Admiral Way Bridge. Reinforced concrete bridge over Fairmont Gulch in West Seattle. It is estimated to cost \$90,000.

University Approach, connecting Roosevelt Way with the University campus. The project involves two roadways, each 35 ft. wide, and an underpass under Roosevelt Way. Estimated cost: \$300,000.

Boren Avenue Extension. The extension of Rainier Avenue into Broadway, involving the grading and paving of a new arterial, with 46-ft. roadway. Estimated cost: \$100,000.

Ballard-University cut-off. The grading and paving of a new connection between the University and Ballard districts. Estimated to cost about \$120,000.

Emerson Street Viaduct, connecting 15th Ave. West with the Magnolia District at the south end of the Ballard Bridge, involving a reinforced concrete viaduct and pavement. Estimated to cost \$316,000. In addition to the city's expenditure, the Great Northern Railway Company will construct a steel or concrete bridge in connection with this project.

Arterial Lighting System. It is estimated that one-eighth of the 4 million dollar project will be expended in 1949.

Cast iron water mains in distribution system and steel water supply lines from headworks to reservoirs, between reser-

voirs, and in north suburban area. Estimated to cost \$1,500,000.

Two large trunk sewer projects not included in the above tabulations:

Diagonal Avenue, et al., to serve the west slope of Beacon Hill and the industrial tide lands east of the East Waterway, estimated to cost \$800,000, and the

White Center Trunk Sewer in West Seattle, estimated to cost \$560,000,

may possibly reach the contract stage during late 1949.

The balance of the total expenditure for betterments will be for residential paving, arterial widening, lateral sewers, minor sidewalk, grading and miscellaneous work. In addition to the betterment program, about \$400,000 will be expended to resurface approximately 25 mi. of existing pavements. This is a continuing program, requiring about 90,000 tons of asphaltic concrete annually, and is performed by the city's forces, as is all maintenance work. Original construction is, in nearly all cases, accomplished by contract.

San Diego

A STATEMENT from A. K. Fogg, City Engineer of San Diego, indicates the magnitude and wide variety of projects to be undertaken in that city during 1949.

Work to be undertaken or completed by the Water Department in 1949:

Alvarado 66 mgd. filtration and softening plant now 20% completed—Total cost	\$3,300,000
Alvarado 20 mg. regulating reservoir with concrete roof now 25% completed—Total cost	285,000
Kearney Mesa pipe line to serve fast growing area north of San Diego River.....	1,150,000
Bay View 10 mg. reservoir and pipe line	375,000
Electric Ave. pipe line.....	360,000
Chalcedony pipe line.....	115,000
Muirlands pipe line extension and pumping plant	50,000
Highland Ave. pipe line.....	250,000
Bonita pipe line replacement...	450,000
Minor water development works	350,000
Water distribution works including replacement of inadequate pipe lines, installation of additional mains, and reconstruction of pumping plants	900,000
Total	\$7,585,000

Construction on the Mission Bay project will extend over a period of several years. It is proposed to relocate the pressure sewer between Mission Beach and Ocean Beach; construct the Midway Drive Bridge and the Ventura Point-Sunset Point Bridge with the connecting roads; build drainage structures to serve the De Anza Cove area; and the utilities to serve Gleason Point and De Anza Point during 1949.

A program of trunk sewer installation to serve the entire city and eliminate septic tanks in the beach areas has been in progress since bonds were authorized

in 1941. This program will be practically completed during 1949 with the extension of a trunk sewer for approximately five miles from Pacific Beach to La Jolla Shores, by the construction of nine sewage pump stations, and the completion of construction of an enlargement of the sewage treatment plant to increase the capacity from approximately 20 mgd. to 40 mgd.

In addition to trunk sewer construction it is expected that more than 20 mi. of sewers will be constructed in the city under local assessment proceedings during 1949.

Construction of Mission Valley Road on a limited access basis, from a connection with Cabrillo Freeway to Fairmount Ave. is scheduled for 1949. This is a joint City-County Project with the County Surveyor's office doing the engineering upon the approximately 2-mi. section within the city limits. Construction of the Wabash Blvd. Highway will be started in 1949. This is a 6½-mi. north-south through highway which will serve the eastern portion of the city. It will connect with the Mission Valley Highway on the north and Harbor Dr. on the south.

Approximately 170 street and alley improvements are scheduled to be constructed in 1949 under local improvement proceedings, and several drainage projects, including the Canon St. Drain, are planned.

San Francisco

A CONSTRUCTION program totaling \$54,302,550 will be carried out in San Francisco during 1949, according to City Engineer Ralph Wadsworth and Manager of Utilities James H. Turner. A tabulation of projects shows that all classes of improvements are to be included.

Two major construction contracts awarded shortly before the end of 1948 will be under way in January. One of these, an \$8,000,000 contract, will provide the first unit of San Francisco's principal sewage treatment plant. This unit, located in the northeasterly portion of the city, will contain the aeration and sedimentation facilities of the new system. The second contract already awarded is for the construction of a new double-leaf bascule bridge across the Islais Creek channel at Third St. The new structure, to cost about \$1,250,000 will widen the existing waterway from 75 to 100 ft., and will provide six lanes for traffic in place of the present four.

During the year additional sewer and sewage treatment projects will include the following:

Sludge Treatment Plant at the Islais Creek area and connecting force main from the aeration and sedimentation plant.....	\$5,000,000
Additional units of the Lake Merced Storm Drainage System involving a second tunnel and a pile supported structure across the lake.....	2,000,000
Extension of Lake St. Sewer....	800,000

A major feature of the street improvement program will be the removal of

additional streetcar tracks and repaving and reconstruction of streets occupied by them. Among the major streets to be included in the 1949 Program are Hayes, Haight, Fulton, Van Ness, Potrero and Sutter Sts. The total cost of this program is expected to run over \$3,000,000.

Other street and highway projects which are expected to start in 1949 are as follows:

Broadway Tunnel from Powell to Larkin St.	\$6,000,000
Extension of Bryant St., from Second St. to Beale St., including a viaduct	200,000
Army St. widening from So. Van Ness Ave. to Guerrero St.	400,000
Stanley Dr. underpass at Junipero Serra Blvd.....	600,000
Overpass structure at junction of Alemany Blvd. and Junipero Serra Blvd.....	400,000
Mission St. viaduct over Alemany Blvd.	400,000

The program will also include a further extension of the modern 3-light traffic signal system in various parts of the city at a cost of about \$800,000 in 1949.

Public Utilities Commission projects for the year, in tabular form, are:

Municipal Railway	
Rolling Stock	\$1,950,000
Buildings	2,660,000
Miscellaneous Structures	50,000
Trolley Construction	1,451,000
Track Reconstruction	351,000
Materials	140,000
Contingencies	67,000
	\$6,669,000

Hetch Hetchy Water Supply	
Installation spillway gates at O'Shaughnessy Dam	195,000
Cherry River Development.....	1,250,000
Hetch Hetchy radio installation	40,000
River Crossing of San Joaquin	1,050,000
	\$2,535,000

Water Department	
Rehabilitation of Alameda pipeline	100,000
Sutro Reservoir and lining.....	1,120,000
Sutro Reservoir pipeline.....	800,000
Sunset supply (Burlingame to Millbrae)	900,000
Sunset supply (Baden to San Bruno)	500,000
Sunset supply (San Bruno to Millbrae)	420,000
Minor replacements throughout system	100,000
Steel main (36 in. in S. F.).....	296,000
Corporation Yard	200,000
Lake Merced pumping station..	1,250,000
Replacement Crystal Springs pipe	390,000
Bay Division pipeline #3.....	11,920,000
Lime treatment plant.....	100,000
Cast iron mains Lakeshore Park	100,000
	\$18,196,000

San Francisco Airport	
Passenger concourse	48,000
Sewage treatment plant and appurtenances	400,000
Constructing one runway and taxiways	1,875,000
Widening, improving existing runway	630,000
Seeding landing field	125,000
Fencing	45,000
Roads, roadway lighting and appurtenances	90,000

Constructing area for airline terminal expansion	360,000
Field lighting and electric power system	770,000
Buildings in present building areas	380,000
Aids to air navigation.....	120,000
	\$4,843,000

Bureau of Light, Heat and Power

For replacement of old street lights and construction of new street lights on San Francisco streets	459,550
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Tacoma

ACCORDING to D. E. Morris, City Engineer, the year 1949 will undoubtedly prove to be an active one in the construction field in the City of Tacoma, particularly from the standpoint of sewer construction. One Local Improvement District has already been approved for 20 mi. of lateral sewers ranging in size from 8 to 15 in. This particular district covers an area of 650 ac. in what is known as the Fern Hill district of Tacoma. Another local improvement district has been called for hearing early in January for the Arlington district which will involve approximately 15 mi. of lateral sewers.

Plans call for grading approximately 1.8 mi. of city streets on what is known as the Pearl St. cut-off to the Tacoma Narrows Bridge. This cut-off will be a 4-lane construction and will provide ready access to and from the bridge at the south end of Tacoma.

Petitions for the establishment of local improvement districts now on file practically assure the construction of one mile of concrete sidewalk and one and one-half miles of Portland cement concrete pavement. Pending petitions indicate that local improvement districts will be established calling for the resurfacing of existing streets with approximately 4 mi. of asphaltic concrete pavement.

Local improvement districts are under way or contracted to the extent of 28.2 mi. of pipe and 132 new six-inch fire hydrants, partly new extensions and partly replacement of wood or inadequate steel mains.

A beginning is expected to be made on construction for the proposed Northeast Tacoma development, involving a 16-in. submerged steel main across Hylebos Waterway, a 1,200-g.p.m. booster pump station at East 11th and Marine View Dr., and a 12-in. steel discharge main from the pump station to NE. 33rd and Brown's Point Blvd. Should cast iron pipe become available, a beginning will be made on the construction of the local improvement district which will require 5 mi. of 12-in. cast iron pipe and the construction of a 500,000-gal. reservoir.

Two additional wells have been drilled in South Tacoma, and three more are planned for 1949. Pumps will be purchased for all five after determining the most suitable capacities. Some 6,600 ft. of 60-in. treated wood pipe remain in the Green River Supply pipe line which is planned to replace with 72-in. or larger steel pipe in the latter part of 1949.

Large Contracts Awarded in 1948

ARIZONA

Mardian Construction Co.	Building	\$ 700,000
Orr & Orr Construction Co.	Highway	417,471
Del E. Webb Construction Co.	Building	20,000,000
Fisher Contracting Co.	Highway	688,536
R. E. Bruce	Building	1,293,415
Womack Construction Co.	Building	739,825
Albert B. Schuff	Building	1,500,000
M. M. Sundt Construction Co.	Building	419,583
W. R. Skousen	Highway	438,801
Arizona Sand & Rock Co.	Airport	517,679
Phoenix-Tempe Stone Co.	Highway	468,027
Vinson Construction Co.	Bridge	778,215
Braemar Apartments, Inc.	Building	1,000,000
Stolte, Inc. Arizona Rock & Sand Co., and Ralph A. Bell and		
United Concrete Pipe Corp.	Steel Towers	2,794,686
Fisher Contracting Co.	Building	1,300,000
Lee Moor Contracting Co.	Bridge	327,459
H. L. Royden	Bridge	374,686

CALIFORNIA

Lord & Bishop and M. J. B. Construction Co.	Highway	1,394,374
Claude Fisher Co., Ltd., and L. A. & R. S. Crow	Dike	916,930
Monson Brothers	Building	1,225,000
Zoss Construction Co.	Building	1,710,000
Harms Brothers	Highway	921,103
L. E. Dixon Co.	Filtration Plant	2,592,400
Bressi-Bevanda Constructors, Inc.	Channel Impr.	3,381,174
Donald Groom	Building	2,000,000
A. Gersten	Building	1,700,000
Paul W. Trousdale	Building	1,867,300
Moore & Roberts	Building	1,887,777
Parker, Steffens & Pearce	Building	2,000,000
Griffith Co.	Highway	1,037,126
Winston Brothers Co.	Highway	1,373,504
Parish Brothers	Highway	1,210,080
Macco Corp.	Bridge	1,117,900
Russell P. Cataline	Building	2,500,000
Allied Contractors, Inc.	Building	1,788,984
Cahill Bros.	Building	2,000,000
Cahill Bros.	Building	1,250,000
Merritt-Chapman & Scott Corp.	Building	17,000,000
United Concrete Pipe Corp.	Conduit extn.	1,396,654
Pacific Bridge Co.	Digestion sys.	3,989,000
Standard Dredging Co.	Dredging	907,535
Stolte, Inc.	Pipe line	2,552,302
Dinwiddie Construction Co.	Building	1,076,450
Swinerton & Walberg	Building	2,750,000
Elmer J. Freethy	Building	1,560,000
Erbenraut & Sommers	Building	2,270,000
Fredrickson and Watson Construction Co.	Highway	1,373,333
N. M. Ball Sons	Highway	1,192,329
E. C. Nickel	Reservoir	1,352,600
American Pipe & Const. Co.	Canal	1,593,462
M & K Corp.	Building	1,293,415
Starrett Bros. & Eken	Building	40,000,000
Lepero Corp.	Building	2,388,123
Dinwiddie Construction Co.	Building	1,076,937
Fredrickson & Kasler	Highway	1,055,958
Stolte, Inc., and Duncanson-Harrelson Co.	Highway	1,318,315
Guy F. Atkinson Co.	Settling sys.	3,613,850
Otto B. Asbach & Sons, Steenberg Construction Co.	Canal	4,826,544
Macco Corp.	Dam	848,245
Monson Bros.	Building	4,500,000
Marigold Corp.	Building	2,000,000
Starrett Bros. & Eken	Building	2,000,000
Swinerton & Walberg	Building	4,700,000
Griffith Co.	Highway	1,642,999
Harms Bros.	Highway	890,867
G. E. Kerns	Bridge	695,769
Fred J. Early, Jr.	Sewerage	778,564
M. H. Golden	Sewerage	1,349,616
K. V. Lloyd and Co.	Canal	2,203,993
Bechtel Corp., and Humiston-Rosendahl, Inc.	Building	3,500,000
Moore & Roberts, Inc.	Building	1,767,777
David D. Bohannon	Building	3,750,000

Parish Bros.	Highway	1,179,479
Clyde W. Wood, Inc.	Highway	960,595
Morrison-Knudsen Co., Inc.	Canal	4,418,811
John J. Moore Co.	Building	2,000,000
Johnson, Drake & Piper, Inc.	Bridge	1,487,711
Artukovich Bros.	Sewers	1,083,027
M. & K. Corp.; Fredrickson & Watson Construction Co., and Piombo Construction Co.	Sewer sys.	1,290,819
Morrison-Knudsen Co., Inc.	Airport	3,994,844
United Concrete Pipe Corp.	Pipe line	2,178,261
Swinerton & Walberg	Building	1,423,400
Watson Bros.	Building	1,600,000
Peter Kiewit Sons' Co., and Fred J. Early, Jr.	Power Plant	3,579,701
Blakeslee-Spierung Co.	Building	3,400,000
Zoss Construction Co.	Building	2,164,192
Baruch Corp.	Building	1,589,000
Stone & Webster Eng'g. Corp.	Gen. Plant	50,000,000
MacDonald, Young and Nelson	Building	30,000,000
Monson Bros.	Building	2,111,856
Haas & Rothschild	Building	2,278,000
Guy F. Atkinson Co.	Bridge	1,327,404
Peter Kiewit Sons' Co., and Fred J. Early, Jr.	Sewerage	1,049,592
MacDonald & Kruse; Green-Mears Construction Co., and Fred D. Chadwick	Channel	1,341,724
A. Teichert & Son	Channel impr.	2,794,308
Standard Dredging Co. and San Francisco Bridge Co.	Dredging	1,439,100
Bechtel Corp.	Gen. Plant	50,000,000
Bechtel Corp.	Power Plant	3,500,000
Stolte, Inc.	Building	1,214,864
Frank C. Sheldon	Building	2,300,000
Guy F. Atkinson Co.	Bridge	1,491,500
Duncanson-Harrelson Co.	Bridge	1,214,277
M. & K. Corp.; Stolte, Inc.; Fred J. Early, Jr., and Haas & Rothschild	Sewerage	8,289,526
Swinerton & Walberg	Building	1,398,000
Downer Corp.	Sewer syst.	763,966
George Herz & Co.	Highway	774,189
C. L. Peck	Building	1,000,000

COLORADO

Morgan Construction Co.	Building	3,000,000
Bonforte Construction Co.	Building	3,000,000
Preston Construction Co.	Building	2,000,000
J. H. & N. M. Monaghan & Assoc.	Highway	559,200
Western Paving Co.	Airport	743,556
Brown Construction Co.	Highway	480,192
Thomas Bate & Sons	Building	1,000,000
Colorado Constructors, Inc.	Sewerage	725,298
Peter Kiewit Sons' Co.	Highway	568,228
Del E. Webb Construction Co.	Building	8,132,706
Mead & Mount Construction Co.	Building	1,120,000
Northwestern Engineering Co.	Highway	2,225,709
Utah Construction Co.	Dam	10,301,653
Brown-Schrepferman & Co.	Building	1,000,000
F. J. Kirchhof Construction Co.	Building	400,000
Mead & Mount Construction Co.	Building	422,000
Blanchard Bros.	Highway	416,111

IDAHO

H. A. Gardner Construction Co.	Highway	460,110
Kloepfer & Gramkow	Building	871,452
Western-Knapp Engineering Co.	Smelter	1,000,000
Walter Butler Construction Co.	Building	1,000,000
Morrison-Knudsen Co., Inc.	Power Plant	11,500,000
Max J. Kuney Co.	Highway	517,851
C. B. Lauch Construction Co.	Sewerage	929,374
Intermountain Builders	Building	558,377
Sather & Sons	Highway	475,538
Carl E. Nelson	Highway	409,641
Jacobsen Construction Co.	Building	350,000

MONTANA

General-Shea-Morrison-Knudsen	Dam	43,431,000
S. J. Groves & Sons Co.	Highway	633,466
J. C. Boespflug Construction Co.	Building	2,000,000
Anderson & Millensifer	Sewer	723,824

Askevold Construction Co.....	Building	468,270
Cahill-Mooney Construction Co.....	Building	620,895
General Electric Co.....	Generators	4,414,000
F. R. Hewett Co.....	Bridge	632,448
Wixson & Crowe Co., and J. H. Trisdale.....	Dam	1,733,880
Lease & Leigland.....	Building	4,400,000
S. J. Groves & Sons Co.....	Highway	962,873
S. Birch & Sons Construction Co.....	Highway	377,417
Nilson-Smith Construction Co.....	Bridge	344,360
McLaughlin, Inc.	Airport	269,000

NEBRASKA

Henry Carlson and Lovering Construction Co.....	Building	5,244,854
C. F. Lytle Co. and Amis Construction Co.....	Dam	4,270,006
Guy F. Atkinson Co.; Bressi- Bevanda Constructors, Inc.; Charles L. Harney, Inc.; W. E. Kier Construction Co.; A. Teichert & Son, Inc.; Trepte Construction Co., and David G. Gordon Construction Co.....	Dam	19,432,386
Peter Kiewit Sons' Co.....	Building	9,984,000
Utilities Construction Co.....	Trans. line	663,252
Missouri Valley Construction Co.....	Relocation	938,067

NEVADA

Morrison-Knudsen Co., Inc.....	Airport	825,999
N. P. Van Valkenburgh.....	Water supply	511,057
Gibbons & Reed.....	Highway	549,007
Schumaker-Evans.....	Building	1,200,000
Southwest Welding & Mfg. Co.....	Penstocks	935,000
Cummings-Baldwin, Inc.....	Building	1,000,000
Olof Nelson Construction Co.....	Highway	744,093
Silver State Construction Co.....	Highway	324,192

NEW MEXICO

W. T. Bookout Construction Co.....	Highway	754,288
Robert E. McKee.....	Building	1,805,462
Haddock Engineers, Ltd.....	Building	1,545,997
J. H. Ryan.....	Bridge	740,274
Lowdermilk Bros.....	Highway	788,655
Robert E. McKee.....	Building	1,053,577
Haddock Engineers, Ltd.; Engi- neers, Ltd.; Tucker McClure; and Ben C. Gerwick.....	Building	11,000,000
O. G. Bradbury.....	Building	938,449
Robert E. McKee.....	Building	2,011,663
Bowen & McLaughlin	Highway	424,135
D. D. Skousen.....	Highway	469,587

NORTH DAKOTA

C. F. Lytle Co. and Green Construction Co.....	Dam	2,360,743
S. J. Groves & Sons Co.....	Highway	868,730
Peter Kiewit Sons' Co., and Morrison-Knudsen Co., Inc.....	Dam	13,622,066

OKLAHOMA

Mittry Bros. Construction Co.....	Dam	5,174,600
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OREGON

San Francisco Bridge Co., and Standard Dredging Corp.....	Channel	2,198,950
Warren Northwest, Inc.....	Highway	657,071
W. C. Smith, Inc.....	Building	1,049,442
Del E. Webb Construction Co.....	Building	2,562,952
Leonard & Slate Oregon Ltd.....	Highway	673,458
Macco Corp.....	Bridge	845,900
Sound Construction & Engrg. Co.....	Building	1,669,905
Ralph & Horwitz.....	Building	1,000,000
Remmet Construction Co.....	Building	1,200,000
Guy F. Atkinson Co.; J. A. Jones Construction Co.; and Os- trander Construction Co.....	Dam	21,648,763
J. G. Shotwell.....	Aggregate	1,498,200
Ross B. Hammond Co.....	Building	1,371,793
Robertson, Hay & Wallace.....	Building	3,500,000
J. A. Terteling & Sons, Inc.	Channel	620,963

SOUTH DAKOTA

Western Contracting Corp.....	Dam	4,405,800
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TEXAS

Robert E. McKee.....	Building	5,712,770
R. P. Farnsworth & Co.....	Building	4,588,900
List & Clark Construction Co.....	Dam	4,263,000
H. B. Zachry	Trans. line	330,440

UTAH

Bechtel Corp.....	Refinery	5,000,000
Christiansen Bros.	Building	1,500,000
W. W. Clyde & Co.....	Highway	507,220
Floyd F. Whiting.....	Channel impr.	591,550
Pacific Pipeline and Engineers, Ltd.....	Pipe line	5,000,000
B. D. Palfreyman.....	Building	3,000,000
Jensen Bros.	Building	611,220
United Concrete Pipe Corp.....	Pipe line	2,429,220
Neils Fugal	Water dist.	439,330

WASHINGTON

Peter Kiewit Sons' Co.....	Highway	884,550
Nels Mortensen & Co.....	Building	1,367,440
MacDonald Building Co.....	Building	2,644,110
Nettleton-Baldwin-Anderson, Inc.....	Building	3,000,000
Kuney Johnson Co.....	Building	1,120,550
Manson Construction & Engrg. Co., and Osberg Construction Co.....	Bridge	1,719,330
Morrison-Knudsen Co., Inc.....	Reloc. RR.	1,000,000
Newport News Shipbuilding & Dry Dock Co.....	Turbines	2,563,090
Bethlehem Pacific Coast Steel Corp.....	Bridge	8,263,900
John A. Roebling's Sons Co.....	Cables	2,932,660
Nettleton-Baldwin-Anderson, Inc., and Sound Engrg. & Construction Co.....	Building	9,500,000
Henry George & Sons, and McInnis & Roberts.....	Building	1,049,880
Robert E. McKee.....	Building	2,467,000
Henry George & Sons.....	Building	2,160,110
Westinghouse Electric Corp.....	Generators	6,466,770
Peter Kiewit Sons' Co., and Morrison-Knudsen Co., Inc.....	Building	2,789,220
McNeil Construction Co.....	Building	4,000,000
General Construction Co.....	Bridge	1,853,660
Nettleton-Baldwin-Anderson, Inc.....	Building	3,000,000
Kuney Johnson Co.....	Building	3,354,090
Strand & Sons.....	Building	1,009,220
State Construction Co.....	Sewer sys.	847,550
L. H. Hoffman.....	Building	6,000,000
Peter Kiewit Sons' Co., and Morrison-Knudsen Co., Inc.....	Pumping plant	13,348,440
Harold J. Raber.....	Building	6,500,000
Sound Construction & Engrg. Co.....	Building	6,077,320
Cascade Contractors, Inc., and Alton V. Phillips.....	Dam	967,550
C. V. Wilder & Clint Dawson	Sewers	616,810
MacRae Bros.	Bridge	661,000

WYOMING

S. Birch & Sons Construction Co.....	Highway	567,880
Gibbons & Reed.....	Highway	643,860
J. P. Steele Construction Co.....	Building	3,299,010
Morrison-Knudsen Co., Inc.....	Canal	1,589,220
J. P. Steele Construction Co.....	Building	1,266,000
Forgey Construction Co.....	Highway	509,660

ALASKA

Judson-Pacific-Murphy Corp.....	Hangar	750,000
William Smith Co.....	Replace rails	996,430
C. F. Lytle Co., and Green Construction Co.....	Highway	4,129,420
S. Birch & Sons Construction Co., and Morrison-Knudsen Co., Inc.....	Highway	3,847,870

CANADA

Commonwealth Construction Co.....	Building	1,111,980
Miners Western, Ltd.....	Tunnel	1,236,950
B. C. Bridge & Dredging Co., Ltd.....	Building	12,000,000
Northern Construction Co., and J. W. Stewart, Ltd.	Building	2,000,000

(NOTE: Large Western contracts awarded during December are not included in this tabulation, but can be found on pages 120-122.)

Water District Plans Own Earth Dam

Southern California water district completes preliminary draft of plans and specifications for earthfill dam near San Diego—Bond issue awaits final approval from state authorities before being submitted to voters—Engineering investigation finished in 2 years

THE LA MESA, Lemon Grove and Spring Valley Irrigation District, which serves over 18,000 ac. of land and domestic water to several communities lying easterly of the city of San Diego, proposes the construction of an earthfill dam in Quail Canyon, approximately two miles east of Lakeside, Calif., to be known as Chet Harritt Dam. The District started reconnaissance and preliminary investigation early in 1947 and has continued engineering studies involving complete surveys, test pits, bank excavations, and core drilling.

The San Diego Testing Laboratory, with Phillip W. Helsley directly in charge, has made a thorough soil study and report covering availability and suitability of materials to be incorporated in the structure. To accomplish this phase of the work thoroughly, nearly 300 test pits were made with either bulldozer or back-hoe, and an actual test area was set up where bank excavation was loaded into trucks, hauled to the test area, spread with bulldozers, and compacted with sheep-foot rollers, under controlled moisture conditions. The investigation indicated there are sufficient materials of each classification within the reservoir site for the construction of the dam.

Baylor Brooks, Professor of Geology at San Diego State College, was employed by the District to make a thorough geological study of the damsite and reservoir area. His report has been completed and copies submitted to the State Engineer's office. In connection with the geological study, the District has had eight diamond core holes drilled to an approximate depth of 100 ft. each, which core holes definitely indicate a very satisfactory damsite, and that existing conditions should not present too much difficulty in the construction program.

General design

Carl R. Rankin, Consulting Civil Engineer, was employed by the Irrigation District several months ago to prepare the necessary plans and specifications for construction of the project and for submission to the State Engineer. The District had previously prepared preliminary plans which had been reviewed by the State Engineer and which form the basis for the work of Mr. Rankin. It is proposed that the earthfill dam will have a height of 175 ft., a crest length of 1,146 ft., a freeboard of 7 ft., and will involve nearly 1,500,000 cu. yd. of fill. The reservoir will have a surface area of approximately 181 ac., and a storage

By **M. J. SHELTON**
Chief Engineer
La Mesa, Lemon Grove and Spring Valley
Irrigation District, La Mesa, Calif.

capacity of about 10,500 ac. ft. There is to be a concrete wall and a paved 14-ft. roadway on top of the dam. There will be a concrete spillway and both slopes of the dam will be surfaced with rock. It is proposed to construct a tunnel approximately 700 ft. long which will permit the installation of the supply and blow-off lines. This tunnel will extend from the downstream toe of the dam to the tower, which will be of concrete construction quite similar to the outlet towers located at El Capitan, San Vicente, and Lake Murray.

Plans and specifications

A preliminary draft of the plans and specifications has been submitted to the State Engineer's office for review, and after tentative approval, the final contract documents will be completed and submitted to the State Engineer for formal approval. It then will be necessary to have the California District Securities Commission review the matter, particularly as regards the financing program. Upon final approval it is planned that a bond issue will be submitted to the voters of the area, after

which, if the bonds prevail, the District will call for bids. It is expected that the work will require a year and a half for completion and may possibly get under way about April, 1949. The estimated amount of the bond issue will probably be between \$2,000,000 and \$2,250,000 which will finance the construction of the dam as well as the following pipelines:

- 5,500 ft. of 42-in. pipeline across the reservoir site replacing an existing 42-in. redwood main;
- 7,000 ft. of concrete pipeline from the outlet tower to the District's El Monte pumping plant;
- 3 mi., approximately, of cast iron pipeline within the service area of the District starting with 20-in. pipe and gradually reducing to 12-in. This line will result in a feeder main surrounding a very rapidly developing area which will permit service to that area from two or three sources whereas there is now but one source.

Reservoir

The Chet Harritt reservoir has a very small drainage area, consisting of about 1.7 sq. mi. However, the construction of the dam is not for the purpose of catching surface runoff, but rather for terminal storage of water from three different sources. The primary source will be the District's share of Colorado River water as delivered by the San Diego County Water Authority. The secondary source will be from the District's Cuyamaca Lake where losses from evaporation are approximately five times that which is expected at the Chet Harritt Reservoir. The third source will be from El Capitan Dam at such times as the San Diego River is in flood stage and water spills at El Capitan Dam.

CHET HARRITT DAMSITE in Quail Canyon showing the crest of proposed dam and scene of extensive test pits and borings. The reservoir is to be fed by the District's share of Colorado River water, Cuyamaca Lake, and overflow from El Capitan Dam.





NORTH SACRAMENTO FREEWAY
in operation during 1948, will be part
of the freeway system extending east-
ward to California-Nevada border

Two Year Record— New Funds Spur California Freeways

UNDER THE Collier-Burns Highway Act passed by the 1947 session of the California State Legislature, the financial structure of the State highway, county road and city street improvement was revamped on a State-wide basis. Revenues for highway purposes were materially increased and allocations to State, county, and city agencies apportioned in more equitable proportions to the needs of traffic facilities under the jurisdiction of the three governmental agencies.

During the first year of operation under the Collier-Burns Act, starting July 1, 1947, the Division of Highways awarded contracts from the State highway budget for the 1947-48 fiscal year totaling \$44,361,700.

Between April 1 and June 30 of this year, contracts totaling \$19,256,600 were awarded under the permissive clause of the Act from the budget for the current 1948-49 fiscal year. In addition to these two amounts, contracts were also awarded by the Division of Highways for improvement to county roads under the Federal-aid Secondary program in the amount of \$7,308,300, and for miscellaneous construction and maintenance contracts an amount of \$5,825,700.

Passage of Collier-Burns Act established highway construction on a \$75,000,000 annual basis, with all types of urban and country roads participating —Freeways in and around all main metropolitan centers proceeding with dispatch

By G. T. McCoy
State Highway Engineer
Sacramento, Calif.

These figures all add to a total of \$76,752,300 in highway contracts between July 1, 1947 and June 30, 1948. During the current fiscal year (July 1, 1948 to June 30, 1949), a similar rate is being maintained in placing construction under way.

In the five months from July 1 to Dec. 1, 1948, the budget contracts amounted to \$22,892,600. In addition to this amount, awards were made for Federal-aid Secondary contracts of \$5,179,700 and \$990,600 in maintenance and miscellaneous construction contracts. These made the total of contract awards for the five months come to \$29,062,900. In addition to this amount, there are contracts pending and projects advertised

for bids in an amount of nearly 35 million dollars.

There remains in the budget for the 1948-49 fiscal year a total of between six and seven million dollars for construction to be placed under way before July 1, 1949 and approximately seven million dollars in F.A.S. county road projects proposed for construction during the remainder of the current fiscal year.

Late in September, the Highway Commission adopted and forwarded to Gov. Warren the State highway budget for the 1949-50 fiscal year. The amount included in this budget for construction is \$70,853,000. This total does not include Federal-aid Secondary funds apportioned to California for the fiscal year, in an amount of \$4,576,000.

The seventy million dollar construction budget provides for proposed im-

improvement to 610 mi. of State highway and construction or reconstruction of 95 bridges and grade separations.

For State highway construction beyond the 1949-50 fiscal year, surveys are now authorized by the California Highway Commission for projects aggregating over 2,000 mi. of State highway and the policy of the Department of preparing plans and acquiring right-of-way one, two, or three years ahead of construction is being continued.

While the volume of highway construction which the California Division of Highways is putting under way and completing is large (on Dec. 1 there were in force 252 contracts with a total construction value of \$93,871,000) traffic congestion is so great that it still remains the State's most critical transportation problem.

No end in sight

Selection of projects for inclusion in State highway budgets is based primarily upon the list of locations where critical deficiencies exist, as submitted to the 1947 session of the Legislature prior to passage of the Collier-Burns Act. The estimated cost of correcting these deficiencies on the State highway system totals well over a billion dollars. However, as the estimated construction revenue for the ten years from 1947 to 1957 totals only \$750,000,000 it may be appreciated that the task of providing adequate highway facilities will confront the State for some years to come.

Furthermore, the continued inflationary rise in construction costs greatly adds to the difficulties of advancing programs under previously determined budgetary controls. In order to stretch

the shrinking dollar as far as possible, the tendency is to play estimates close to the vest in hope that the spiral of inflation may level off. The Department, however, is unable to see any definite indications as yet of a break. This continued upward trend has and will continue to offset the gains in revenue under the Collier-Burns Act and makes it impossible to modernize the State highway system in step with traffic and population increases.

As it would be quite impractical in a short statement such as this to list all State highway projects, the following brief descriptions include a few of the larger projects in the 1948-49 and 1949-50 State highway budgets.

The current program

A contract is now under way at Roseville for construction on U. S. 99E of reinforced concrete and steel subways along Washington St. beneath the tracks of the Southern Pacific Railroad and under Vernon St. and Atlantic St. The contract also provides for grading and paving 3.1 mi. on new alignment from Vernon and Grant Sts. to about one mile north of Andora Subway. Through the main portion of Roseville the new route will be four-lane divided concrete pavement and the northerly 1.3 mi. will be two-lane plantmix surfacing. Construction of this railroad grade separation will eliminate a grade crossing at the railroad yards which has long been a source of traffic congestion. The project will cost about \$1,700,000.

EASTBAY FREEWAY, Oakland, is being constructed across marshland by excavating soft material and replacing it with clean sand dredged from San Francisco Bay.

In Santa Cruz County, a contract is under way for paving with plantmix surfacing the 7.7 mi. of four-lane divided highway along the coast between Rob Roy Junction and Morrissey Ave. in Santa Cruz. The grading and construction of structures was performed under a contract awarded last year. The estimated cost of the paving contract is \$1,400,000.

Two contracts are under way along the East Shore Freeway in Oakland for grading 4.7 mi. and paving four to six divided lanes with Portland cement concrete. Included in the project is the 42nd Ave. Interchange, consisting of two railroad underpasses, a portion of a railroad overhead, two highway undercrossings and two highway overcrossings. Grade separation structures at 5th Ave., 19th Ave., 23rd Ave., 29th Ave. and Fruitvale Ave. have been constructed under separate individual contracts. Completion of the two contracts at a cost of about \$3,557,000 will expedite traffic from near the South city limits of Oakland to Oak St.

The Santa Rosa Freeway portion of the Redwood Highway in Sonoma County, now under contract, will afford a by-pass of the main part of the city. The project consists of grading 4.3 mi. of four lane divided roadbed on which Portland cement concrete paving is being placed. The construction cost of this contract together with signal installations will amount to \$1,632,000.

Hollywood Parkway construction has been carried on at locations as right-of-way is cleared and also on a schedule that would occasion the least inconvenience to city street traffic. During this fiscal year grade separation structures



at nine locations were placed under contract and four additional structures will be placed under contract from funds made available in the 1948-49 budget. The total value of contracts awarded for the Hollywood Parkway during this period is about \$4,370,000.

The unit of Santa Ana Parkway placed under contract late in the summer of 1948 extending from LaVerne Ave. to Eastland Ave. comprises the construction of a railroad underpass, a highway grade separation at Atlantic Blvd., grading the six lane divided roadbed and paving with Portland cement concrete. Completion of the Parkway from Aliso St. in Los Angeles to a short distance outside the city limits is contributing a large volume of traffic to this suburban area which will be materially alleviated by the present construction. The contract value of this project is \$1,660,000.

Further development of the Ridge Route will be made by the project proposed for construction between Alamos Creek and State Route 138 near Gorman. The freeway will be accomplished by grading and surfacing two new lanes adjacent to the existing roadbed where possible and the remaining portion will consist of grading and surfacing four divided lanes on revised alignment. Included in the budget is an item of \$1,335,000 to perform this work.

The development of U. S. 40 between Sacramento and San Francisco into a divided lane freeway is being continued by two contracts now under way in the American Canyon between the Napa County line and Cordelia and from Ledgewood Creek to 3.5 mi. east of Fairfield. The portion in American Canyon is being confined to grading two lanes adjacent to the existing roadbed with paving to follow in a later contract. The Fairfield section, by-passing the city to the north, consists of two new Portland cement concrete lanes where adjacent to the existing pavement and the remaining part is four divided Portland cement concrete lanes on new alignment.

And next year

The project between Auburn and one mile west of Applegate on U. S. 40 in Placer County will consist of grading for four divided lanes, starting at the easterly end of the recently completed Auburn Freeway and following new alignment to a junction with the existing highway between Clipper Gap and Applegate. The new location, 6.1 mi. in length, will eliminate many sharp curves and steep grades. The budgeted cost including construction engineering is \$1,380,000.

A unit of the extensive freeway plan for the Bayshore and U. S. 101 access to San Francisco will be the project between 10th St. and South Van Ness Ave. The work proposed at this time will consist of constructing several grade separation structures over the heavily traveled city streets. Ultimately this section will serve as the connection between the Redwood highway on the north and the Coast highway on the south. The budgeted cost including construction engineering is \$1,100,000.

Another unit of the Bay Shore freeway plan for San Francisco will be the 1.4-mi. project between Augusta St. and 25th St. The roadway will be graded and Portland cement concrete paving placed for six and eight divided lanes. Interchange structures are to be built at either end of the project for turning movements and access to the freeway. Allocations for construction and construction engineering are \$3,820,000.

West from Altamont Pass

A contract recently awarded on U. S. 50 in Alameda County covers the grading of a line change northerly of Livermore. This work is the first part of the budgeted project between Greenville and 1.7 mi. west of Livermore. Beginning at the west end of the Altamont Pass highway, two additional lanes will be provided adjacent to the existing roadbed and four lane paving will be placed over the line change now under construction. The length of multi-lane highways will be increased by 5.6 mi. on completion of this project. Construction costs and construction engineering are budgeted in the amount of \$1,403,000.

A grading project, 5.6 mi. in length, is proposed between Gilroy and Sargent Overhead on U. S. 101 in Santa Clara County. Two additional lanes will be provided alongside a portion of the existing two lane highway and the remaining section will be four lanes on new alignment. Paving will be placed in a future contract. Budgeted costs including construction engineering are \$1,342,000.

Included in the budget is an item for \$9,455,000 for continuing construction on the Hollywood Parkway in Los Angeles. A considerable amount of the activities during this budget period will be between Western Ave. and Highland Ave. to allow for completion of separation structures ahead of paving operations.

Two projects proposed along the Santa Ana Parkway in Los Angeles and Orange Counties will involve 11.5 mi. of four lane grading and Portland cement concrete paving. The portions to be constructed are between Rosecrans Ave. and Miraflores, and will involve \$3,905,000 including construction engineering.

Freeway at Malibu

The section of existing highway remaining on U. S. 101 between Calabasas and Malibu Junction will be developed to freeway standards. Two additional lanes are to be graded and paved with Portland cement concrete to provide four divided lanes at a cost of \$1,100,000 including construction engineering.

Grading and surfacing 4.7 mi. of U. S. 99 in Los Angeles County between Castaic Creek and Palomas Creek is proposed during this period. This construction will join two projects completed or under way in 1948. Two additional lanes will be provided on the southerly half while the remaining will be four lanes on new alignment. Budgeted costs including construction engineering amount to \$1,210,000.

A project for reconstructing a portion of the Ramona Parkway between the

Los Angeles city limits and 1.7 mi. easterly will be partially on new alignment all developed to freeway standards. The budgeted amount for this construction is \$1,470,000 which includes construction engineering.

Rosemead Blvd. between Garvey Ave. and Valley Blvd. in Los Angeles County will be developed to a six lane divided highway by a grading and paving project to be under contract during the period. Funds have been allocated the amount of \$1,139,000 for this construction which includes construction engineering.

A section 9.6 mi. in length on U. S. 9 between Redlands and Beaumont will be graded and surfaced. The existing two lanes will be expanded to provide four divided lanes at a cost of \$1,870,000 including construction engineering.

By-pass road at Stockton

The grading project on the Stockton By-pass now under construction in San Joaquin County will be paved with Portland cement concrete. On completion four divided lanes will be provided between Mariposa Road and the Calaveras River, joining at that point with the recently completed multi-lane highway between the Calaveras River and Lodi. A connection will also be made along U. S. 50 to Wilson Way in Stockton. Budgeted costs including construction engineering are \$1,404,000.

U. S. 101 will be relocated between 16th St. in National City and G St. in Chula Vista. Existing city streets and county road will be developed to four divided lanes to provide a more direct route through this heavily traveled section. Budget for this 2.5 mi. of construction and construction engineering is an amount of \$1,657,000.

Advances Made in Study Of Soil Stabilization

RECENT ADVANCES in soil stabilization whereby chemicals or plastics are added to soil to create paving withstanding pressures even better than concrete were described by Dr. Hans F. Winterkorn of Princeton University before the American Chemical Society. The "plasticizing" of soils for roads and landing strips was widely used during World War II.

Use of chemically toughened dirt during the war was limited because engineers thought they had to destroy a vegetable matter in the soil to prevent later breakdown of their paving material. Dr. Winterkorn pointed out that it has now become possible to use soil containing large amounts of vegetable matter by the addition of chemicals which both stabilize and waterproof so that bacteria cannot attack and break down the vegetable matter. One of the chemicals used is aniline furfural, a plastic and some kinds of tar and a little cement also are used. They are designed to make the soil tough but not brittle.

The method should work well for extension of highway paving into remote areas where regular paving would be too costly, Dr. Winterkorn reported.



Northwest Flood Control— Dorena Dam Builders Beat Schedules

Last working season at Dorena Dam in Oregon was only 71 days long — However, constructors Atkinson, Kier, Bressi-Bevanda and Teichert are 7 months ahead of schedule—Streamlined concrete handling, use of latest earthmovers and development of special rigs are the positive factors

NATURE, as if resentful of the yoke constructors would impose upon the existing order of things, ended with rains the second summer of construction on Dorena Dam after only seventy-one suitable working days. Despite the short working season, the flood-conscious Willamette Valley of southwestern Oregon can be assured of the protection the structure will provide. Joint contractors, Guy F. Atkinson Co., W. E. Kier, Bressi & Bevanda and A. Teichert & Son, have squeezed the maximum amount of effective operation into the limited time to promise completion of the dam seven months ahead of the specified completion date.

Dorena Dam is the third of a series

of twenty eventual Army Engineer-sponsored flood control dams planned for construction on tributaries of the Willamette River. Two dams of the system are already completed, Fern Ridge on Long Tom River, and Cottage Grove on the Coast Fork. The Engineers estimate these two dams have already prevented \$3,000,000 damage in floods of 1943-48. Preparations are now going ahead for building of the huge Detroit Dam on the North Santiam, and rail-

OVERALL VIEW at Dorena Dam site, top of page. Spillway in foreground will form dam's north abutment; remainder will be rolled earth fill. Diversion channel at top of view cuts partially completed embankment.

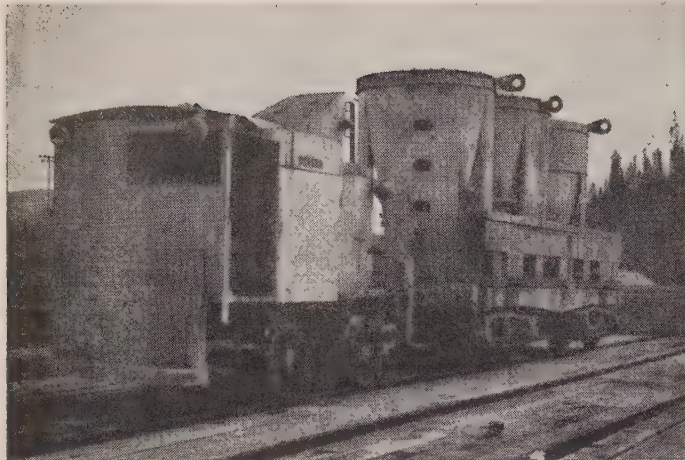
road relocation is in progress for construction of Meridian Dam on the middle fork of the Willamette.

More fears will be lessened

The recently revised Army Engineer "308" report envisions an eventual seventeen storage reservoirs in the entire Willamette Valley, plus three re-regulating reservoirs. Completion of the Fern Ridge and Cottage Grove structures has already cut flood crests 3 to 6 ft. at gauging points downstream. With the completion of Dorena Dam, fears of valley residents will once more be lessened.

Site of Dorena Dam is about 2 mi. below the village of Dorena on the Row River, tributary of the coast fork of the Willamette. The structure was placed under construction at the beginning of summer, 1947, following award of a \$7,737,571 contract to the Atkinson et al. combination. Specified completion date was July, 1950; probable completion date is Nov., 1949.

When completed, the earthfill structure will be 140 ft. high with an overall length of 3,350 ft. That is only medium-



sized among the country's earth dams. (Dorena's embankment will contain 4,000,000 cu. yd.; Garrison Dam in North Dakota, to be one of the world's largest man-formed piles of dirt, will contain 25,000,000 cu. yd.)

The structure will have a modified concrete ogee spillway 200 ft. across with a 150 ft. long stilling basin. Outlet facilities will consist of five 5 x 6-ft. slide gates, hydraulically operated. Maximum storage behind the dam will be 76,000 ac. ft. with the normal pool covering 1,840 ac.

Stature as testing ground

Despite its unimpressive size in this age of massive construction, the structure bears a stature in the minds of engineer-planners as the testing ground for earth-fill dam construction materials and methods and spillway concrete design. Army Engineers have on the planning boards a huge program of flood-control construction in the entire Pacific Northwest area and elsewhere. Many lessons learned at Dorena will be applied diligently as the program unfolds.

For instance, special low-heat cement with low alkali content is being used for the spillway concrete. This is Type IV Portland cement, containing the alkalis, sodium oxide and potassium oxide, in no greater than a 0.6 per cent proportion. Spillway construction is now near completion. No refrigeration process or ice was used in the construction of the dam for cooling of the concrete. The cement was produced at the Oswego plant of Oregon Portland Cement Co.

CONCRETE TRAIN, left, with provision for three 4-cu. yd. buckets, delivered mix from batch plant to traveler crane with no lost time. Special hitch, right, enabled tractors to pull instead of push Tournapulls.

Added feature of the spillway mass concrete mix, containing 6-in. maximum size gravel and cement content of .75 bbl. per cu. yd., is the low slump, kept at all times between 1½ and 3 in. and resulting in placeability problems. For handling the low slump mix into forms, special Gar-Bro 4-cu. yd. buckets were designed with steeper side slopes.

Streamlined concrete handling

Production and handling of concrete has been streamlined by the contractors to enable pouring of an average 80 to 85-cu. yd. volume per hour, and a maximum hourly pour of 100 cu. yd. using two 2-cu. yd. Koehring tilting mixers. Placing is proceeding in 5-ft. lifts for the spillway blocks.

A batch-type mixing plant was set up immediately downstream from the spillway site. Aggregates are being obtained from alluvial riverbed deposits 2 mi. upstream from the damsite. An aggregate crushing and screening plant prepares the sand and gravel which is then placed in storage bins and belt-conveyed 200 ft. to the batch plant.

Ingredients for each batch are carefully weighed under close supervision by an Army Engineer inspector. Five basic concrete mixes (See Table I) were designed in the laboratory before construction began, supplying adequate

choice of a suitable mix for different portions of the spillway. Observation of the mixes has caused their revision as placing progressed. Mixes designated in Figure I are those contained in Supplement No. 4 to the original.

For each batch mixed at the automatic batching plant, an autographic recorder produces a continuous visible record on a single ruled chart of the weight of cement, water and each size of aggregate; of mixing time, consistency of concrete during mixing process, and of the time of day.

No lost time at pouring site

The mix is discharged into a collecting hopper of 5-cu. yd. capacity suspends over a double car track. Two trains, each with engine and one flat car, operate on the tracks. Provision was made for placement of 3 of the 4-cu. yd. buckets on each flat car.

The bucket-train system works like this. One of the trains is loaded at the batch plant while the other is delivering buckets at the other end of the tracks. Operations are timed so the loaded train is ready when the other returns with empties. With provision for three buckets on each flat car, two charged buckets are delivered to the pouring site and the third space accommodates the empty bucket previously delivered by the other train. Thus, each train need not wait at the pouring site for empties and there is no hitch to interrupt a continuous pour.

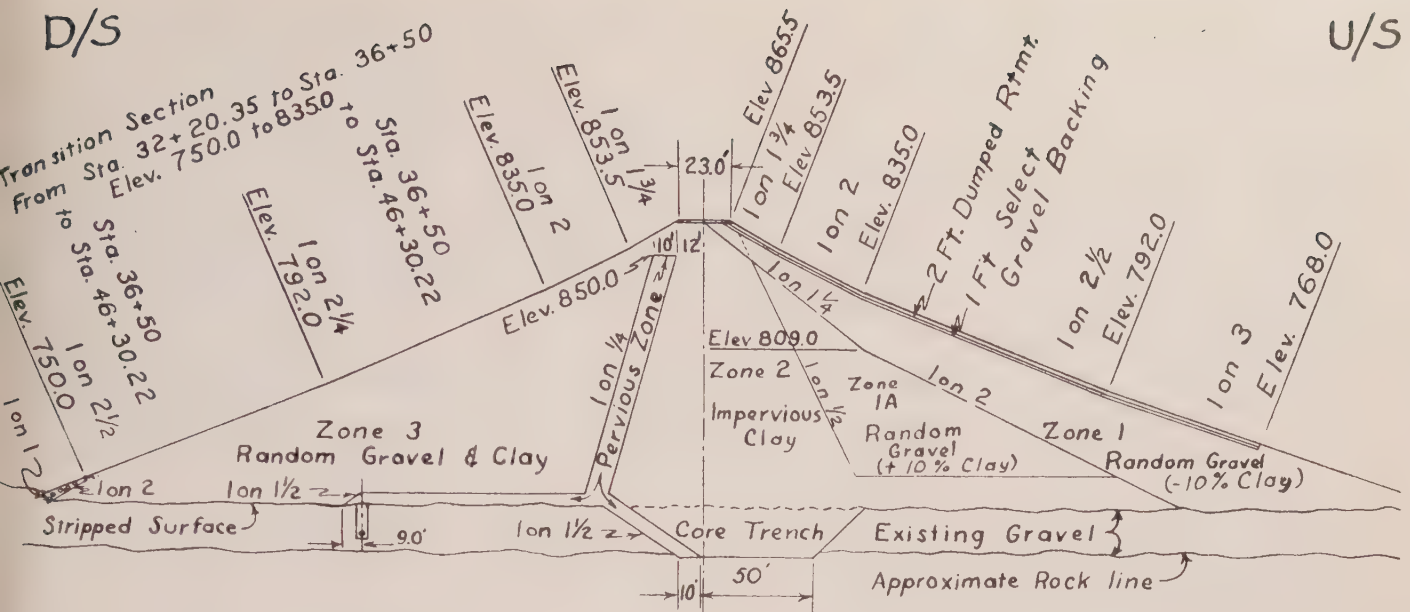
A Colby traveler crane with 115-ft. boom rides on track the length of the downstream spillway face. This crane has delivered a major portion of the spillway concrete. A stiff-leg derrick with 140-ft. boom is handling concrete for the north abutment, beyond reach of the traveler. This derrick is also within reach of the bucket train.

Vibrating, curing and grouting

Most of the spillway concrete is being cured by water-spraying, although Hunt's Process was used for a portion of the south abutment. The surface of the overflow spillway, the outlet conduit and the stilling basin floor baffles and walls have been given a dense, hard surface by vacuum-process treatment. Tests indicated that from .02 to .07 gal. of water was withdrawn from each square

TABLE I
Basic Concrete Dry Weight Mixes at Dorena Dam

Mix Selector Number	1	2	3	4	5	6	7	8	9	10
Volume—Cu. Yd.	2.0	1.0	2.0	1.0	1.8	1.0	1.6	1.0	0.8	.5
Coarse Agg. 6"-3"	lb. 1871	935	1620	810	.....	.....	.....	.....	.....	.....
Coarse Agg. 3"-1½"	lb. 1701	850	1570	785	1323	735	.....	.....	.....	.....
Coarse Agg. 1½"-¾"	lb. 916	458	1080	540	1278	710	1984	1425	.....	.....
Coarse Agg. ¾"-#4	lb. 853	427	1130	565	1530	850	1328	765	.....	.....
Fine Agg. Sand	lb. 1752	876	1480	740	1720	955	1656	995	1667	1042
Cement	lb. 564	282	752	376	778	432	827	517	832	520
Air Admix.	oz. 4	2	8	4	7.7	4.6	8.8	5.5	.....	.....
Water	lb. 380	190	374	187	423	235	416	260	440	275
Total Wt.	lb. 8037	4018	8006	4003	7052	3917	6211	3962	2939	1837
Slump	in. 1-2	1-2	2-3	2-3	2-3	2-3	2-4	2-4	10	10
Water/Cement ratio	.674	.674	.497	.497	.544	.544	.503	.503	.529	.529



foot of treated concrete surface, and it was estimated the vacuum process case-hardened the surface concrete to a depth of 3 or 4 in.

All concrete is being placed with internal-type, 2-man electric vibrators. For initial operation, the vibrators were powered by 3.3-h.p. motors. This proved inadequate because of the low-slump mix, so they were replaced by 6-h.p. motors. The new high-frequency vibrators, specially designed for this job by Chicago Pneumatic Tool Co., will also be used at McNary Dam.

A grout curtain is being placed beneath the spillway section with maximum depth of grout holes being 75 ft. This is being accomplished by "stage grouting." Holes are first drilled to a comparatively shallow depth (15 to 30 ft.). These holes are then grouted at low pressure and cleaned out before the grout takes a hard set. The holes are then deepened by drilling to whatever depth conditions indicate to be desirable, and then grouted at a higher pres-

sure. The process of grouting by stages continues at higher and higher pressures until the final depth is reached. Final spacing between holes in the grout gallery is 10 ft.

Drainage and diversion coordinated

Preceding construction of the spillway section and earth embankment, the water content of the fill materials for the embankment was lowered by drainage of the borrow area. This was accomplished by construction of drainage ditches and a hillside interceptor channel. The channel was designed for 4,000 c.f.s. and will later be extended to the river near the town of Dorena and utilized for the river diversion. It is anticipated that the river will be diverted

through the structure early next spring.

The earth embankment comprising the south portion of the dam is designed with 23-ft. crest width, and 1:1 1/4 minimum upstream and downstream slopes. The upstream face will be protected by a 2-ft. revetment of hard, durable quarry stone topping a 1-ft. width of gravel backing.

Typical cross-section of the embankment is shown in the accompanying drawing. Rigid control of moisture and clay content in embankment materials is another feature of the construction. Zone 1 material is limited to a 10% clay content, the remainder consisting of random gravel. Zone 2 (impervious core) will contain not less than 20% clay, while Zone 3 is of random gravel or clay as desired by the contractor. One change in embankment design was made during construction. A new zone, IA, was placed between Zones 1 and 2 (see drawing), the new zone containing not less than 10% clay.

Fill material for the embankment is

EARTHWORK for Dorena Dam embankment proceeds rapidly with the latest and largest equipment. A 26-cu. yd. Southwest wagon is loaded by Northwest dragline, left; Euclid loader scoops 15 cu. yd. in 15 sec., top right; bottom, tandem sheepsfoot rollers are pulled by TD-24 International.



EQUIPMENT AT DORENA

- 2 TD-24 International tractors
- 18 D-8 Caterpillar tractors
- 3 DW-10 Caterpillar tractors
- 3 motor patrols, Caterpillar Model 12
- 2 LeTourneau Carryalls
- 14 Tournapulls
- 11 Euclid wagons, all 13-cu. yd. capacity
- 4 Southwest wagons of 25-cu. yd. capacity
- 5 20-yd. Western trucks
- 3 water wagons, (2 Fords, 1 Western)
- 3 Rome plows, disc-type
- 1 Minneapolis-Moline disc plow
- 2 154-B Bucyrus-Erie draglines
- 1 Marcy ball mill with 3 ft. diameter barrel
- 1 Colby traveler crane
- 1 Euclid D-V Loader
- 2 20-ton pneumatic rollers
- 3 small wobbly pneumatic rollers
- 1 200-h.p. Ingersoll-Rand compressor
- 2 portable 500-h.p. Ingersoll-Rand compressors

being obtained upstream from the damsite as far as 1.57 mi. away. Large borrow areas within the river canyon were stripped of deleterious material to allow sufficient drying of suitable fill material. Subsequent excavation proceeds by 6-in. thicknesses to facilitate drying and aeration.

To hasten drying, Zone 2 borrow areas are first scarified by rooters until the material tests on the dry side of the modified Proctor moisture content. The area is then sprinkled by water wagons, and gang-disc plowed until it is 4% to 5% on the wet side of optimum moisture.

Latest and largest equipment for earthwork

For hauling to the damsite, Zone 2 material is loaded into Tournapulls, all equipped with a special hitch to allow pulling by tractors instead of pushing. The material is placed in 8-in. layers at the fill area and compacted by two sheepsfoot tamping rollers working in tandem and pulled by one of the huge TD-24 International tractors. Excess moisture is removed by aeration before the final compaction. Final moisture content is not allowed to vary more than 2 per cent either way from the optimum.

Material for Zones 1 and 3 is loaded at the borrow area by a Euclid D-V Loader into 13-cu. yd. Euclid bottom-dump wagons, the loading of each wagon requiring 40 to 50 seconds. The Euclids are pulled to the fill by another TD-24 International and D-8 Caterpillar tractors. This material is placed in 9-in. layers, and moisture control is equally as rigid as for Zone 2 material.

Regular sized rubber tired wobbly rollers were used initially for compacting Zones 1 and 3. These proved unsuitable because rocks squeezed between the wheels due to insufficient clearance. To meet this problem, the contractor built two large pneumatic rollers with 10-in. clearance between wheels. The big rollers have 16:00 x 24-ply tires and, with steel punching counterweight and ballast, weigh in excess of 16 tons. They

have a compression rating of 325 lb. per inch of width of tread.

Dorena's constructors

W. A. Schwarz, an oldster with wide and varied construction experience in the West, is resident engineer for the Army Engineers. F. E. Drager is assistant resident engineer and field engineer on earthwork. Kenneth Ramsey is supervisor on concrete and L. M. Bartlett is office engineer. T. W. Ragsdale is

Chief of Operations for the Portland District, Corps of Engineers, and Otis Hartman is Chief of the Portland District Construction Division. The entire construction project is under the direction of Col. O. E. Walsh, Portland District Engineer.

A. H. Steiner is project manager for the contractors and Aubrey Horne project engineer. "Slim" Connolly earthwork superintendent and B. Reeves is concrete superintendent.

Western Bond Issues and R. E. A. Loans Forecast New Construction Activity

FUNDS MADE available in recent weeks through bond issues or construction grants for work in the Western half of the United States total \$44,895,780. Listed by states, they follow:

Arizona

Phoenix recently endorsed five bond issues, including \$3,500,000 for water works, \$1,500,000 for airport improvements, \$1,500,000 for fire department works, \$1,350,000 for library construction, and \$1,000,000 for parks; Yuma voters approved \$93,000 in library bonds and \$50,000 in bonds to construct a new swimming pool.

California

Arden School District has approved bonds totaling \$58,000 for elementary school additions; Brophy School District, \$19,000 for the same purpose; Bishop Union School District voters approved of bonds in the amount of \$390,000 to construct new school facilities; Big Pine School District voted \$226,000 in bonds for school construction; Chowchilla High School District voted favorably on \$195,000 in bonds for school expansions; Costa Mesa has okehed bonds amounting to \$295,000 to erect a new school; Fairfield approved \$85,000 in bonds for water and sewer system improvements; La Habra School District has voted for \$400,000 in bonds to finance school building; Long Beach School District approved bonds totaling \$14,905,000 for schools, including a new City College; Mariposa County voters favored issuance of \$225,000 in bonds to construct a 20-bed hospital; Mill Valley School District voted \$252,000 in bonds for school additions; Rowland School District at Puente approved \$70,000 in school bonds; and Mendocino County voters approved \$580,000 for a new county court house at Ukiah.

Idaho

Bonnors Ferry citizens voted a \$150,000 bond issue to complete construction of a municipal power dam on the Moyie River.

Nebraska

Cornhusker Rural Public Power District, Columbus, has received a loan from Rural Electrification Administration in the amount of \$904,000, to construct 560 mi. of new power line and other system improvement.

New Mexico

Socorro Electric Co-op., Socorro, wa advanced \$190,000 by REA to construct 25 mi. of line.

North Dakota

Oliver-Mercer Electric Co-op., Hazen was granted \$1,055,000 by REA to build 668 mi. of distribution lines; Moorhead Gran-Sou Electric Co-op., Inc., Flasher has received a loan of \$1,015,000 from REA for construction of headquarters facilities and 672 mi. of distribution line.

Oregon

Voters in Roseburg have approved bonds totaling \$895,000 for construction additions to several schools in the city.

Oklahoma

Cotton Electric Co-op., Walters, wa granted an REA advance of \$1,250,000 to construct 244 mi. of distribution line, 9 mi. of tie line, a two-way radio system and other system improvements.

Texas

Nueces Electric Co-op., Robstown, was given an REA loan of \$208,000 to construct 95 mi. of line and headquarters facilities; Wise Electric Co-op., Decatur, has an REA loan of \$550,000 to erect 301 mi. of distribution line, 29 mi. of tie line, and system improvements; Dea Smith County Electric Co-op., Hereford was loaned \$760,000 by REA to build 28 mi. of distribution line, a two-way radio system, and other system improvements; Johnson County Electric Co-op. Assn., Cleburne, \$180,000 from REA for 60 mi. of line, two-way radio, and other construction; McCulloch County Electric Co-op., Brady, \$185,000 from REA for 50 mi. of distribution line and system improvements; Comanche County Electric Co-op. Assn., Comanche, REA advance of \$830,000 for 521 mi. of line, general system improvements, and completion of 49 mi. of line previously approved; B-K Electric Co-op., Seymour, \$135,000 from REA for 81 mi. of line and two-way radio system; and Lyntegar Electric Co-op., Tahoka, is loaned \$515,000 by REA to construct 358 mi. of distribution and 11 mi. of tie line.

Alaska

Matanuska Electric Assn., Palmer was granted an REA loan of \$185,000 to construct 18 mi. of line and headquarters facilities.

CONSTRUCTION DESIGN CHART

CIII...Steel Beams in Flexure

IN THIS SERIES of charts I have thus far deliberately avoided the presentation of any which would be directly applicable to the use of structural steel members. Many readers have noted the absence of such charts and have questioned me relative to the reason. The basic reason for omitting such subject matter goes back to 1936 when the series of charts was first announced. A representative of A.I.S.C. protested that such charts were dangerous tools in the hands of the inexperienced. Although we received unrestricted clearance from authorities high in the steel industry, I preferred to avoid the controversy which such subject matter would have obviously started.

One objective has been to present a collection of charts for the solution of

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routine problems with which the construction man might be faced. He seldom has a complete technical library available, and is frequently limited to those books which he can carry in a brief case. He needs roughly approximate answers, and he wants them quickly. In order to meet this need, a limited number of charts applicable to structural steel members will be presented. The relative amount of reader interest will probably determine the number to be presented.

The accompanying chart gives the allowable unit load, uniformly distributed,

for standard "I" and wide flange beams in flexure under conditions of lateral restraint. The inclusion of all sections listed in the steel handbooks is obviously impractical. I have therefore indicated only the light weight section of each depth. Such light weight sections are usually the economical size and the ones most commonly available. A single straight line intersecting all scales is necessary for a solution of the chart.

In order to illustrate the use of the accompanying chart, the following conditions have been assumed:

Span = 15' 0"

Load = 2,000 lb. per lin. ft.

The solution line drawn on the chart for the above conditions, indicates that a 12" X 6.5" X 25# wide flange beam is a little deficient for an allowable stress of 20,000 p.s.i. Likewise, a 12" X 31.8# standard "I" beam is slightly understressed for the assumed loading and span. As a check on the results indicated by the chart, we have:

Bending Moment,

$$M = \frac{w L^2}{8} = \frac{2,000 \times 15^2 \times 12}{8} = 675,000 \text{ in. lb.}$$

12" X 6.5" X 25# wide flange beam

Section modulus, $S = 30.9 \text{ in.}^3$

$$\text{Unit stress, } f = \frac{M}{S} = \frac{675,000}{30.9} = 21,820 \text{ p.s.i.}$$

12" X 31.8# standard "I" beam

Section modulus, $S = 36.0 \text{ in.}^3$

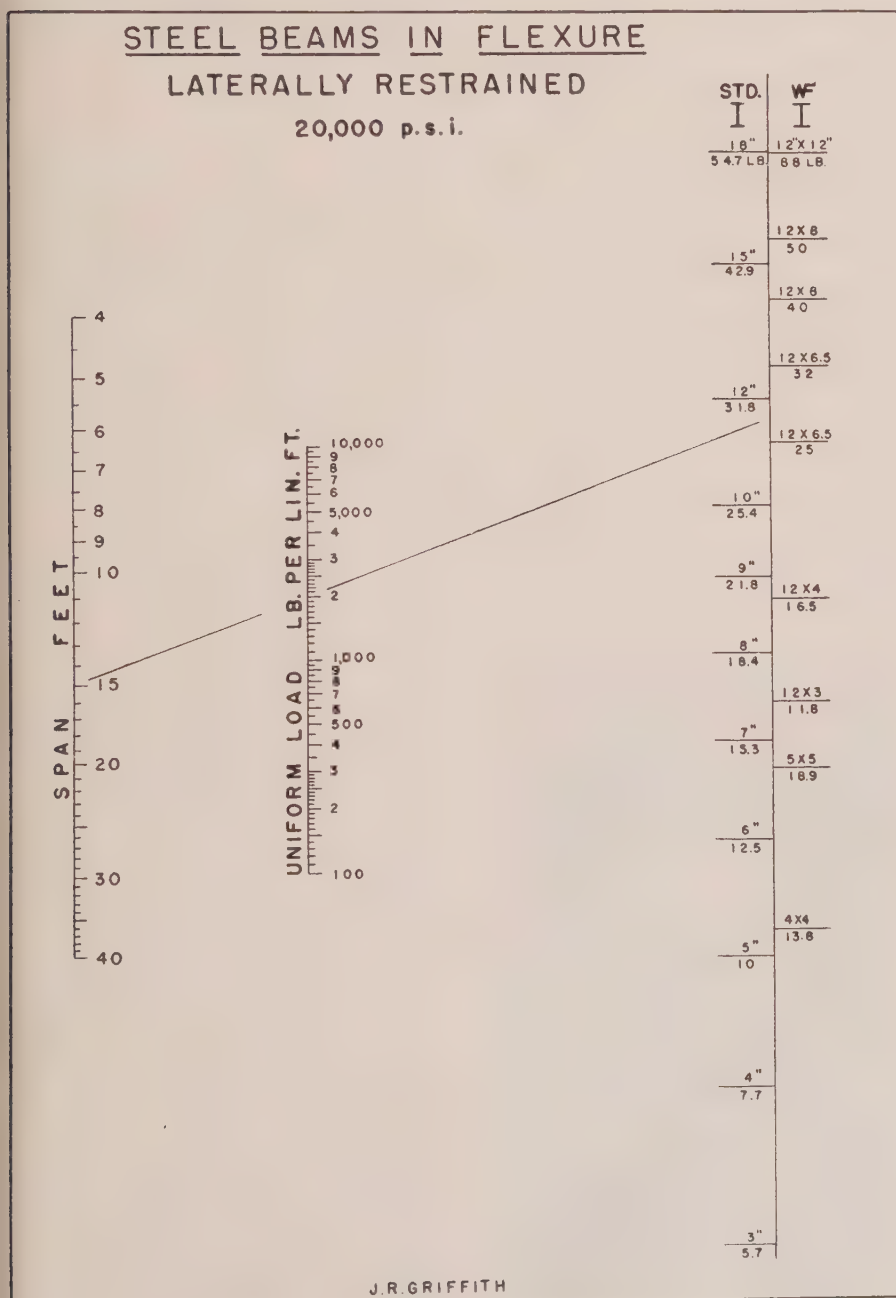
$$\text{Unit stress, } f = \frac{675,000}{36.0} = 18,750 \text{ p.s.i.}$$

The 1947 A.I.S.C. Manual does not list a 12" X 6.5" X 25# wide flange section, although such a section was listed in former editions. The current edition of the Manual eliminates both the 25# and 28# sections of the 12" X 6.5" wide flange members and substitutes a 27# section instead. The experienced designer must always work from a stock list of available sections, and the availability varies materially in different sections of the country.

San Diego Sends Cry for Water as Reservoirs Dry

THE WATER SCARCITY in San Diego, Calif., is becoming more acute despite the fact that Colorado River water has been pouring through the new San Diego Aqueduct into municipal water storage areas. Because of lack of rainfall, those reservoirs are down to 21.6 per cent capacity, even though the aqueduct has been delivering more than 64,000,000 gallons of water a day.

The water shortage is demonstrated vividly at El Capitan Dam near Lakeside. Its reservoir, capable of holding 38 billion gallons, now contains less than two billion gallons, or 4.9 per cent of capacity, the lowest amount since construction of the dam 13 years ago.



Portrait — A Public Utilities Chief

James H. Turner, San Francisco's Manager of Public Utilities, has demonstrated competence in running the City's life-lines and acting as liaison officer for tax-payer and administration

By **BETTY THOMPSON**
San Francisco, Calif.

tive and the capacity for independent thought, and was always willing to take on extra jobs for the sake of the organization. According to a long-time associate, "You'd tell him to do something, and that was the last you ever worried about it. You just knew the job was going to get done." Turner also was constantly preparing himself for advancement by taking regular promotional examinations.

Training in public works

From 1926 to October, 1945, his work was interestingly varied. He took an active part in the preparations for acquiring the Spring Valley Water Company properties, supervised preparation and compilation of specifications for enlargement of O'Shaughnessy Dam—acted as contact representative of the City with the Public Works Administration, and, in connection with the San Francisco Bay Exposition, handled all phases of engineering, financing and contract work of the Public Utilities Commission. This involved contacts with engineering, legal and finance departments of the Exposition Corporation. He also had direction of all phases of the contract work at Yerba Buena Shoals, now Treasure Island, in connection with the construction of an airport on the Shoals, as well as special construction for the Exposition held prior to its proposed use as an airport.

In 1938, Turner was partially instrumental in saving San Francisco the tidy sum of almost a million dollars. This

pertains to the famous Trans-Bay Lawsuit, wherein the City was sued for additional compensation by the contractors who undertook to build O'Shaughnessy Dam. The lower courts awarded the contractors \$800,000. The case was appealed, and before the new trial came up, additional information had to be supplied by the City. The suit was extremely involved from an engineering standpoint, requiring the preparation of numerous exhibits and the delving for obscure bits of information. Turner acted as an aid to the City Attorney, and his services proved sufficiently valuable that the judgment of the lower court was reversed, and in addition, the contractors had to pay court costs, with a saving to San Francisco of the amount mentioned above.

San Francisco is a fortunate city, since it possesses a water supply that, when fully developed, will be adequate for all the city's anticipated future expansion. This is the great Hetch Hetchy water project, which is neither understood nor appreciated by the majority of the persons it serves. However, for years it was extremely difficult to dispose legally of Hetch Hetchy power, in a manner satisfactory to the United States Government. In February, 1942, Turner was made Manager and Chief Engineer of the Hetch Hetchy Water Supply, Power, and Utilities Engineering Bureau, and under his direction, the problem of power disposal was finally brought to a conclusion, in a series of contracts which at long last were approved by the Government.

Head of all utilities

Then, in October, 1945, the five-man Utilities Commission appointed Turner as Manager, a job equivalent to that of running a two or three million dollar private company. Power, water, airports, and—of course—the City's transit system—all come under the heading of Public Utilities, and all their manifold administrative problems filter through Turner. It is notable that, in being selected for this post, he was jumped over men several steps above him in both position and years of service, yet no resentment has ever been directed toward Turner on this account.

Generally, the public takes its utilities for granted. If something goes wrong with the water or power set-ups, it usually can be adjusted in comparative silence, and the private citizen is rarely inconvenienced thereby. Of course, this thing of taking utilities for granted can work two ways, as was shown in the recent November elections, when a proposition for sorely needed airport bonds was defeated. The original bond

LIKE MOST large cities in the United States, San Francisco has a major transportation problem. Traffic has increased, equipment has aged, and the public fights every proposed hike in fares which might offset the increased operating costs. No one is satisfied with things as they are—and no one wants to foot the bill for improvements.

Under such conditions, there has to be someone to blame when things go wrong. In San Francisco, this hardy gentleman is James H. Turner, Manager of Public Utilities. It is to James Turner that Mr. and Mrs.irate Tax-Payer address their letters of complaint, when buses fall behind schedule or the street car neglects to stop at their waiting zone. It is Turner at whom the newspapers direct their editorial blasts, and it is Turner who somehow is expected to effect transportation miracles overnight—without, of course, levying tax assessments to make these miracles possible.

The man who is called upon to pull rabbits out of San Francisco's dilapidated old transportation hat, has one big thing in his favor. He was born in San Francisco just fifty years ago, and knows the city's problems inside out. Turner attended San Francisco public and parochial schools, Cogswell Polytechnic College and the University of California, following which, in 1916, he started his engineering career as that lowest of the low, a rod and chainman—or S.I.—on the Halsey Wise Project for the Pacific Gas and Electric Company.

In 1917, he served as office assistant and rodman on tunnel construction for the Big Bend Project, Pit River Development of the P. G. & E. In 1918-19, with time out for Army Service with the U. S. Tank Corps, Turner worked with the Pacific Coast Shipbuilding Co., laying out and drafting steel ship construction. From there he went to the Pacific Coast Glass Co., as assistant foreman on bottle and glass production, and on the installation and operation of automatic machinery.

City career started

Then, in 1922, Turner entered the employ of the City of San Francisco. At this time, civil engineers had the reputation of being "drifters," men who changed jobs at the drop of a hat, working at one place just long enough to get the wrinkles out of their stomachs, then setting off again, picking a location rather than a job.

So, when Turner finished supervising the construction of Pulgas Tunnel, the pipe lines and other features of the Hetch Hetchy Aqueduct in the Bay Crossing Division, it might reasonably have been expected that he would now decide to move on to greener fields. By this time—1926—however, he had made a firm place for himself in the Department of Public Works, and was recognized by his superiors as a man who was going places, one well worth training for bigger things.

From the first, he showed both initia-

JAMES H. TURNER



issue, which had been approved, no longer is sufficient to do the job, due to such factors as increased prices, changed standards set up by the C.A.A., new trends in airport construction, and new and expensive landing aids that must be installed. San Francisco needs a modern airport. The construction now in progress needs another \$9,000,000. And it is up to Mr. Turner to convince the taxpayers of these facts.

But however silent the public may be on other subjects, it can and does wax vocal when the word transportation is mentioned. When Mr. Turner took office in 1945, the transit problem was the foremost headache to greet him, and although many improvements have been made, public clamor has scarcely abated.

Problems in transit

More in sorrow than in anger, Mr. Turner points to a few of the facts with which he must cope.

San Franciscans have what is known as the "high riding habit," as opposed to cities such as Los Angeles which place heavy demands upon their transit systems during rush hours, but get by with curtailed service the rest of the time. In San Francisco, street cars and buses must be prepared to run with almost maximum frequency, at all times, day or night.

In the interests of efficiency, the City purchased and incorporated into its own system the independent Market Street Railway. It has been necessary to replace much of that line's outworn and antiquated equipment. This takes money, which the taxpayers are reluctant to furnish.

These same taxpayers are continually voting salary raises for conductors and bus drivers—although money to offset increased operating costs is not always forthcoming. For example, it was a major project to increase the five cent fare—in effect for fifty years—to a basic rate of three rides for a quarter. Recently, a measure for a flat ten cent fare was defeated, despite the fact many comparable cities are now in the fifteen cent bracket. Furthermore, as a true San Franciscan, Mr. Turner also loves the cable cars—but as Manager of Public Utilities, he is forced to oppose their continuance on technical grounds.

As can be seen, Turner's job is one that demands a variety of qualifications. He must be an engineer, a lawyer, a good mixer, have publicity sense, and be able to win the confidence of both the public and those working with him. He must also keep on good terms with the Board of Supervisors. To date, Turner has come through in fine style. He has taken criticism from all quarters without losing his equanimity, and when given a chance to air his opinion, generally has been able to convince his listeners that his main object is "the greatest good for the greatest number."

Turner personally

Turner is an alert and vigorous man, appearing much younger than his fifty years. He says that, for as long as he can remember, work has been his only hobby, and he gives the impression of a

man constantly looking for new worlds to conquer. He is married, and has one daughter, Lois. He is a member of the American Society of Civil Engineers, Delta Sigma Phi, San Francisco Chamber of Commerce, and the Serra Club, and is a registered Civil Engineer and Electrical Engineer.

One of his greatest assets today is the ability to express himself fluently and clearly. This is not accidental. In his earlier years with the city, he realized that, like many engineers, he was not so articulate as he would have liked, so he became a member of a luncheon club, made up largely of engineers, who employed a coach of public speaking to sit in on luncheon talks and offer criticisms and comment. The results speak for themselves.

Turner points out that as soon as an improvement demands an assessment from the taxpayer, it ceases to be a decision of the management. San Francisco

at present has a master plan, involving among other things, a subway under Market Street, elevated roads, controlled rights-of-way and so on, but it is impossible to pay for these out of existing tax rates. Incidentally, this master plan is one reason why the Public Utilities Commission favors the Southern Bay Crossing, rather than the Parallel Span recently recommended to the California Toll Bridge Authority.

Meanwhile, as Mr. Turner points out, one cannot stymie day-to-day improvements by forcing them to conform to a master plan, however desirable that may be. For some time to come, San Franciscans can expect to see their street car tracks torn up, their buses rerouted, their traffic experts making new reports, and their transit system gradually improving, while Mr. Turner can expect to continue his thankless efforts to placate the taxpayers and keep peace with the press.

Utilities Seek Permission to Build Natural Gas Pipe Line in Southwest

THE FEDERAL Power Commission has scheduled hearings to commence Jan. 31, 1949 in San Francisco, on the applications from El Paso Natural Gas Co., San Juan Pipe Line Co., and Pacific Gas and Electric Co., who are seeking FPC authorization to construct and operate natural gas transmission facilities.

El Paso's application proposes the construction and operation of additional facilities to transport and sell approx-

imately 400,000,000 cu. ft. of natural gas a day to Pacific Gas and Electric Co. on the border line of California and Arizona near Needles, Calif. Of this volume, 150,000,000 cu. ft. is to be purchased from San Juan Pipe Line Co., and 250,000,000 cu. ft. is to be purchased in the Permian Basin in New Mexico and Texas. Facilities planned for construction include approximately 192 mi. of 30- and 26-in. line looping the company's present 26-in. line from the Permian Basin; about 95 mi. of 24-in. line in Texas to reach gas supplies; about 102 mi. of 26-in. and 17 mi. of 30-in. line extending from the company's Gila compressor station in central Arizona to a junction with the proposed San Juan line; 80,840 h.p. in compressor capacity and additional field lines and equipment. Cost has been estimated at \$52,456,032.

San Juan has requested authorization to construct and operate facilities to transport and sell 150,000,000 cu. ft. of natural gas daily to El Paso at a point about 20 mi. east of Needles, in Mohave County, Ariz. The gas proposed to be transported is to be purchased by San Juan in San Juan County, N. Mex. Facilities to be constructed would include 451 mi. of 24-in. pipeline, a 3,300-h.p. main line compressor station, 121 mi. of feeder and gathering lines, a field compressor station with 3,000 h.p. installed capacity and appurtenant facilities. Total cost has been estimated at \$28,000,000.

PG&E's construction plans include 506 mi. of 30-in. line extending from the California boundary near Topock, Ariz., to its terminal near Milpitas, Calif., a total of 67,056 h.p. in compressor facilities, and additional lateral lines. Total cost has been estimated between \$57,274,000 and \$65,275,000. These facilities would be operated to transport and sell natural gas to customers in northern and central California.

MAN-HOURS SAVED ON HIGH WORK

SPIDER STAGING, Inc., of Renton, Wash., has perfected a light-weight power-driven staging, which has been found very useful in reaching bridge, dam, and other high spots requiring maintenance, but which are inaccessible to ordinary wooden scaffolding.



Construction Equipment Maintenance

Steel Painted on to Reclaim Parts

WITH SUPER-EFFICIENT gas and electrical equipment for melting and spraying purposes, it is now possible to apply even the high-melt alloys, including Tufton and Stainless grades of steels, like conventional painting materials for a variety of unprecedented industrial purposes.

Generally speaking, the process consists of utilizing a gun mechanism to feed a wire of a specified alloy into a gas

Any alloy in wire form can be sprayed evenly on worn mechanical parts to reclaim them for useful service—Here's how the process works

By **RICHARD S. JENSEN**
General Manager
Metallizing Company of Los Angeles
Los Angeles, Calif.

flame or electrical heating unit so that the wire can be rapidly melted and atomized with a jet of compressed air. Tests thus far indicate that any alloy which can be obtained in wire form is sprayable in this manner on many different types of metallic and nonmetallic surfaces.

Such spraying has in turn permitted accomplishment of the following general types of work:

1. The protective and decorative coating of both metallic and non-metallic products.
2. The rapid and inexpensive production of metal mold cavities on low-cost patterns, such as plaster patterns.
3. The repair of defective metal castings and worn mechanical parts such as crankshafts and piston heads, etc.

The preparation of various surfaces for spraying with high-melt alloys fundamentally depends on the degree of adhesion that must be established between two similar or dissimilar mate-

rials. If a sprayed alloy is to be permanently adhered to a surface, the latter must be thoroughly cleaned and roughened by sand blasting or machining in order to provide good footing for the atomized metal during the solidification interval, thus eliminating the danger of later defects due to unequal coefficients of expansion and contraction in the hot and unheated materials. On the other hand, if only temporary adhesion is required, as in the production of mold cavities on metallic or non-metallic patterns, the surface of a base material should be merely clean and smooth, having a texture of the type that can be attained with a light dust blast, since glazed or lubricated surfaces will cause blisters or warpage even in strip coatings.

Sprayed alloy coatings are usually applied in thin layers, but may be built up to any desired thickness at a speed which depends on the size, shape, and heat resistance of the surfaces that are being sprayed. A certain loss of materials must be anticipated in connection with any spraying process, and computations to date indicate that these can be minimized in spraying alloys if data in the accompanying table are carefully observed.

Use of alloy materials

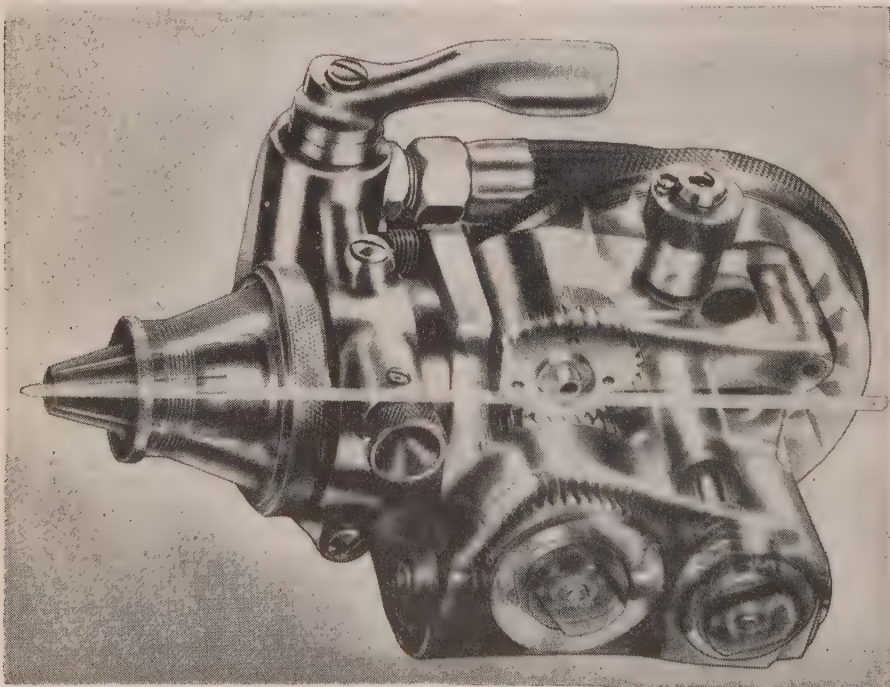
In many cases, it is desirable to apply two different alloy spray materials to a single surface. For instance, an iron product may be primed with a coating of cadmium prior to the application of a nickel spray coating in order to prevent eventual electrochemical corrosion; or a plastic surface may be given a preliminary coating with a low-melt lead alloy in order to eliminate the danger of damage and facilitate the adhesion of a sprayed steel material.

In at least a few instances, it has been found advisable to spray coat non-metallic surfaces with various types of alloys so that a final metallic coating could be electroplated thereon. However, alloy spraying should not be considered as an electroplating accessory in the finishing of non-metallic articles; for, despite a normally-rough texture, sprayed metal surfaces can be ground, buffed, brushed, or machined to an intermediate or highly-lustrous finish at a comparatively low cost.

As a rule, sprayed alloy material should have a thickness of at least .01 in. if they are to be finished by cutting or polishing with machine tools, greater



A LATHE SETUP, above, is used to rotate a small shaft during the process of spraying it with molten steel. Such rotation facilitates the application of uniform coatings. Phantom view of the wire-type metallizing gun, below. The white line through the center denotes the wire-feed channel where the alloy is melted and atomized.



Alloy Type	Thickness Unsprayed	Thickness Sprayed	Average Coat Thickness	Ft./Wire/Lb. 11 Ga.	1/8"	Deposit Efficiency
Aluminum	.071 /lb.	.062/lb.	.003 to .004	----	68	85%
Cadmium	.023 /lb.	.016/lb.	.003 to .004	----	22	70%
Copper	.0216/lb.	.018/lb.	.002 to .003	40	20	83%
Monel	.022 /lb.	.018/lb.	.002 to .003	40	20	82%
Steel	.024 /lb.	.020/lb.	.002 to .003	45	24	82%
Zinc	.0267/lb.	.017/lb.	.003 to .004	----	27	65%

thickness being mandatory if deep cuts or extensive grinding is necessary.

Tool bits with three side rake angles, 12 to 15 deg., 8 to 12 deg., and 0 to 5 deg., are usually employed, regardless of whether the metallized surface is internal, external, or flat, in a standard tool holder with a 15 deg. rake. Surface speeds range from 50 to 250 ft. per min. at .003 to .008 in. feed per revolution, depending on the type of sprayed alloy surface that is to be machined.

Roughing and finishing

Roughing-in machine work is normally done to about .010 to .015 in. over a specified finish dimension, and several different tool settings may be experimentally utilized in order to determine how the best possible finish can be attained on a given type of work.

Internal surfaces may be rough and finish bored in a more or less conventional manner, providing the boring bar is heavy and well-supported for light feeds and cuts, although internal grinding equipment is usually preferable for this type of work. Flat surfaces are not usually milled, since milling cutters have a tendency to chip sprayed metals, but can be satisfactorily finished with shapers and planers after all high spots and

flash have been removed by filing or grinding so as to prevent gouging.

A 3500 r.p.m. portable grinder with a 1/2 h.p. motor has been extensively used in finishing sprayed alloy surfaces. Its attachments include a 6-ft. flexible shaft with a ball-bearing handpiece, a 3 x 3-in. sanding drum, a sanding disc holder for 3 to 4-in. diameter sanding discs, and fittings for mounting wire brushes or buffing wheels. The sanding drums are rubber mandrels on which abrasive sleeves are mounted, 60-grit sleeves being used for roughing, 80-grit sleeves being used for general-purpose work, and 100 to 120-grit sleeves for finishing.

Grinding generally serves the purpose of eliminating excessive roughness, but must be accomplished at fairly light pressures whenever there is danger of damaging thin alloy layers. Ground surfaces may be polished for a bright lustre with ordinary metal buffing wheels.

When a sprayed-alloy surface is not exceptionally rough and does not require the brightest possible finish, all finishing work may be done with a wire brush. Brushes with a 4 to 6-in. diameter will give satisfactory results, if they are made from 24 to 36-gauge wire which matches the color of the sprayed alloy surface.

New Flame Machining Method Enables Fast Replacement of Worn Sprockets

FAST REPLACEMENT of worn cast iron or cast steel sprockets and gears on construction machinery is now possible through a new method of flame machining, developed by the Cogmatic Co. of Milwaukee, Wis. The method enables sprockets to be flame machined from steel plate in as little time as 5 min. for a 12-in. sprocket, with other cutting times dependent upon the diameter, thickness and characteristics of the metal.

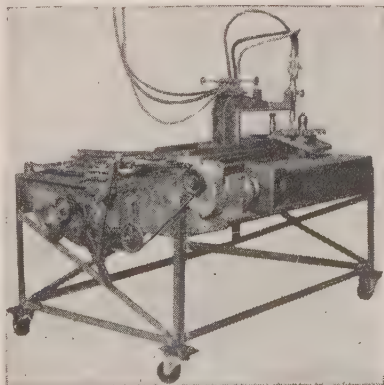
Here's how the method works. The machine operates on the principle of combining two motions: the blank to be cut rotates on a spindle while an oxy-acetylene cutting torch, mounted on a torch carriage, moves radially in respect to the blank. Movement of the cutting head is controlled by means of a system called a pantograph, and such movement is transmitted to the cutting head by tracing the contour of a cam, the design of which reflects standard and special tooth patterns. Rotation of the steel blank is related to the movement of the torch carriage.

Three basic adjustments are necessary to produce a wide variety of products on this machine: First, selecting proper cam and driving gear; second, adjusting

torch carriage in a roller carriage to bring the flame to the proper pitch radius; and third, adjusting pantograph levers. Adjustments to pantograph levers make it possible to use one cam for a great variety of different types of teeth, all to standard A.S.A. or special specifications.

The operator of the machine may make quick substitution of simple driving gears, thus permitting a wide variety

FLAME machining equipment is all mounted on one steel table 69 in. long.



in the number of teeth which can be cut while using the same cam. Any one of twenty basic cams may be used with the variables of adjustment mentioned, resulting in more than 5,000 types and sizes of sprockets and gears.

The machine is equipped to flame machine pinions, ratchets and racks in addition. As each tooth is flame machined, the clean wearing surface is automatically toughened in degrees determined by the characteristics of the metal itself, with no further machining being necessary. The accuracy in pitch, concentricity and contour are far greater than found in ordinary cast products.

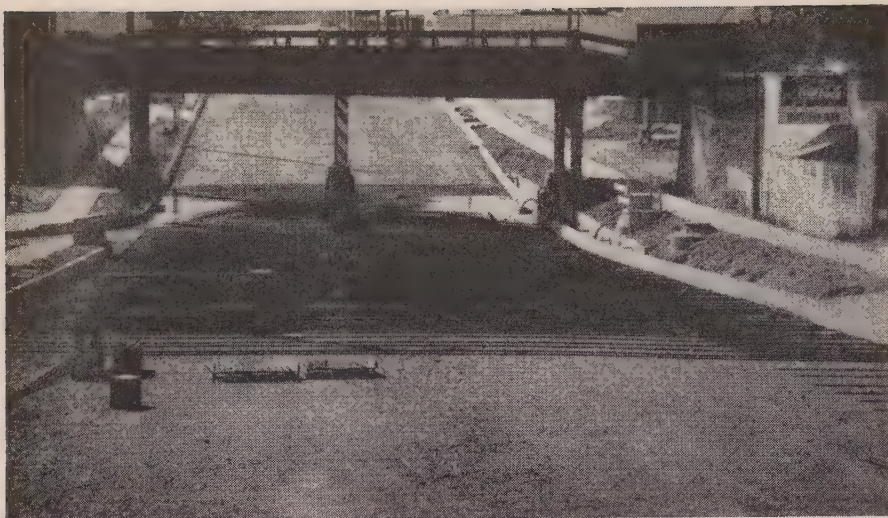
The present model will handle sprockets and gears with diameters up to 4 ft., while cutting blanks up to 3 in. thick. The illustration shows the pantograph and cam tracing parts mounted in the rear of the machine, with the cutting head being forward.

Tungsten Carbide Bits To Speed Rock Drilling

SPECIAL QUALITIES of tungsten carbide inserts in rock bits will bring about their increased use in place of standard drilling methods during the next few years, it was pointed out by Blair Burwell, president of the Mineral Engineering Co. of Grand Junction, Colo., in a paper presented before the American Mining Congress. Even though spectacular results in drilling hard rock with initial test lots of tungsten carbide bits have been followed by erratic performance, insert breakage and drill thread failure, new developments will soon eliminate these drawbacks.

Burwell outlined an important development now under way where the tungsten carbide is welded on the cutting edges of conventional steel bits. Here, the problem has been the bond between the steel of the bit and the welded metal, as the use of surfaced bits in hard rock has tended to shatter and break the hard surface coating. He predicted that a satisfactory bit will be developed with drilling performance and cost intermediate between standard bits and tungsten carbide insert bits. These can be developed by attention to the same factors which have proved essential to all-around use of the insert bits, namely, small holes and light machines, and by improvements in welding metal and heat treatment after welding. Successful use of bits of this type has been reported at the Bureau of Mines Experimental plant at Rifle, Colo.

Typical of the use of tungsten carbide bits for high-speed drilling was the record established at the Adams Tunnel of the Colorado-Big Thompson Project. On this job, 128 ft. per bit was drilled through granite and 428 ft. per bit was drilled through sandstone. Alloy drill life on the job was 231 ft. per rod. Also on this job, carbide bits with broken inserts from hard rock faces were reused in sandstone rock.



Wrought iron pipes being laid in pavement slab of underpass to defrost Oregon highway.

Highway Snow and Ice Melted By Radiant Heating System

THE DREAM of every motorist and every highway engineer—a snow-melting highway—has been opened for use in Klamath Falls, Ore.

In the first application of radiant heating principles to a public road, the highway will be heated in bad weather by hot water from an underground spring circulated through a network of welded wrought iron pipe laid in the concrete. Four lanes wide, 450 ft. long with an eight per cent grade, this dangerous road area is designed to remain clear and skid-free in all weather by automatically melting up to one inch of snow or one-tenth inch of ice per hour.

The stretch of all-weather heated pavement is on The Dalles-California Highway leading into Klamath Falls from the north. It passes under a railroad viaduct and a few hundred feet farther crosses an irrigation ditch, thus necessitating a grade two or three per cent steeper than would be normally used.

Work was started on the road late last spring after a ten-inch well had been drilled which struck a good flow of hot water at 390 ft. G. S. Paxson, bridge engineer for the Oregon State Highway Commission, developed the idea for the winter-proof highway.

The hot well-water itself is not run through the roadway piping. Instead, a coil of two-inch pipe is submerged deep in the well-water, which tests at 190 deg., about 20 deg. below boiling temperature. In effect, the well serves as a boiler. A pump sends ordinary water and anti-freeze through the well coil, where it is heated or reheated to not less than 160 deg.

A 2-in. pipe runs from the well to the pavement, and then parallel to the road for a distance of about 400 ft. In the pavement slab are embedded 15,000 ft. of ¾-in. wrought iron pipe, made up into one grid for each of a series of 30-ft. road panels. Each of these 15 panels is

connected with the 2-in. water main by valves.

The pipe carried a coating of asphalt before being laid in the concrete. Wrought iron was used in the installation because of its resistance to corrosion and because its coefficient of expansion is virtually the same as that of concrete, thus keeping the bond and minimizing the danger of cracking the concrete.

The two-inch main and the series of grids comprise a closed circuit through which heated water is pumped, the valves insuring an even flow of water through each grid. Thus the whole 8-in. slab of road concrete is warmed to snow-melting temperature.

The pump, thermostatically controlled, automatically begins to circulate the water when air temperature drops to freezing and continues to operate until the temperature rises above freezing. Another pump draws water from the well since it loses its heat value as the cool water flows from the road through the heat transfer coils. Hot water then bubbles up from the earth back into the well.

This type of heating, with a boiler used to heat the water, has been increasingly popular in residential, industrial and business construction. During the past few years it has been brought outdoors in many installations to winter-proof sidewalks, airports, private driveways and filling station areas.

The natural hot water at Klamath Falls is widely used by the residents. It has been tapped to heat 400 rooms, a swimming pool, two hospitals, a high school, a new office building, several apartment houses, business buildings, and a newly-constructed \$3,000,000 veterans hospital. It is used for sterilizing dairy and soft-drink bottles. Ranchers outside of the town use it to heat their poultry sheds and green houses and to warm drinking water for their stock.

Oklahoma to Propose More County Engineers

OKLAHOMA's county 3-unit plan on building highways will be abolished if the forthcoming Legislature adopts a sweeping proposal of its Legislative council.

The council has gone on record as favoring its abolishment and the substitution for a county-wide unit plan to be operated under the sole authority of a county engineer.

Under the present law each of the three county commissioners is the full authority on what roads are to be built in his district and when. His responsibility is confined to his individual district.

Under the new legislation coming before the assembly will be a law making county commissioners collectively responsible for all the roads in the county.

Supporters claim the change will result in a uniform program of farm-to-market linked-up development, will eliminate waste, reduce costs and that communities who have felt neglected under the present system will be provided with adequate means of obtaining relief. The proposed system is working well in several Western states.

Until the adoption of the new farm-to-market road law in 1947 few Oklahoma counties had a salaried engineer employed regularly. Much road construction was done without engineering advice, while in some instances it was let out on a fee system.

Since the passage of the law all farm-to-market engineering is done by engineers, the greater part on a fee system. Some engineers hold contracts with a half dozen or more counties.

Also adopted by the council from its committees for drafting into law are proposals taking from the school funds and transferring to the state highway department auto and truck licenses and a half cent increase per gallon on gasoline for school bus and rural mail routes in the farm-to-market program.

Recent A.R.B.A. Survey Shows Covered Bridges Economical

COVERED BRIDGES are still an important factor in this country's transportation system, according to a survey by the American Road Builders' Association showing that service records of the bridges have more than proved their cost. Some 25 states from an original 36 have usable covered bridges today, the ARBA survey revealed, and Canada still champions the style and continues to build them. Many still exist in Oregon, Washington, and Northern California where lumber is cheap and plentiful.

They are still being constructed on secondary roads in some states. The oil impregnated wooden pegs that formerly held planks and studding together have given way to the supremacy of steel nail and bolts. The modern counterparts, however, are not being designed as high and wide as a load of hay.

NEWS OF WESTERN CONSTRUCTION

JANUARY 15, 1949

Utah Power Starts on Fifty Million Dollar Expansion

UTAH POWER & Light Co., Salt Lake City, has announced a \$50,000,000 expansion program covering the next five years. According to J. A. Hale, Vice-president, the facilities planned cover every phase of electric utility construction. His brief statement follows:

The first large project planned is an extension to the Orem steam electric station located near Provo, Utah, consisting principally of one 40,000/44,000-kw., 0.85-power factor, condensing turbine-generator; necessary circulating and make-up water facilities using Provo River water; one direct-fired pulverized-coal-burning (and oil-burning if required) steam generating unit for 850-psig., 900° F. steam conditions at throttle and necessary associated equipment; coal, ash and oil handling facilities; station building and other structures as required; all necessary mechanical and electrical accessory equipment; and additional transformer and switchyard facilities required for connection into present transmission systems. Active construction will begin in April, 1949, and the plant will be completed during the summer of 1950.

Construction should begin in the latter part of 1949 on an extension to the Jordan steam electric station at Salt Lake City, consisting principally of one 60,000/66,000-kw., 0.85-power factor, condensing turbine-generator; necessary circulating and make-up water facilities using Jordan River and Salt Lake City water; one direct-fired pulverized-coal-burning steam generating unit for 1,250-psig., 950° F. steam conditions at throttle and necessary associated equipment; coal, ash and oil handling facilities; station building and other structures as required; all necessary mechanical and electrical accessory equipment; and additional transformer and switchyard facilities required for connection into present transmission systems. This unit will be on the line in 1951.

A second 60,000/66,000-kw. unit at Jordan is scheduled for construction beginning in 1951.

No additional hydro power is sched-

uled, but there will be substantial annual expenditures for replacement of wood pipes and flumes.

Transmission line construction costs will amount to over a million dollars a year. Most of the lines, 132-kv. and 44-kv., will be wood pole H-frame construction, with copper conductor. This type of work will be done generally by contractors in the territory.

Distribution line and substation construction costs will exceed three million dollars a year for the period. Unit type three phase substation construction is predominant. There has been considerable contract work on the rural exten-

sion program, and on street lighting installations in Salt Lake City and elsewhere.

New service and office buildings are under construction or authorized. There is a small amount of Diesel-electric work in prospect.

State, Denied Ferries, Supports Bridge Plan

THE WASHINGTON State Toll Bridge Authority has indicated its support for construction of Agate Pass Bridge near Seattle as a separate project instead of its erection as part of the program for acquisition of ferries for a Puget Sound transportation system. Both the bridge and ferry purchases were to have been financed by a \$10,500,000 bond issue, approved by voters but

SHOVEL OPERATES IN CRAMPED QUARTERS TO EXCAVATE CANAL

OPERATING in the picturesque but very limited space between eucalyptus trees on the right and an orange orchard on the left, a Bucyrus-Erie Dragshovel cuts out the preliminary excavation for a main canal of the Sapphire Water Co., near Upland, Calif. The soil is full of boulders and roots. John Poetker is the contractor.



invalidated by the State Supreme Court. The court ruled last month that the state cannot legally acquire ferries.

Clarence B. Shain, Washington State Director of Highways, said he would recommend the separate project plan at the next Toll Bridge Authority meeting if legal matters could be worked out and financing arranged. It is estimated the bridge would pay enough revenue to retire a bond issue. The 0.233-mi. steel cantilever span would connect Bainbridge Island with State Highway No. 21-A at Suquamish in Kitsap County. The low bid of \$1,398,439 for its construction has already been extended by Manson Construction and Engineering Co. of Seattle.

Construction of the bridge would possibly eliminate more than half of the private ferry lines now operating between the main islands and the western side of Puget Sound. Whatever the action of the Toll Bridge Authority, one fight is sure to occur when the new State Legislature convenes. That is over the question of state versus private operation of the key ferry routes.

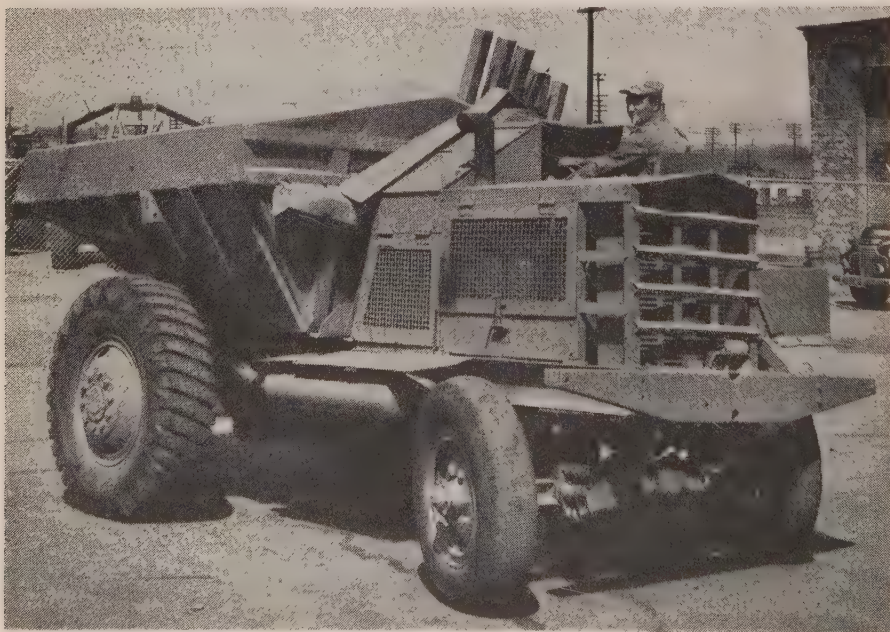
Blast Furnace Contract Let

THE FABRICATION and erection of a new blast furnace at Fontana, Calif., has been awarded to Consolidated Western Steel Corp., a United States Steel subsidiary, by the Kaiser Co., Inc., of Oakland, Calif.

The new furnace will have a rated capacity of 1,200 tons of pig iron and appurtenant facilities necessary to produce steel plate. It will be completed in 1949, and is almost identical with the present blast furnace of similar capacity also fabricated and erected by Consolidated Steel in 1942.

DUMPSTERS CONVERTED FROM GASOLINE TO DIESEL POWER

REDESIGNING Koehring gravity-type dumpsters by replacing the gasoline engine with a Cummins Diesel has greatly improved their efficiency on road work in Colorado's high mountain country. They are the property of Lowdermilk Bros., Denver contracting firm. The gas engine was removed, the frame extended 19½ in. and reinforced, then the Diesel engine was attached, also a new shaft, new clutch and radiator.



Bureau Turns Irrigation Projects Over to Water Users' Organizations

CANALS, laterals, and other facilities for distributing irrigation water on the Bureau of Reclamation's Grand Valley project in Colorado and Vale project in Oregon were turned over to the local water users' organizations for operation on Jan. 1.

The transfer of similar irrigation facilities to the water users on the Carlsbad project in New Mexico, Belle Fourche project in South Dakota, and Scofield project in Utah has been postponed until April 1, in order to give the water users' organizations time to get their affairs in shape to take over the projects.

Also, the Bureau's Regional Directors concerned have been instructed to press for transfer of irrigation facilities to water users organizations on the Rio Grande project in Texas-New Mexico, the Valley Division of the Yuma project in Arizona, the Orland project in California, the Milk River project in Montana, parts of the Klamath project in Oregon-California, parts of the Yakima project in Washington, and certain facilities of other projects.

Reclamation Commissioner Michael W. Straus commented:

"From time to time, there has been some comment on our operation of irrigation facilities from various water users organizations. This has grown largely out of the increasing costs of project operations and maintenance. The water users now have full opportunity to take over the operation of these facilities themselves and under their own responsibility demonstrate what

they can do with them."

The irrigation facilities of the Grand Valley project are to be turned over to the Grand Valley Water Users Association of Grand Junction, Colo. Wayne Cheisman, assistant operation and maintenance supervisor of Region No. 4, Salt Lake City, is retiring from Bureau employment to become manager of the Grand Valley Water Users Association. Cheisman formerly was in charge of the government's operation of the Grand Valley project.

The Vale project is being turned over to the Vale, Ore., Irrigation District. The Carlsbad facilities are to be turned over to the Carlsbad Irrigation District, Carlsbad, N. Mex., and the Belle Fourche to the Belle Fourche District, Newell, S. Dak. Irrigation works on the Scofield project will be transferred to the Carbon Water Conservancy District of Price, Utah.

Negotiations for transfer of the Rio Grande project are being carried on with the Elephant Butte Irrigation District of Las Cruces, N. Mex.; and the El Paso County Water Improvement District No. 1, El Paso, Tex. Those for the Valley Division of the Yuma project are being carried on with the Yuma County Water Users Association, Yuma, Ariz.

Hungry Horse Change to Augment Flood Control

A CHANGE in the design of the multiple-purpose Hungry Horse Dam in Montana to provide for greater flood control has been announced by R. J. Newell, Regional Director of the Bureau of Reclamation. He said an additional discharge outlet would be installed.

The alteration of the original plans for the \$100,000,000 structure, being constructed on the South Fork of the Flathead River, was worked out jointly by the Corps of Engineers and the Bureau of Reclamation under the coordinated flood-control program for the Columbia River and tributaries.

In view of last spring's flood disaster, space in the Hungry Horse Reservoir has assumed far greater value than anyone had counted on previously, Newell stated. In the face of this fact the Corps of Engineers, which agency has major responsibility for flood control, felt that greater discharge capacity was needed for quickly evacuating the 3,500,000 ac. ft. reservoir in times of impending floods.

Original specifications for the dam called for two outlet pipes, each 8 ft. in diameter and each having a discharge capacity of 4,000 cu. ft. per sec. The pipes will be 460 ft. long and pass through the dam at a downward incline from an upstream elevation of approximately 100 ft. above bedrock. The third unit to be added will be of similar size

and capacity. In addition, a "glory hole" spillway, having a maximum discharge capacity of 35,000 cu. ft. per sec., will be constructed.

The outlet works will be utilized each year primarily between late March and early May when run-off forecasts indicate the evacuation of additional capacity for flood control is necessary. The installation and use of the additional outlet will have no effect on the power generating capacity of the Hungry Horse power plant, rated at 300,000 kw., or on prospective irrigation in the Kali-spell area.

Columbia Basin Report Differences Reconciled

RECONCILIATION of all technical differences in the multi-million dollar Columbia Basin development programs of the Corps of Engineers and the Bureau of Reclamation has been reached at meetings between representatives of the two agencies, according to a joint announcement by Col. Theron D. Weaver, North Pacific Division Engineer of the Corps of Engineers, and R. J. Newell, Bureau of Reclamation Regional Director.

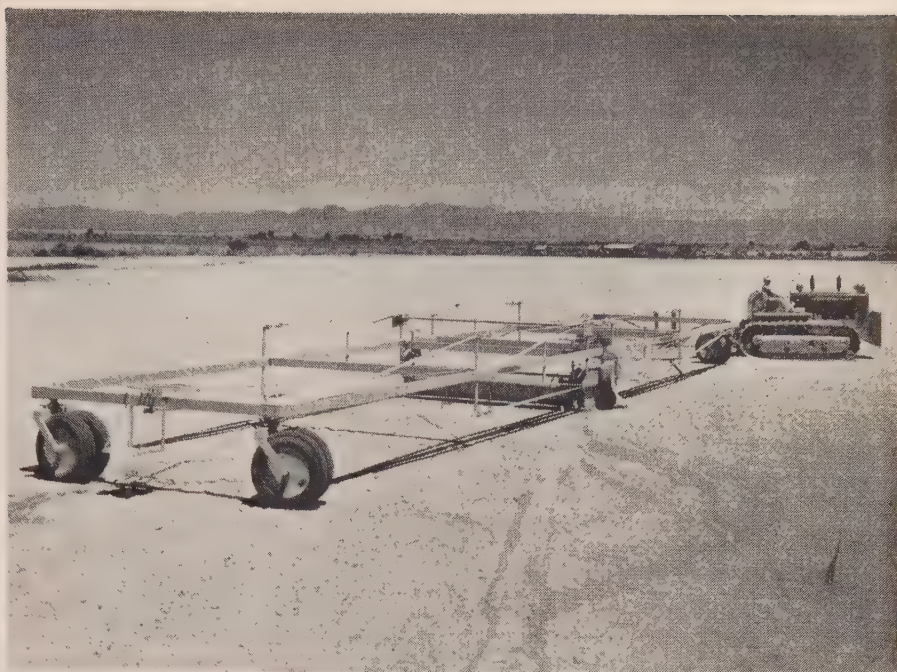
Various engineering phases of the Engineers' recently revised "308" report and the Bureau's comprehensive basin development study were discussed in detail by engineers of the respective agencies. The joint analysis revealed only minor engineering or technical deviations and these were satisfactorily resolved.

Both plans call for construction of multiple-purpose dams and other improvements on the Columbia River and its tributaries. The Engineers' plan, announced last Nov. 8, calls for immediate authorization of seven new dams in addition to those now authorized or under way, with emphasis on the interests of flood control, navigation, irrigation and power. The Bureau announced their program more than a year ago, recommending similar multi-purpose projects, emphasizing reclamation but providing various other benefits.

Denver Square Selected for Huge Building Development

A \$4-MILLION PROJECT will be built on the courthouse square in Denver, Colo., by Webb & Knapp of New York City, recent purchasers of the plot for \$818,600. The type of development has not been announced, but E. B. Harding, Denver representative of the New York firm, said it would consist of only one large building and would be either a "miniature Radio City," a merchandise mart or a modern hotel.

Webb & Knapp, along with certain associates yet to be named, will construct the building as their own investment. The firm is proceeding with plans for the project following abandonment of a legal fight by Gordon Tamblin, Denver contractor, to block sale of the square.



GIANT LAND PLANE PREPARES IMPERIAL VALLEY LAND FOR FARMING

POWERED by a big International TD-24 tractor, a land plane 80 ft. long and 17 ft. wide, is used by Larry Lambertz, Imperial, Calif., contractor, to level farm land in California's year-round farming valley. Rough land is first rough-graded with scrapers, the plane puts on finishing touch by cutting high points and filling depressions.

Missouri River Power Projects Outlawed by Federal Commission

THE FEDERAL Power Commission has made public an opinion and order finding each of the Montana Power Company's nine developments in Montana on the Missouri and Madison Rivers subject to the licensing requirements of the Federal Power Act because of unauthorized occupancy of a "navigable water" or public lands or both. The company was ordered to file an application for license for operation and maintenance of the Morony, Ryan, Rainbow, Black Eagle, Holter, Hauser and Canyon Ferry developments on the Missouri River and Hebgen on the Madison. Application for a license for a second development on the Madison River has been filed by the company.

In its opinion the Commission stated that the issues presented were whether any or all of the developments occupy navigable waters or public lands contrary to the provisions of the Federal Power Act, and whether any or all of them affect the navigable capacity of navigable waters of the United States.

The company contended that none of the projects are located in a "navigable water." However, the Commission stated: "Notwithstanding interruptions by falls, shallows, and rapids compelling land carriage, the Missouri River was used in both its natural and improved condition for the transportation of persons and property in interstate commerce from its mouth to Stubbs Ferry, (near Helena) and was suitable for such use in both its natural and improved condition throughout its entire length." Its conclusions were based upon the

historical use of the river for boat navigation, and for transportation of loose logs and large rafts of lumber as well as upon an examination of the physical characteristics of the stream.

In addition, the Commission pointed out that "Congress has repeatedly asserted and manifested its jurisdiction over the entire length of the Missouri River by appropriations for improvement for navigation as far upstream as Stubbs Ferry, by authorizing and directing surveys and examinations of the river as far upstream as Three Forks, and authorizing the construction of dams at various points as far upstream as Three Forks."

The Commission, after holding that the seven Missouri River developments occupy navigable waters, turned to the question of the authority of the company for occupancy of navigable waters and of public lands. The company did not claim authority for occupancy of navigable waters for the Morony, Ryan, Rainbow and Black Eagle developments and insisted that none is required. However it did claim authority predating the Federal Water Power Act of 1920 for occupancy of public lands for the Holter, Hauser and Canyon Ferry developments. While denying that Holter, Hauser and Canyon Ferry occupy navigable waters, the company contended that acts of Congress gave it any authority that might be necessary. As to the Madison development, the company conceded the need for authorization to occupy public lands. On the other hand,

(Continued on page 110)

Bids Invited in Near Future for Reclamation Construction Projects

BID CALLS expected in ensuing weeks from the Bureau of Reclamation include projects in virtually every state of the West. Specifications and bid forms may be obtained from the office of the Chief Engineer in Denver or from local Regional offices.

On Jan. 14, invitations were issued for construction of North Dam, an earthfill dam 94 ft. high and 1,350 ft. long, and 1.5 mi. of 16,000 cfs. capacity feeder canal on the Columbia Basin project in eastern Washington; a pumping plant, substation structure and about 8 mi. of canals and laterals on the Savage project near Savage, Mont.; drilling three water supply wells near Tucumcari, N. Mex.; erection of the Cannonball government camp, near Elgin, N. Dak.; construction of 8 residences at Parker, Ariz.; construction of the 750-kv. capacity substation at Haxtun, Colo., a unit of the Colorado-Big Thompson Project; and building a 30-mi., 115-kv. transmission line near Eloy, Ariz.

On Jan. 17, a bid call is to be issued for construction of 3.5 mi. of 161-kv. wood pole transmission line between Loma and Fort Benton, Mont.

On Jan. 20, the Bureau will invite bids on 12.5 mi. of the Superior Canal, of 139-cfs. capacity, near Superior, Neb., and on relocation of 8.5 mi. of Colorado State Highway 280, near Granby, Colo.

On Jan. 25, bids will be asked on construction of the 6.4-mi. Tecolote tunnel, and 1.7 mi. of access road on the Santa Barbara Project near Goleta, Calif.; earthwork, lining and structures on 14.5

mi. of the East Low canal, with 4,500-cfs. capacity, and 6.75 mi. of the Rocky Coulee wasteway, on the Columbia Basin Project in Washington; completion of the Kortess power plant and switchyard at Kortess Dam on the North Platte River about 62 mi. southwest of Casper, Wyo.; and a 52-mi. wood-pole transmission line from Goshen to Pali-sades, Ida.

Other construction jobs on which bids are to be advertised in the next two months include two earthfill dams: Platoro Dam, 150 ft. high and 1,500 ft. long, located 40 mi. west of Alamosa, Colo., and Tiber Dam, 185 ft. high and 2,880 ft. long, on the Marias River, 16 mi. west of Chester, Mont.; rehabilitation of Ochoco Dam, spillway and outlet works on the Crooked River Project, near Prineville, Ore.; relocation of 30 mi. of Forest Service road near Kalispell, Mont.; earthwork and structures on five canals: 18 mi. of the Wellton-Mohawk Canal, 20 mi. east of Yuma, Ariz., and 16 mi. of the Courtland Canal, near Superior, Neb., 15 mi. of the Winchester Wasteway, near Winchester, Wash., canals and laterals on 4,068 ac. near Wolf Point, Mont., and excavation and stabilization of 1 mi. of the Granby Pump Canal; dredging of the Colorado River in the vicinity of Needles, Calif.; improvement of 10 mi. of the channel of the Lost River near Klamath Falls, Ore.; a 1,000-ft. siphon on the Shoshone Project in northwest Wyoming; an equalizing reservoir of 10-ac. ft. capacity near Ogden, Utah.

Seattle Asks Permission to Change Skagit River Power Development

THE CITY of Seattle, Wash., has filed with the Federal Power Commission an application for amendment of the license for its Ross and Diablo water-power developments on the Skagit River in Washington to include its existing Gorge power development with certain proposed changes and additions, among which is the replacement of the existing Gorge dam with a new diversion dam. Estimated overall cost of the proposed new construction and changes in existing structures is \$9,554,276.

Plans for additions to the existing Gorge Power plant, which include construction of an extension to the present powerhouse, would increase horsepower from 82,500 to approximately 165,000, according to the city's application.

The proposed new diversion dam would be located downstream from the existing timber-crib dam and, with flashboards, would raise the forebay elevation from 778 to 786 ft. The city also proposes to enlarge the cross-section of its temporary tunnel, to repair and "streamline" the permanent 2-mi. tunnel, and to construct a 675-ft. penstock tunnel. Other plans include the re-

building of the Gorge switching station, alterations to the surge tank, and modernization of the existing powerhouse.

The city also requested the Commission to include a provision in the license for future replacement of the new diversion dam by a concrete dam which would create approximately 100 ft. of additional head for operation of the Gorge plant.

The city's application said the construction would be financed through issuance and sale of municipal electric utility revenue bonds, as authorized by Seattle city ordinances.

OBITUARIES...

Gordon Stanley Nyberg, 31, contractor at Spokane, Wash., died suddenly Dec. 5 while stopping in a hotel at Cut Bank, Mont.

Thomas Bate, 82, pioneer Colorado contractor who had been engaged in construction projects throughout that state for nearly 50 years, died Nov. 30 at his home in Denver. He was a partner in the general contracting firm of

Thomas Bate & Sons, Denver, and was past president of the Denver Master Builders Association.

David W. Lamb, 63, who worked for the United States Public Roads Administration as an engineer on many highways in the Pacific Northwest for 30 years, died recently in a Salem, Wash., hospital.

Hector Melvin Draper, 57, general contractor and home builder of Salt Lake City, Utah, died Nov. 20 of coronary thrombosis. He was a member of Utah Associated Contractors for the past several years.

J. Lester Brown, 44, general superintendent for Mitty Brothers Construction Co. on their contract with the U. S. Army Engineers for the construction of Hulah Dam, Oklahoma, died Dec. 6, after a short illness. Brown had worked on many heavy construction projects for both the Federal government and contractors.

Albert Morton Collier, 70, retired assistant city engineer of Oakland, Calif., died recently of a heart attack while observing a football game. He was a native of Nevada.

Herman C. Johnson, 65, building contractor of Seattle, Wash., died Dec. 1 after a brief illness.

Eugene W. Dow, 38, engineer for the New Mexico State Highway Department at Roswell, N. M., died Nov. 16.

John A. Holmberg, 66, co-founder of the contracting firm of Holmberg & Norman at Port Orchard, Wash., died recently. The partner, L. A. Norman, died in 1931. The firm constructed many miles of highway in Washington.

Claes J. Nordquist, 83, building contractor of Los Angeles, Calif., died Nov. 29.

W. T. "Tabb" Thompson, 59, engineer with the Oregon State Highway Department at Eugene, was killed on Dec. 8 in an automobile accident. He was supervising two highway jobs near North Bend.

C. E. Walker, 78, Denver, Colo., contractor who built the Mountain States Tel. & Tel. building in that city, died Nov. 28 after a short illness. He erected many other Denver business buildings before his retirement in 1935.

Colonel F. Betz, contractor of San Luis Obispo, Calif., was killed when the plane he was flying crashed near Tracy, Calif., on Jan. 1. He was 28 years old. His flight was for the purpose of delivering the payroll to his employees on the Delta-Mendota canal project. The money was saved.

Famous Colorado Bridge May Be Sold to City

CITIZENS of Canon City, Colo., will vote Jan. 18 to decide whether or not they will purchase one of the West's greatest scenic attractions, the Royal Gorge Bridge, highest suspension span in the world. The purchase would include the famed bridge and the Royal Gorge incline railway, which winds up a 100 per cent grade on the north rim of the gorge. Purchase price is \$726,260.

The Royal Gorge Bridge Co., constructors of the span in 1929 and its operators since that time, are reportedly not too anxious to sell the property. But under terms of their 1929 lease with the city allowing use of the Royal Gorge site, Canon City was given the option to buy the property in 1949. The purchase price was predetermined as the average

annual net profit for the last five years multiplied by ten. Net profit during the last few years has exceeded the cost of municipal operation for Canon City, so the community of 15,000 persons may soon become one of the nation's few cities to operate without any tax levy.

FPC Authorizes Increased Power Delivery to Mexico

SAN DIEGO Gas & Electric Co. has been authorized by the Federal Power Commission to increase its transmission of electric energy to Mexico from the previously authorized annual total of 22,200,000 kw. hr., to a new amount not to exceed 45,000,000 kw. hr. a year.

Under terms of the Commission's order, the company may transmit up to 40,000,000 kw. hr. yearly over its 12 kv. transmission line opposite Tia Juana.

FPC also authorized San Diego Gas to transmit to a point opposite Tecate, Mexico, either 2,500,000 kw. hr. a year on a 2.3 kilovolt line, which previously was limited to 200,000 kw. hr.

The San Diego Company sells electricity to M. P. Barbachaho and Cia. Electrica Fronteriza, S. A., a Mexican Company, at two points on the international boundary near Tecate and Tia Juana, Mexico.

THE 33RD Annual Convention of the Colorado Society of Engineers will be held Feb. 3, 4, and 5, 1949, in the Shirley-Savoy Hotel, Denver.

The Society is planning a well-rounded program of interest to engineers and associates in all fields, including speakers, dance, banquet, and exhibits by many well-known manufacturers.

PERSONALLY SPEAKING

Terrence J. Owens is the appointed city engineer of Denver, Colo., to succeed E. A. Smith, who will continue with the department as an engineering consultant. Owens has been deputy city engineer since joining the department on Sept. 1, 1948. He is a civil engineering graduate of the University of Colorado and served overseas with the 1140th Engineering Combat Battalion during the war. Owens indicated he would appoint Assistant City Engineer Dewey Wright as his deputy. Wright, also a University of Colorado graduate, has eleven years' experience with the U. S. Public Roads Administration and the Civil Aeronautics Administration. Smith entered the city engineer's office in 1910 and was named City Engineer in 1945.

John Morrison of Morrison Engineering Co., Helena, Mont., is the elected president of the Montana Section, American Society of Civil Engineers. Louis Henke, Jr., Montana State Highway Bridge Department engineer, was named secretary-treasurer. John D. Officer of Columbia Falls, was named first vice-president, and Harold O. Egeberg of Great Falls was elected second vice-president.

Roy O. Young of Mandan, N. D., was elected president of the North Dakota Reclamation Association at its recent annual convention. Other officers include: C. S. Summers, of Bowbells, first vice-president; R. L. Dushinski, Devils Lake, second vice-president; Fred G. Hagen, Fargo, treasurer; J. I. Rovig, Mandan, secretary; Harry Polk, Williston, state director, and Oscar Lunseth, Grand Forks, retiring president, ex-officio national director.

Charles E. Brokaw, director of the Denver, Colo., regional field office of the United States Department of Commerce, has been named the department's representative on the Missouri Basin Interagency Committee. He will represent business and industrial development matters as one of the five federal representatives on the committee. The other five members are chosen from among the governors of the ten states in the basin.



FRED W. MEYER

Fred W. Meyer has been named Chief of the Engineering Division of Bechtel Corp., San Francisco and Los Angeles, Calif., engineering construction firm. Meyer joined the Bechtel organization in 1942 following seven years of refinery design and process engineering with the Standard Oil Co. of California. With Bechtel, he has been active on such major refinery engineering projects as the 100-octane plant at Richmond, Calif., the butadiene plant at El Segundo, and the Borger, Tex., plant of Phillips Petroleum Co. His headquarters will be in San Francisco.

Commander W. H. Bainbridge of the United States Coast and Geodetic Survey has succeeded Lt. Commander Robert A. Earle as supervisor of the midwestern district of the survey, with headquarters at Portland, Ore. Commander Earle has been stationed in Portland for 4 years, first as officer in charge of the photogrammetric office there, and later as director of the mapping project covering coastal areas of Oregon, Washington, California and Alaska. This work will be continued under the

direction of Commander Bainbridge, who for the past year commanded the survey ship Hodgson on the Columbia River. Lt. Commander H. J. Healy relieves Bainbridge on the Hodgson. Commander Earle will move to Seattle, Wash., on another assignment.

Harold C. Hargreaves, chief building inspector of Salt Lake City, Utah, is the first president of the newly organized Utah Chapter of the Pacific Coast Building Officials Conference, an organization dedicated to improvement of building practices and codes. The Utah group was formed as a result of a split in the old Utah-Idaho chapter of the organization. Other new officers are: Morris Marler, Logan, first vice-president; Charles V. Gordon, Cedar City, second vice-president, and W. Y. Tipton, Salt Lake City, secretary-treasurer. Tipton was president of the old Utah-Idaho Chapter.

Five engineers within the San Diego District Office of the California Division of Highways have received promotions. E. E. Sorenson, assistant district engineer in charge of operations, was appointed chief of the Division of Highways Equipment Department, and was transferred to San Francisco. R. B. Luckenbach, district traffic engineer, was named assistant engineer in charge of operations. R. A. Hayler, design engineer, became assistant district engineer in charge of planning. M. H. West, assistant traffic engineer, became traffic engineer, and J. P. Sinclair, project engineer, became engineer of design.

J. H. Davies and Associates, consulting civil engineering firm, with main offices in Long Beach, Calif., have opened a branch office in Santa Ana, Calif., to serve Orange County. The new office will provide a complete structural and civil engineering service, furnishing plans, calculations, specifications and supervision for commercial, industrial and public building construction and for various civil engineering projects. Norman F. Rau, Civil Engineer, will be in charge of the office.



JAY E. JELICK

Jay E. Jellick, registered civil engineer, has replaced **Ralph Rader** as Manager of the Portland Cement Information Bureau at San Francisco. Jellick held the position prior to Rader's appointment in 1943. Prior to his work with the Bureau, he served successively as District Engineer of the Los Angeles and San Francisco offices and as Manager of the Pacific Coast offices of the Portland Cement Association.

Ed Gooch has resigned as city engineer of Bellingham, Mont., a position he held for the past 11 years. He will remain with the city's engineering department as a consultant, retaining his civil service status.

George Ebner of Valier, Mont., is the elected president of the Montana Reclamation Association, succeeding **O. P. Balgord** of Lavina. **O. A. Bergeson** of Dillon was named vice-president to succeed Ebner, and **H. P. Buck** of Billings was renamed secretary-treasurer.

Hubert Woods, Research Director of the Riverside Cement Co. of Los Angeles, Calif., since 1926, has been chosen Director of Research for the Portland Cement Association, Chicago, Ill.

Two U. S. Forest Service veterans, **Robert L. Deering**, assistant regional forester in charge of operation, and **Earl V. Lackey**, regional fiscal agent, retired Dec. 31. "Bob" Deering held his position for 28 years. His successor will be **Donald E. Clark**, now assistant regional forester in charge of personnel management. **William F. Murray** will succeed Lackey.

Leonard G. Estey is the new Resident Engineer of the Corps of Engineers' Boise, Ida., area, to succeed **Oliver A. Lewis** upon his transfer to the Walla Walla District. Estey has been assistant chief of the construction branch since the formation of the Walla Walla District, including the Boise area, on November 1, 1948. Prior to that he was with the Seattle District, Corps of Engineers, in the same capacity. Lewis, who has been Boise Resident Engineer since 1942, will be chief of the examination

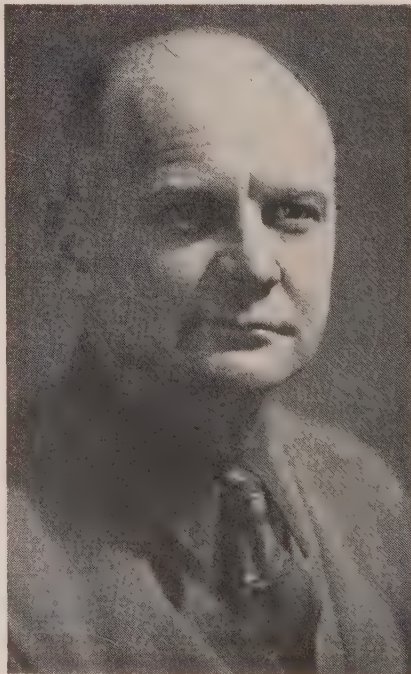
and survey section in the Walla Walla District and will coordinate work of the levee and channel design section.

Dr. George C. Condra, of Lincoln, Neb., Chief of the Conservation and Survey Division of the University of Nebraska, is the elected president of the Nebraska State Irrigation Association to succeed **E. O. Daggett**. **Cletus Nelson** of Holdrege and **Charles Klingman** of Gering were chosen vice-presidents. **Dan S. Jones, Jr.**, of Lincoln, Assistant Chief of the Nebraska Bureau of Irrigation, was elected secretary-treasurer. Jones succeeds **R. H. Willis** of Bridgeport, who served as secretary for thirty years. Willis, Chief of the State Irrigation Bureau, was made secretary emeritus for life.

Alaskan contractors have joined to form an Alaska Chapter of the Associated General Contractors of America. An office and headquarters will be established soon in Anchorage. Charter members comprise all contracting firms who have been associated with building during the past several years. A tentative board of directors has been elected. They include **William Lofholm**, general superintendent for Morrison-Knudsen Co., Inc., in Alaska; **R. H. Stock** of the Stock & Grove Construction Co., Anchorage; **D. W. Clayton** of C. F. Lytle & Green Construction Co.; **D. L. Chaney** of S. Birch & Sons, Seattle, Wash.; **M. P. Hunter**, principal of the M. P. Hunter Co.; **A. N. Strandberg**, superintendent of the J. B. Warrack Co. in Alaska, and **C. William Hufeisen**, principal in the firm of the same name.

E. J. Nieman, resident engineer for the Bureau of Reclamation on the Main Canal, Bacon Siphon and Bacon Tunnel of the Columbia Basin Project near Coulee City, Wash., has been named resident engineer on the Bureau's Soap Lake Siphon project. He will maintain headquarters at Coulee City this winter and will move to Soap Lake next summer. Nieman joined the Bureau at Coulee Dam in 1933 after an 8-yr. period with the City of Tacoma on construction of Cushman Dam.

E. J. NIEMAN



JESSE ROSENWALD

Jesse Rosenwald, consulting structural engineer of San Francisco, has been elected president of the Structural Engineers Association of Northern California, succeeding **John A. Blume**. The new president was for a number of years a member of the firm of Couchot and Rosenwald, but now maintains a private engineering office. Other officers elected were **Arthur W. Anderson**, vice-president, **George A. Sedgwick** and **Harold O. Sjoberg**, directors. Holdover directors include Blume, **John E. Rinne**, and **Henry J. Degenkolb**.

A. D. Drumm of Fallon, Nev., has been re-elected president of the Nevada Chapter of the Associated General Contractors of America for 1949, and **Edward Pine** was reappointed secretary-treasurer. **Earl Games** and **Walker Boudwin** were named first and second vice-presidents, respectively. **C. V. Isbell** was chosen treasurer and **E. J. Maupin** and **Boudwin** were named to the board of directors.

Wayne M. Akin, chairman of the Arizona Interstate Stream Commission, has been re-elected as chairman of the board and president of the Central Arizona Project Association. **John Jacobs** remains as vice-president and **Glenn Taylor** and **Howard J. Smith** were re-elected treasurer and secretary, respectively.

Mark Falk, structural engineer of San Francisco, succeeds **Clyde E. Bentley** as president of the Consulting Engineers Association of Northern California. **Harold M. Engle** is the new vice-president to succeed **William W. Moore**. **M. D. Perkins** remains as secretary-treasurer.

Harold A. Rands, consulting civil engineer of Portland, Ore., for many years, has retired from active business.

F. O. McMillan, Oregon State College engineering professor, is the charter president of the new Mid-Willamette Valley Section of the Professional Engineers of Oregon. **George Green** of Portland, president of the state association, presented the group with a charter at a special meeting. Other officers of the Willamette section are: **Robert T. Stanley** of the Oregon State

Highway Department, secretary-treasurer; Ray B. Boals of the Eugene Water Board, vice-president, and W. C. Williams, assistant engineer of the State Highway Commission, Salem, and John H. Quiner of Eugene, directors.

Colonel B. C. Allin, consulting civil engineer of San Francisco, is now a member of the staff of U. S. Appraisal Co., and will be responsible for their San Francisco office and the Northern California territory. He will continue his own engineering consulting practice in addition to his work with the appraisal firm.

Vernon L. Conyers, head of the Conyers Construction Co. of Spokane, Wash., is the elected president of the Home Builders' Association of Spokane. He succeeds Grant Hahn, who headed the association for the past two years. Other new officers of the association are: I. R. Minzel, Minzel Construction Co., vice-president; Donn E. Marr, Audubon Homes, secretary, and Wayne L. Garceau, Garceau Construction Co., treasurer.

John A. Baumgartner of Tucson, Ariz., is the newly installed president of the Arizona Section, American Society of Civil Engineers. Other new officers are John Girard, of Phoenix, vice-president, and Dario Traviani, also of Phoenix, secretary-treasurer. G. L. McLane of Phoenix is the outgoing president.

Carl M. Bennett of Grand Junction, Colo., has been appointed assistant city engineer of Colorado Springs, Colo. He will assist City Engineer Frank O. Ray. Bennett was director of public works and planning at Grand Junction.

SUPERVISING THE JOBS

Raymond Concrete Pile Co., Los Angeles, Calif., are now driving the piling for the \$1,007,000 New Long Beach Stadium adjoining Lakewood Village in Long Beach. The pile-driving is under the direct supervision of Frank H. Davis, general superintendent for all of the company's activities in the Southwest. J. J. Malloy is the job superintendent for Raymond and Charles Houk is foreman. Contractor G. E. Kerns of Long Beach has the contract for the structure, with G. E. Kerns in charge of purchasing and Fred Kerns as project manager. Hal Morser is carpenter foreman for Kerns, and Marvin Holwick is labor foreman.

Allison Honer Co., builders at Santa Ana, Calif., are working on a number of large contracts in Santa Ana and Orange County. A. L. "Andy" Jensen is their general superintendent on the \$1,000,000 construction of Sears, Roebuck & Company's new Santa Ana plant, B. C. Woolums is carpenter foreman and B. C. Grace is labor foreman. E. W. Kind is supervising construction of the \$418,860 Santa Ana Community Hospital's new 2-story and basement concrete building. David Lewis is the carpenter foreman on this job, and G. H. Brader is labor foreman. The company is also constructing a new Y.M.C.A.-Y.W.C.A. building in Orange at \$70,000. O. T. "Tom" Moore is supervising this construction, A. Foss Parks is carpenter

foreman and Herb Brickley is labor foreman. Tom Moore is also supervising a \$50,000 remodeling job on the Santa Ana Elks Temple. George Anderson is carpenter foreman on this job. Purchasing is handled at the company's main office by Allison Honer and Fred McCandless.

A. O. Strandberg is project manager on work at Grand Coulee Dam on a \$13,348,419 contract let to Morrison-Knudsen Company and Peter Kiewit Sons' Company. R. H. Madsen is assistant project manager; M. J. Howard, general superintendent; C. A. Pittman, office manager; L. P. Williams, purchasing agent; Rex Swearingen, paymaster; D. L. Howard, accountant, and Duke Grkovic, safety engineer.

Rush N. Hill is the superintendent for Griffith Co., Los Angeles, Calif., on construction of a \$600,000 building for the Santa Clara Lemon Growers at Oxnard, Calif. Fred Carlson is the general foreman. Felipe Gutierrez is labor foreman, and Fenton Hill and Sam Hurley are carpenter foremen. John Poore is the job office manager.

O. H. Tucker is the general superintendent for Macco Corp., Clearwater, Calif., on construction of the \$850,000 earthfill dam

Former Construction Workers Wanted by the FBI for Bank Robbery in the Pacific Northwest

THE FEDERAL Bureau of Investigation has solicited the aid of *Western Construction News* in its search for George Daum, shown in the pencil sketches at the left, and Joe Hans Wagner, photos on the right. These men are sought for bank robbery and other serious crimes committed in the Northwest. They are known to have been employed at various times in construction, railroad maintenance, tunnelling, and logging. If any reader recalls working with these men in recent years or has any other information about them, it is requested that they get in touch with the nearest FBI office at once.

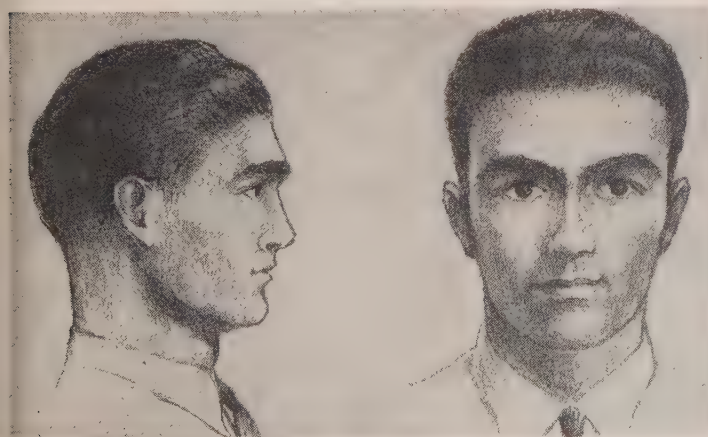
Daum, born Feb. 2, 1900, is described as: height about 5 ft., 6 in.; weight, 145 lb. in 1938; eyes, possibly brown; hair, dark brown or black; eyebrows, heavy and dark; beard, heavy and smooth shaven; nose, straight, rather small; ears, small; usually wears working clothes; speaks quietly, using good English without accent, also speaks a Central European or Russian language; appears intelligent; under excitement may have twitching of

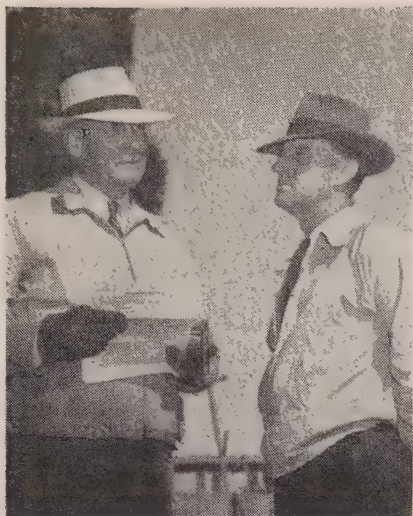
upper right face and lip; generally quiet, unobtrusive, uncommunicative; cold-blooded and vicious, usually armed with at least one gun.

Wagner, born Jan. 27, 1897, probably in Austria, is described as follows: Height 5 ft., 3 in.; weight, 113 lb.; blue eyes; dark brown hair; dark complexioned with slender build; has small blotch inside right elbow, and small mole on right back of neck; has two vaccination scars on upper right arm, one on upper left arm; sometimes wears small mustache.

Both men have used many aliases. Among those used by Daum are: Frank Florey, George Goss, William Hollick, George Novey, William Shaffer, George Straun, George Strom, Oscar Strom, George Duich; aliases employed by Wagner have included: Steve Clement, Stephan Klemencich, Reimer,

Selek, N. Takaroff, Joe Hence Wagner, Joe Wasaroah, George Wasarobe, "Crooked Steve," "Little Joe," "Little Steve the Bohemian," "Russian Shorty," and "Shorty Slovak."





O. H. TUCKER, right, superintendent on Los Padres Dam in Carmel Valley, chats with **AL H. JOHNSON**, his former associate on San Francisco Airport job.

on the Carmel River in Monterey County, Calif., for the California Water & Telephone Co. **W. F. Hays** is resident engineer on the job. **G. E. Goodall** is the consulting engineer for both design and construction of the dam.

Paul Le Master is superintendent for Rhoades Bros. & Shofner of Los Angeles, Calif., on construction of the Dixon Canyon Dam, a part of the Colorado-Big Thompson Project. **R. M. Latham** is the assistant superintendent. **Parker Floyd** and **George**

Bradley are day and swing foremen, respectively, and **Charles Rose** is master mechanic. **Bill Guthrie** is the quarry foreman, and **D. E. Deatrich** is the job office manager.

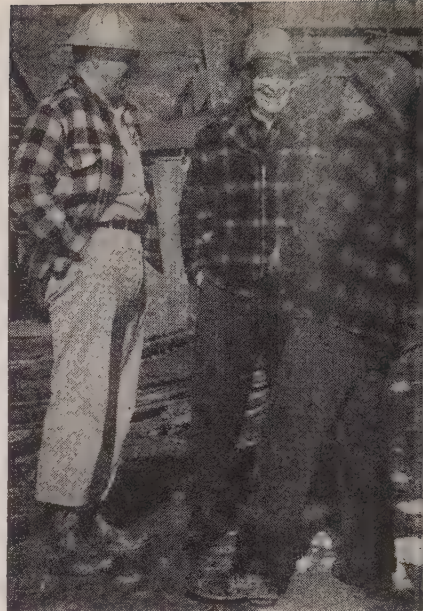
R. J. Bartol is project manager for Bartol & Mognett Construction Co., Phoenix, Ariz., on their \$42,000 contract for street paving at Del E. Webb's Pueblo Gardens housing project near Tucson, Ariz. Bartol is also directing work for the firm on their \$80,000 contract for street, curb and gutter paving at the Winterhaven Subdivision near Tucson.

C. D. Walters is supervising construction of a store building at Avondale, Ariz., for the Walters Co. of Phoenix. **Travis Stewart** is foreman on the job.

Frank Gendrich is supervising construction of the \$1,270,000 public library building at Oak and Madison Sts. in Oakland, Calif., for Stolte, Inc., of Oakland. The job will be completed by mid-1950. **P. Batt** is the superintendent for contractor, **J. Henry Harris** of Berkeley, Calif., on excavation and paving for the structure.

C. A. Robinson is supervising construction of the Auto-Lite Battery Corporation's building at Clearwater, Calif.

Floyd King is the general superintendent for Stolte, Inc., Oakland, Calif., on their \$450,000 contract for construction of sewage facilities at Walnut Creek for the Central Contra Costa Sanitary District. **H. Gumpertz** is the project manager. Fore-



ANOTHER RECORD has been broken by Morrison-Knudsen's tunnel driving crews on P. G. & E.'s Feather River Project (WCN, Nov., 1948). Driving a 25-ft. horseshoe bore through solid granite under the supervision of **AL HUNTINGTON**, left above, the M-K crews advanced 47 ft. in one day and 206 ft. for the week (3-shift, 6-day week basis). **LES HUNTINGTON** (back to camera), superintendent for Walsh Construction Co. on the same project, had claimed the record with 43- and 202-ft. advances. That's **W. A. "ALLIE" HUNTINGTON** in the center, Al's father. Les is Al's uncle, so the rivalry has become a family affair. About one-third of the 55,000 ft. of tunnel has been driven, so more records will probably fall before Walsh, Morrison-Knudsen and the Huntingtons finish their part of the job.

men on the job are **Alvin Hunt**, "Red" **Moore**, **Sturgeon Robinson** and **Clinton Andrews**.

Ray McKee is supervising construction of the Malibu Elementary School at Winter Canyon in California for **James I. Barnes Construction Co.**, Santa Monica, Calif. Representing the Santa Monica City Schools on the project is **Paul White Building Engineer**.

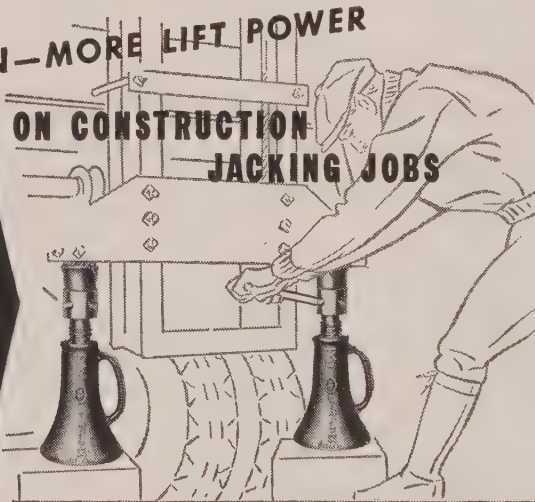
Allen E. Anderson, superintendent for Sather & Sons, Spokane, Wash., is directing 12 mi. of grading and surfacing on the Warm River-Yellowstone Highway in Fremont County, Idaho. The job is under a \$475,538 contract.

Luther "Red" Darr is superintendent for Macco Corp., Clearwater, Calif., on their new contract for construction on the Coachella Canal near Mecca, Calif. **Bill Lease** job engineer; **Paul Fertig**, equipment engineer, and **John Sawyer** have charge of all Macco jobs in the Los Angeles area.

William T. Wright is project engineer for Kistner, Curtis & Wright, Los Angeles, Calif., engineers, for construction of the \$1,700,000 Salton Sea Test Base in Southern California. **Harry W. Hall** is in charge of construction and inspection for the engineers, **Lou Osborn** is assistant project engineer.

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CARL KNOLL, above, is field engineer for Offco Construction Co. and Pacific Pipeline & Engineers, Ltd., joint-venture sub-contractors for piping and hydro-pneumatic systems in the new Water Softening and Filtration Plant at La Verne, Calif. **W. L. SQUIERS**, below, is project manager for L. E. Dixon Co., general contractors on the \$4,000,000 Metropolitan Water District job.



neer, and **B. E. Beckler, Jr.**, is resident engineer. Trepte Construction Co., San Diego, Calif., have the construction contract.

Charles Chaney is supervising construction work at the Moscow-Pullman Airport at Pullman, Wash., for contractors, McAttee & Heathe of Spokane. **Joe Zupan** is asphalt plant foreman, **D. C. Curtiss** is master mechanic, and **Arnold Eidam** is timekeeper. **G. A. Riedesel** is the resident engineer. The job includes the asphaltic concrete paving of a 5,000-ft. runway.

A. Bettega is the superintendent for contractor **C. Norman Peterson** of Berkeley, Calif., on construction of a \$100,000 concrete and frame building at Benicia, Calif. **W. A. Hogin** is the job foreman. **Tom Haran** is resident engineer.

Stanley Bent, Jr., is the project manager for Bent Construction Co., Los Angeles, Calif., on construction of a 147-ft. high concrete arch dam on the Temecula River in

Riverside County, Calif. The job is under a \$584,000 contract. **Kenneth Harrison** is the resident engineer. **G. E. Goodall** is the consulting engineer for design and construction of the structure.

Bill Bailey is supervising construction of the Roths Market building in Ventura, Calif., for contractors, Myers Bros., of Los Angeles, Calif. **Cullen G. Burke** is the carpenter foreman, and **George Vandal** is office manager.

Expansion of the grand stand structures at the Hollywood Turf Club in Inglewood, Calif., to cost more than \$1,000,000, is being handled by contractor **Robert E. McKee** of Los Angeles, Calif. **Lamar Wilson**, manager of McKee's Los Angeles office, is personally supervising the structures work. **Frank Morrell** is general foreman

for McKee, **Lloyd Keith** is carpenter foreman, and labor foremen are **Bill Langford** and **Ray Zicafoose**. **Frank Anding** is the job engineer and **John Fox** is his assistant. The structures work will cost about \$500,000. **Bethlehem Pacific Coast Steel Corp.** are handling the steel erection, which will also cost about \$500,000. **Fred Woodward** is their foreman on the job.

Matt Reardon is superintendent for Raymond Concrete Pile Co., Los Angeles, Calif., on their sub-contract for the new Belhart Street Bridge in Long Beach. **Floyd Williamson** is the job foreman. **Guy F. Atkinson Co.**, South San Francisco, has the main contract for the structure.

F. Malfitano and **L. L. Roberts** are superintending construction on 2.5 mi. of highway in Humboldt County, Calif., for

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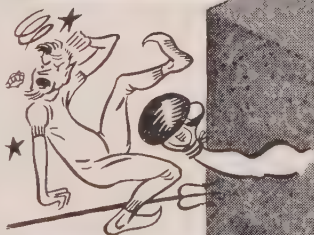


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the joint venture firm of M. Malfitano & Son, Inc., and Macal Improvement Co., Inc., of Antioch, Calif. **Lonnie Treat** is the job foreman and **S. Lucido** is job office manager. **Fred Brann** is resident engineer for the State Highway Department. The job was temporarily suspended in December, 1948, because of bad weather.

George Moore is the superintendent for Nichols-White, Inc., Palo Alto, Calif., on construction of a \$225,000 reinforced concrete building at the corner of Lytton and Ramona Sts., in Palo Alto, to house the Palo Alto Times. **C. Mills** is the project manager and **A. Farquharson** is the job foreman. Resident engineers are **Birge M. Clark** and **Walter Stromquist**.

B. D. Rogers is supervising construction of laterals on the All American Canal near Coachella, Calif., for R. V. Lloyd & Co., Russellville, Ariz. **Denver Criner** is master mechanic on the job, and foremen are **C. C. Christensen**, **William P. Webster** and **Bert Kristianson**.

R. L. Hart is the project manager for Walker Construction Co., Inc., on the erection of residential income property in Phoenix, Ariz. **Mike Warrick** and **Bert La Mar** are foremen on the project, costing more than \$100,000. **Fred Walker** is president of the contracting firm.

John L. Sanders is the superintendent for J & B Construction Co. of Los Angeles, Calif., on their \$165,000 contract for erection of the Coachella Elementary School at Coachella, Calif.

T. C. Holmes is project manager for Bartol and Mognett Construction Co., Phoenix, Ariz., on their \$65,000 contract for production of sand, rock and ready-mix concrete for paving, curb and gutter work in Tucson, Ariz.

M. C. Shelley is superintendent for the Harold Ashton Building Co. on construction of the \$60,000 Mountain States Telephone building in Coolidge, Ariz.

SAM SALESKY, powder foreman for Macco Construction Co., on excavation at Los Padres Dam, now under construction on Carmel River in California.



UNIT BID SUMMARY

Sewerage . . .

California—Alameda County—City—Interceptor

P. and J. Artukovich, Los Angeles, Calif., at \$637,344 (Schedule I), and Healy-Tibbitts Construction Co. at \$597,793 (Schedule II), were low bidders to the East Bay Municipal Utility District, Oakland, Calif., for construction of the south intercepting sewer, Section 4, in Oakland, Calif. Unit bids were submitted by the following:

	Schedule I	Schedule II
(A) P. and J. Artukovich.....	\$637,344	\$623,952
(B) Healy-Tibbitts Construction Co.....	No Bid	597,793
(C) McGuire & Hester.....	No Bid	677,769
(D) Duncanson-Harrelson Company	No Bid	707,543
(E) Artukovich Brothers	790,291	No Bid
(F) Stolte, Incorporated	899,626	825,788

SCHEDULE I

- (1) 51,871 cu. yd. excavation of trench;
- (2) 446 cu. yd. excavation for structures;
- (3) 34,140 cu. yd. backfill and compaction;
- (4) No items;
- (5) 3,500 cu. yd. furnish imported backfill material;
- (6) 21,440 cu. yd. furnish imported cohesionless backfill material;
- (7) 5,688 lin. ft. furnish and install under-drain system;
- (8) 2,700 cu. yd. furnish crusher-run backfill material;
- (9) 1,000 cu. yd. station yards overhaul of backfill material;
- (10) 5,688 lin. ft. furnish timber sheet piling and bracing;
- (11) 5,688 lin. ft. install ditto;
- (12) 106 lin. ft. install 48-in. ID reinforced concrete sewer pipe sections;
- (13) 2,761 lin. ft. install 78-in. ID reinforced concrete sewer pipe sections;
- (14) 2,788 lin. ft. install 48-in. ID reinforced concrete sewer pipe sections;
- (15) 22 each install flexible joint between concrete pipe and structure;
- (16) 8 units furnish and install 18-in. VC sewer pipe and stoppers;
- (17) 277 cu. yd. furnish and install class A concrete;
- (18) 4,726 cu. yd. ditto Class B;
- (19) 17,500 lbs. furnish and place reinforcing steel;
- (20) 5,200 lbs. furnish Portland cement;
- (21) 526 cwt. furnish calcined, reactive, siliceous material;
- (22) 10 sets install manholes, frames and covers;
- (23) 720 sq. yd. place bituminous pavement;
- (24) 2 sets furnish and install stoplogs;
- (25) No items;
- (26) lump sum, 1 job final clean-up.

SCHEDULE II

- (1) 37,500 cu. yd. excavation of trench;
- (2) 446 cu. yd. excavation for structures;
- (3) 600 cu. yd. excavation of unsuitable sub-grade material;
- (4) 18,590 cu. yd. backfill and compaction;
- (5) 5,890 cu. yd. furnish imported selected backfill material;
- (6) 3,500 cu. yd. furnish imported backfill material;
- (7) 5,840 lin. ft. furnish and install under-drain system;
- (8) 2,700 cu. yd. furnish crusher-run backfill material;
- (9) 1,000 cu. yd. station overhaul of backfill material;
- (10) 700 lin. ft. sheathing ordered left in place;
- (11) 94,700 lin. ft. furnish timber piling;
- (12) 94,700 lin. ft. install timber piling;
- (13) 106 lin. ft. install 48-in. ID reinforced concrete sewer pipe sections;
- (14) 2,761 lin. ft. install 78-in. ditto;
- (15) 2,788 lin. ft. install 84-in. ditto;
- (16) 22 each, install flexible joints between concrete pipe and structure;
- (17) 8 units furnish and install 18-in. vitreous clay sewer pipe and stoppers;
- (18) 277 cu. yd. furnish and install Class A concrete;
- (19) 6,450 cu. yd. furnish and install Class B concrete;
- (20) 93,900 lbs. furnish and place reinforcing steel;
- (21) 6,900 bbls. furnish Portland cement;
- (22) 526 cwt. furnish calcined, reactive siliceous material;
- (23) 10 sets install manhole frames and covers;
- (24) 720 sq. yd. replace bituminous pavement;
- (25) 2 sets furnish and install stoplogs;
- (26) No items;
- (27) Lump sum, 1 job final clean-up.

SCHEDULE I

	(A)	(B)	(C)	(D)	(E)	(F)
(1)	\$4.15				\$5.00	\$4.3
(2)	7.00				10.00	8.0
(3)	1.25				2.00	.5
(4)						
(5)	2.52				2.50	2.5
(6)	3.00				2.50	3.1
(7)	1.25				1.00	3.4
(8)	2.75				3.00	4.0
(9)	.15				1.00	.5
(10)	15.00				20.00	36.0
(11)	8.00				10.00	32.0
(12)	10.00				25.00	25.0
(13)	5.50				9.00	4.2
(14)	6.00				9.00	5.0
(15)	35.00				20.00	80.0
(16)	15.00				20.00	50.0
(17)	70.00				100.00	108.0
(18)	16.00				20.00	13.0
(19)	.15				.15	.1
(20)	4.00				5.00	3.1
(21)	1.50				2.00	1.2
(22)	20.00				25.00	30.0
(23)	4.50				4.00	4.5
(24)	55.00				100.00	160.0
(25)						
(26)	\$1,000				\$2,000	\$1,000

SCHEDULE II

	(A)	(B)	(C)	(D)	(E)	(F)
(1)	\$4.15	\$5.50	\$5.00	\$9.00		\$10.0
(2)	7.00	35.00	8.85	10.00		8.0
(3)	5.50	5.00	24.75	5.00		5.0
(4)	1.00	1.75	1.50	1.00		.5
(5)	2.52	3.50	2.25	2.50		3.0
(6)	2.52	3.20	2.25	2.50		2.1
(7)	1.25	5.00	3.35	4.45		5.1
(8)	2.75	4.00	2.25	2.50		4.0
(9)	.15	.50	.15	.25		.1
(10)	17.00	4.00	5.00	10.00		24.0
(11)	.75	.42	.90	.55		.4
(12)	1.25	.38	1.15	.35		.1
(13)	10.00	25.00	9.50	10.00		15.0

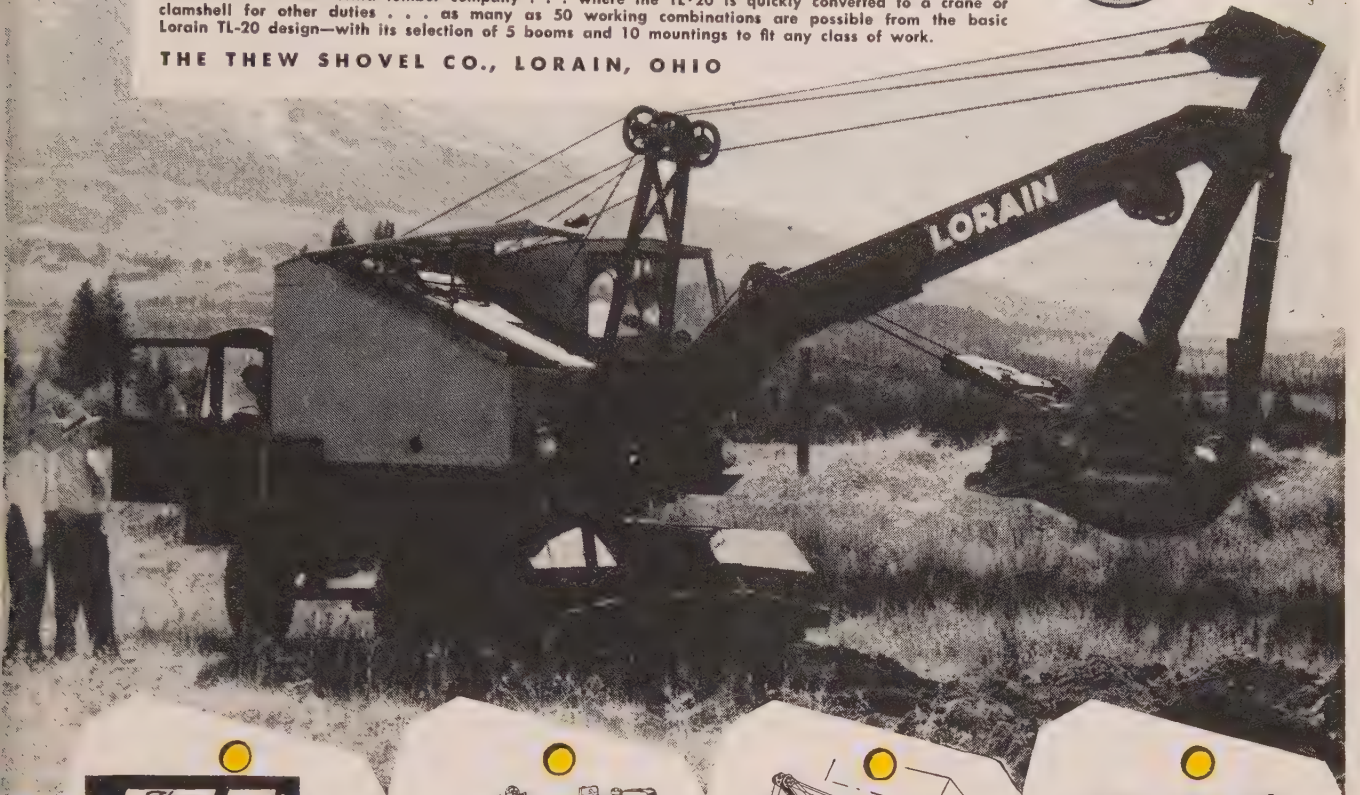
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AGAIN IT'S LORAIN IN CALIFORNIA

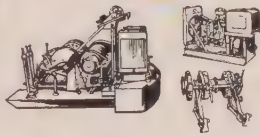
LORAIN TL-20 MOTO-CRANE DOES TRIPLE DUTY FOR CALIFORNIA LUMBER COMPANY

When this picture was taken, the Lorain TL-20 was equipped as a Hoe for trench excavation work—with 14,000 ft. Mt. Shasta serving as a background. It also serves as the "handyman" around the yard of this northern California lumber company . . . where the TL-20 is quickly converted to a crane or clamshell for other duties . . . as many as 50 working combinations are possible from the basic Lorain TL-20 design—with its selection of 5 booms and 10 mountings to fit any class of work.

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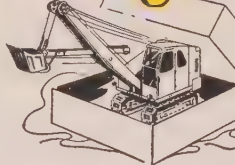


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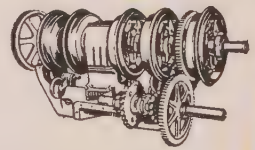
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P. L. CROOKS & CO., INC.
Portland 10, Ore.

LE ROI-RIX MACHINERY CO.
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MOUNTAIN TRACTOR CO.
Missoula and Kalispell, Mont.

LEE REDMAN EQUIPMENT CO.
Phoenix, Arizona

SOUTHERN IDAHO EQUIPMENT CO.
Idaho Falls, Idaho

TRACTOR & EQUIPMENT CO.
Sidney, Mont. Branch: Miles City Equip. Co., Miles City, Mont.

WORTHAM MACHINERY CO.
Cheyenne, Wyo. and Billings, Mont. Branches: Sheridan, Greybull, Casper and Rock Springs, Wyo.

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CRAWLER CLAMSHELLS



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SELF-PROPELLED UNITS



MOTO-CRANES

Missouri River Power

... Continued from page 101

the claim was made that the Hebgen's occupancy of public lands was authorized.

After reviewing the claimed authority of the company, the Commission affirmatively found that the company has a valid permit as to public lands occupied by the Holter development, but that license is nevertheless required for occupancy of a navigable water, which was held to be unauthorized.

In conclusion the Commission said: "Since each of the nine developments occupies without authority a 'navigable water' or public lands, or both, and since all affect the navigable capacity of a 'navigable water,' the Commission has authority under the Act to require that they be operated and maintained only if licensed. Exercise of that authority will serve the public interest in the manner intended by Congress."

The decision made public today is the latest development in a proceeding initiated by a Commission order of 1943 requiring the company to show cause why it should not apply for license for each of the seven Missouri River developments.

Water Pollution Control

... Continued from page 78

local governments for the construction of necessary treatment works, and for the preparation of reports, plans, and specifications in connection therewith. It also calls for the making of grants to aid in financing the cost of engineering, architectural, and economic investigations and studies, surveys, designs, plans, working drawings, specifications, procedures and other action preliminary to the construction of projects approved by the State Water Pollution agency and by the Surgeon General.

A program of the Bureau which will be in limited operation during 1949 is the Disaster Surplus Property Program, which provides for the loan or transfer of surplus personal property to state and local governments for use in the alleviation of damage caused by flood or other catastrophe. Aid was furnished under this program in 1948 in the Columbia River disaster area. Surplus property stocks have dwindled greatly, however, and barring new legislation, it will be more and more difficult to furnish aid under the program in 1949.

Under the provisions of the War Mobilization and Reconversion Act of 1944, Federal advances have been made to states and other non-Federal public agencies to assist in the advance plan preparation of their public works. The advances are repaid, without interest, as construction of the public works so planned is undertaken. Since June 30, 1947, when the provisions of the Act expired, the Bureau has been concentrating on speeding up the completion of plans for which advances had been approved and reviewing completed plans to insure that the projects are ready for construction.

(14)	5.50	8.00	4.00	10.00	
(15)	6.00	9.50	4.00	10.00	
(16)	35.00	50.00	24.00	25.00	
(17)	15.00	34.00	30.00	25.00	
(18)	70.00	70.00	100.00	60.00	
(19)	16.00	11.00	16.00	11.00	
(20)	.15	.12	.14	.12	
(21)	4.00	4.40	4.00	5.00	
(22)	1.50	2.00	1.80	2.00	
(23)	20.00	35.00	65.00	25.00	
(24)	4.50	3.00	1.35	3.00	
(25)	55.00	200.00	175.00	100.00	
(26)					
(27)	\$1,000	\$1,000	\$500	\$1,000	

Bridge and Grade Separation...

Washington—Kitsap County—State—Redecking

MacRae Brothers, Seattle, Wash., have received a \$661,061 contract from the Washington State Department of Highways, Olympia, for the reconstruction of approach spans and redecking on the Port Washington rows Bridge in Washington. Unit bids were submitted by the following:

(1) MacRae Brothers	\$661,061	(3) Manson Const. & Engrg. Co.	\$677,740
(2) M. P. Butler	662,544	(4) General Construction Co.	747,000

	(1)	(2)	(3)	(4)
200 cu. yd. unclassified excavation, including haul	.65	\$ 2.70	\$ 6.00	
2,800 cu. yds. common borrow in place, including haul	1.00	2.00	1.50	
600 cu. yds. selected roadway borrow in place, including haul	2.30	3.50	2.00	
110 cu. yds. furnishing and placing cr. st. surf. in place	4.25	4.00	5.00	
128 lin. ft. removing existing concrete retaining wall	1.00	8.00	4.00	
222 lin. ft. removing existing concrete curb and gutter	.30	2.00	2.00	
116 sq. yds. removing existing concrete sidewalk and ramp	.30	1.00	2.00	
BRIDGE				
1,200 cu. yds. structure excavation	5.50	5.50	5.00	
Lump sum, shoring and cribs	\$45,300	\$28,200	\$40,000	\$45,300
50 days mechanical tamper	40.00	47.00	60.00	
534 cu. yds. Class A concrete in place	67.00	40.00	80.00	
915 cu. yds. Class F concrete in place	59.00	30.00	50.00	
830 cu. yds. Class H concrete in place	40.00	30.00	30.00	
38,000 lbs. steel reinforcing bars in place	.14	.12	.12	
1,448,000 lbs. structural carbon steel in place	.187	.22	.22	
6,000 lbs. cast steel in place	.47	.47	.50	
586,000 lbs. steel roadway decking in place	.245	.24	.20	
54,000 lbs. steel sidewalk decking in place	.55	.26	.40	
Lump sum, removing portions of existing structure	\$17,000	\$50,000	\$28,000	\$50,000
140 lin. ft. downspouts in place	7.75	10.00	7.00	
8 only cinch anchors in place	15.00	20.00	25.00	
44 m. b. m. timber and lumber in place	200.00	210.00	200.00	440.00

California—Placer County—State—Underpass

Guy F. Atkinson Co., South San Francisco, Calif., have received a \$1,327,404 contract from the California Division of Highways, Sacramento, for the construction of an underpass and overcrossing and 3 mi. of grading and surfacing, between Vernon Street and Grant Street in the city of Roseville, 2 mi. north of the limit. Unit bids were received from the following:

(A) Guy F. Atkinson Company	\$1,327,404	(F) Fredrickson Brothers	\$1,580,000
(B) Granite Construction Co.	1,488,418	(G) Fredrickson & Watson Construction Company, M. & K. Corporation	1,580,000
(C) Bates & Rogers Construction Co.	1,519,225	(H) Lord & Bishop, A. Teichert & Son, Inc.	1,690,000
(D) George Pollock Company	1,532,342		
(E) United Concrete Pipe Corporation, John C. Gist, Ralph A. Bell	1,539,381		

(1) 1,200 cu. yd. removing concrete.	(39) 130 lin. ft. stairway safety tread.
(2) Lump sum, clearing and grubbing.	(40) 3,000 sq. yd. membrane waterproofing.
(3) 187,500 cu. yd. rdwy. excav.	(41) 3,000 sq. yd. protective covering.
(4) 4,300 cu. yd. struct. excav. (major structs.).	(42) 170 cu. yd. broken concrete riprap.
(5) 8,800 cu. yd. struct. backfill (major structs.).	(43) 1,010 cu. yd. P.C.C. (curbs and gutters).
(6) 7,700 cu. yd. struct. excav.	(44) 465 cu. yd. P.C.C. (sidewalks).
(7) 1,200 cu. yd. ditch and channel excav.	(45) 70 ea. monuments.
(8) 47,000 sq. yd. compacting original ground.	(46) 350 lin. ft. metal plate guard railing.
(9) 1,941,000 sta. yd. overhaul.	(47) 85 lin. ft. metal plate guard railing (b curb, Atlantic St.).
(10) 57,000 cu. yd. imported borrow.	(48) 85 ea. culvert markers and guide posts.
(11) 12,500 sq. yd. prep. slopes (slope eros. pro.).	(49) 2,232 lin. ft. chain link fence.
(12) 22,200 sq. yd. mixing and compacting (cem. treated subgrade).	(50) 3.8 mi. new property fence.
(13) 875 bbl. Portland cem. (cem. treated subgrade).	(51) 7 ea. drive gates.
(14) dev. wat. sup. & furn. wat. equip.	(52) 0.3 mi. remov. and reconstr. exist. prop. f.
(15) 5,700 M. gal. applying water.	(53) 2,623 lin. ft. 12-in. R.C.P.
(16) 172 sta. finishing rdwy.	(54) 1,020 lin. ft. 15-in. R.C.P.
(17) 16,500 tons crusher run base.	(55) 460 lin. ft. 18-in. R.C.P.
(18) 105 tons liquid asph., SC-2 (pr. ct. & pen. tr.)	(56) 205 lin. ft. 24-in. R.C.P.
(19) 90 tons sand (pr. ct., pen. tr. & curing sl.)	(57) 400 lin. ft. 30-in. R.C.P.
(20) 22 tons liquid asph., SC-6 (sl. ct.)	(58) 390 lin. ft. 36-in. R.C.P.
(21) 300 tons screenings (sl. ct.)	(59) 790 lin. ft. 48-in. R.C.P.
(22) 35 tons liquid asph., RORC-5 (curing sl.)	(60) 36 lin. ft. 4-in. cast iron pipe.
(23) 1 ton asphaltic emulsion (pt. binder).	(61) 44 lin. ft. 4-in. welded steel pipe (side drains).
(24) 7,760 tons mineral aggregate (pl. mix. surf.)	(62) 216 lin. ft. 8-in. C.M.P. (16 ga.)
(25) 100 lin. ft. raised bars.	(63) 130 lin. ft. 12-in. C.M.P. (16 ga.)
(26) 390 tons paving asph. (pl. mix. surf.)	(64) 790 lin. ft. 18-in. C.M.P. (16 ga.)
(27) 4,800 cu. yd. P.C.C. (pavement).	(65) 160 lin. ft. 24-in. C.M.P. (14 ga.)
(28) 3,550 ea. pavement tie bolt assemblies.	(66) 166 lin. ft. 30-in. C.M.P. (14 ga.)
(29) 14 sects. pavement crossing devices, Type D.	(67) 176 lin. ft. 42-in. C.M.P. (12 ga.)
(30) 14 sects. moving and resetting pave. crossing devices.	(68) 226 lin. ft. 54-in. C.M.P. (12 ga.)
(31) 8,200 cu. yd. Class "A" P.C.C. (structs.)	(69) 76 lin. ft. 60-in. C.M.P. (10 ga.)
(32) 1,235 lin. ft. rubber waterstops.	(70) 130 lin. ft. 8-in. perf. metal pipe underdrain (16 ga.)
(33) 2,400,000 lb. furn. struct. steel.	(71) 5,220 lin. ft. 8-in. perf. metal pipe underdrain (14 ga.)
(34) 65,000 lb. furn. struct. silicon steel.	(72) 745 cu. yd. filter material.
(35) 2,465,000 lb. erecting struct. steel.	(73) 6 ea. spillway assemblies.
(36) 1,991 lin. ft. struct. railing.	(74) 190 lin. ft. 8-in. C.M.P. down drains (16 ga.)
(37) 2,700 lb. stair railing.	(75) 1,500 lin. ft. salvaging exist. pipe culvert
(38) 2,550 lb. miscellaneous steel.	

(Continued on next page)



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February 7-8-9, 1949

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General Electric Low For McNary Generators

CONTRACT has been signed for the first four generators for McNary Dam on the Columbia River, involving an expenditure of \$7,302,674, by Col. William Whipple, District Engineer, Corps of Engineers, Walla Walla District. The generators will be built by General Electric Co., who submitted the low bid.

The contract calls for the design, manufacture, delivery, installation and testing of four 73,684-kva. alternating-current generators along with some appurtenances for the McNary Dam powerhouse. The unit price of the generators is listed at \$1,800,000.

Under the terms of the contract, General Electric Co. is to deliver the first generator by July 1, 1953, have it installed by Nov. 1, 1953, and tested and ready for service by April 1, 1954.

The second generator is to be delivered by Nov. 1, 1953, installed by March 1, 1954, and ready for service by April 1, 1954.

The third generator is to be delivered by May 1, 1954, installed by Sept. 1, 1954, and in service by Sept. 15, 1954, and the fourth generator is due to be delivered by Sept. 1, 1954, installed by Jan. 1, 1955, and ready for service by Jan. 15, 1955.

Western Section of John Hart Highway Contracts Awarded

TWO CONTRACTS covering 56 mi. of construction on the western section of the John Hart Highway into the Peace River area of British Columbia have now been placed by the provincial government. Both went to W. C. Arnett & Company of Vancouver, B. C. This means the government will pour another \$2,223,696 into the big road outlet which will give Peace River its first direct road link with the rest of British Columbia.

A whole year's work has been lost on the part of the highway between Prince George and Azouzetta Lake, on the summit of Pine Pass. Campbell Construction Co., which held the contract, found it was unable to carry on for the money available and about two months ago the government took back the contract.

The Arnett company was low bidder on both the new contracts. One of them covers a 30-mi. stretch from Mile 14 to Mile 44 in Summit Lake area. The other is between Mile 68 and Mile 94 near Azouzetta Lake.

As a result of financial difficulties besetting the highway project it is now officially estimated here that total cost will run between ten and twelve million dollars. Original cost was supposed to be around six million for the 251-mi. road link.

The contractors were given a 30 per cent upward scale in their prices in the general revision allowed by a Supreme Court judge last year because of rising costs.

- (76) 1 ea. 18-in. automatic drainage gate.
- (77) 10 ea. salvaging drop inlet frames and covers.
- (78) 8 ea. salvaging and reinstalling manhole frames and covers.
- (79) 29 ea. cast steel frames and covers for drop inlets.
- (80) 5 ea. cast iron frames and covers for hanholes.
- (81) 51 ea. drop inlets.
- (82) 8 ea. manholes (Type J).
- (83) 5 ea. manholes (Types K & L).
- (84) 5,400 lb. cast steel frames and gratings. (catch basins and storage box).
- (85) 1,000,500 lb. bar reinf. steel.
- (86) Drainage pumping equipment.
- (87) Electrical equipment.

- (88) 60 lin. ft. 1-in. galv. steel pipe (supply lines).
- (89) 430 lin. ft. 1½-in. galv. steel pipe (sup. lines).
- (90) 710 lin. ft. 2-in. galv. steel pipe (supply lines).
- (91) 390 lin. ft. 2½-in. galv. steel pipe (sup. lines).
- (92) 41 ea. control assemblies.
- (93) 3,105 lin. ft. ¾-in. galv. steel pipe (nozzle lines).
- (94) 2,605 lin. ft. 1-in. galv. steel pipe (nozzle lines).
- (95) 245 lin. ft. 1¼-in. galv. steel pipe (nozzle lines).
- (96) Rail barriers.
- (97) 14 ea. red reflectors.
- (98) traffic signals.

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	
(1)	4.10	2.70	7.14	6.00	7.00	4.00	2.80	
(2)	\$9,500	\$15,600	\$4,080	\$10,000	\$10,000	\$6,000	\$41,000	\$10
(3)	.39	.48	.55	.85	.54	.75	.58	
(4)	1.50	1.50	3.00	2.50	2.00	3.50	2.85	
(5)	2.00	2.00	3.30	3.00	2.50	3.50	3.45	
(6)	2.90	2.60	2.95	3.00	2.50	3.50	3.00	
(7)	1.20	1.70	2.04	2.00	1.50	2.00	1.70	
(8)	.07	.05	.09	.10	.06	.08	.06	
(9)	.007	.005	.0051	.01	.007	.007	.008	
(10)	.94	1.10	1.52	1.10	1.45	1.25	1.21	
(11)	.10	.13	.13	.10	.20	.15	.16	
(12)	.35	.37	.46	.36	.40	.32	.31	
(13)	4.25	5.60	4.85	4.45	4.00	4.20	4.75	
(14)	\$5,000	\$4,000	\$2,550	\$15,000	\$2,500	\$4,500	\$14,600	\$5
(15)	1.75	1.50	2.04	2.50	2.00	1.75	1.50	
(16)	20.00	20.00	15.30	13.50	20.00	25.00	30.00	1
(17)	2.70	3.00	2.70	2.60	3.40	3.00	2.75	3
(18)	31.00	40.00	31.62	32.00	35.00	32.00	36.00	3
(19)	6.00	5.50	5.10	4.95	7.00	4.75	4.75	5
(20)	31.00	40.00	32.64	40.00	40.00	35.00	36.00	5
(21)	5.25	5.00	6.15	4.10	7.00	5.50	6.30	4
(22)	40.00	70.00	43.00	42.00	45.00	38.00	41.00	4
(23)	60.00	100.00	65.00	60.00	60.00	55.00	60.00	10
(24)	4.30	4.20	4.25	4.15	4.55	3.70	4.35	
(25)	.70	1.50	2.05	1.50	2.50	1.25	1.75	
(26)	30.00	25.00	27.50	27.00	24.00	25.00	26.50	2
(27)	15.50	17.00	18.25	16.00	18.00	16.00	16.35	1
(28)	.60	.50	.92	.85	.75	.50	.57	
(29)	90.00	175.00	230.00	250.00	150.00	180.00	190.00	25
(30)	30.00	75.00	53.00	50.00	25.00	85.00	23.00	5
(31)	35.10	48.00	45.80	38.00	43.50	47.00	48.00	5
(32)	3.00	2.00	2.25	5.00	2.50	3.00	2.20	
(33)	.092	.10	.10	.11	.10	.11	.096	
(34)	.095	.10	.106	.12	.12	.12	.118	
(35)	.032	.025	.0175	.025	.025	.023	.03	
(36)	12.00	12.00	13.25	15.00	9.00	14.50	14.50	1
(37)	.60	.40	.65	.65	.60	.60	.53	
(38)	.40	.40	.60	.50	.60	.60	.47	
(39)	2.20	3.00	2.90	4.00	2.50	4.00	1.91	
(40)	1.00	1.80	1.70	2.00	2.25	2.00	2.20	
(41)	1.00	1.10	1.70	1.50	2.50	1.25	1.40	
(42)	12.00	10.00	12.90	15.00	20.00	14.00	16.50	1
(43)	35.00	42.00	39.45	27.00	40.00	40.00	40.00	4
(44)	22.00	30.00	29.00	26.00	40.00	40.00	34.00	3
(45)	6.00	7.00	7.50	8.00	6.00	5.50	6.00	
(46)	3.00	3.00	3.00	3.00	3.50	3.50	3.40	
(47)	6.00	3.00	3.50	3.00	5.50	4.00	4.15	
(48)	6.00	3.00	6.00	7.50	6.00	4.00	6.00	
(49)	2.20	2.00	2.00	3.00	3.00	2.25	2.30	
(50)	\$1,200	\$1,200	\$1,200	\$1,500	\$1,250	\$1,100	\$1,400	\$1
(51)	50.00	40.00	35.00	50.00	50.00	45.00	41.00	\$1
(52)	\$1,200	\$1,200	\$1,200	\$1,000	\$1,000	\$1,050	\$1,420	\$1
(53)	2.80	2.00	3.00	2.50	2.50	3.30	2.53	
(54)	3.80	2.40	3.65	3.00	3.00	4.35	3.00	
(55)	4.50	3.00	4.75	3.75	3.60	4.45	3.70	
(56)	5.50	5.20	6.50	6.00	6.00	6.00	4.90	
(57)	8.20	6.20	9.20	7.00	7.00	8.60	6.80	
(58)	11.00	9.50	12.60	9.00	10.00	12.50	9.70	
(59)	14.00	18.00	22.80	15.00	18.00	18.50	17.00	
(60)	9.00	3.00	2.40	3.00	4.00	3.50	3.50	
(61)	3.00	3.00	3.15	2.00	3.00	2.50	4.75	
(62)	1.75	2.00	1.90	2.00	1.90	2.75	1.90	
(63)	2.80	2.30	2.60	2.50	2.40	2.30	2.35	
(64)	3.60	3.20	3.80	3.25	3.20	3.30	3.25	
(65)	5.00	4.70	5.85	5.00	5.00	4.85	5.10	
(66)	6.00	6.00	7.30	6.00	6.00	6.10	6.50	
(67)	10.00	11.00	14.10	10.00	11.00	10.70	11.00	
(68)	13.50	16.00	19.30	15.00	14.50	16.50	15.00	
(69)	18.00	23.00	26.45	20.00	20.00	21.50	19.75	
(70)	2.50	2.00	2.10	2.00	1.80	2.35	1.80	
(71)	1.90	2.50	2.55	2.50	2.30	2.40	2.13	
(72)	4.70	6.00	5.65	5.00	8.00	6.50	6.25	
(73)	30.00	34.00	87.35	30.00	30.00	30.00	50.00	
(74)	1.70	2.00	2.15	1.70	2.20	1.90	2.50	
(75)	1.20	.80	2.95	2.00	1.50	1.75	1.75	
(76)	50.00	54.00	51.20	50.00	50.00	87.50	70.00	
(77)	25.00	10.00	13.65	25.00	12.00	12.00	21.00	
(78)	25.00	30.00	30.00	30.00	25.00	30.00	32.00	
(79)	110.00	80.00	143.00	75.00	60.00	72.50	77.00	
(80)	90.00	100.00	82.20	100.00	60.00	84.00	49.00	
(81)	120.00	150.00	185.00	150.00	120.00	110.00	175.00	11
(82)	140.00	200.00	195.00	300.00	300.00	200.00	228.00	20
(83)	180.00	400.00	225.00	400.00	450.00	345.00	400.00	38
(84)	.35	.30	.42	.40	.50	.37	.37	
(85)	.095	.09	.082	.09	.10	.09	.0954	
(86)	\$7,200	\$6,000	\$5,825	\$5,000	\$6,500	\$3,000	\$6,700	\$1
(87)	\$28,000	\$33,000	\$26,800	\$31,500	\$40,000	\$27,000	\$27,000	\$2
(88)	.90	.90	.80	1.00	.90	1.00	1.00	
(89)	1.30	1.20	1.13	1.25	1.30	1.25	1.33	
(90)	1.70	1.50	1.50	1.70	1.70	1.75	1.72	
(91)	2.20	2.00	2.00	2.20	2.20	2.20	2.25	
(92)	25.00	30.00	27.35	35.00	30.00	30.00	31.75	
(93)	.65	.40	.50	.70	.60	.55	.60	
(94)	.75	.60	.65	.75	.70	.70	.72	
(95)	1.10	.80	.84	1.00	1.00	.94	1.00	
(96)	\$1,000	\$1,086	\$1,265	\$1,000	500.00	\$1,450	\$1,000	9
(97)	3.00	4.00	2.25	5.00	5.00	2.00	5.00	
(98)	\$10,000	\$14,593	\$13,200	\$15,000	\$16,000	\$10,000	\$10,475	\$1

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Irrigation . . .

Washington—Grant County—Bur. of Reclam.—Soap Lake Siphon

Utah Construction Co., San Francisco, Calif., and Winston Brothers Co., Azusa, Calif., submitted a low bid of \$7,614,729 (Sch. 1 and 2) for the construction of the Soap Lake Siphon, a structure 12,883 ft. long consisting of about 4,000 ft. of 25-ft. reinforced concrete pipe and about 8,000 ft. of 22-ft., steel-lined concrete pipe. The siphon will carry water around the north end of Soap Lake, to irrigate about 280,000 acres of land in the northwesterly part of the Columbia Basin Reclamation Project area, south of Quincy and Ephrata. There were three low bids on Sch. 1 and 2. Schedules 3, 4, and 5 covered a combination of about 4,000 ft. of reinforced concrete pipe and 8,100 ft. of steel pipe. The lowest bid on that combination was \$10,252,226. Nine firms or groups of contractors bid on one or more of the five schedules. None bid on all five. Unit bids were submitted by the following:

	Sch. 1	Sch. 2	Sch. 3	Sch. 4	Sch. 5
(A) The Utah Construction Co., and Winston Bros. Construction Company (will accept award of Sch. 1, 2, or 3. Will not accept award of Sch. 4 unless awarded in combination with Sch. 3).....	\$2,544,850	\$5,422,330	\$2,616,650	\$856,280	.....
(B) Guy F. Atkinson Co. and Bressi & Bevanda Constructors, Inc. (bid based on award of Sch. 1 and 2 combined—all or none).....	2,550,180	5,156,440	.....	.....	.....
(C) General Construction Co., and The Shea Co. (will accept award on Sch. 1 and 2 together as one contract).....	2,585,400	5,126,620	.....	.....	.....
(D) United Concrete Pipe Corp.; C. M. Elliott; Stolte, Inc.; R. S. Seabrook; Haddock-Engineers, Ltd., and John C. Gist. (will accept Sch. 1 and 2 together, but will not accept either Sch. 1 or 2 separately).....	3,068,300	5,821,500	.....	843,060	.....
(E) Schumann & Johnson.....	.....	.....	.....	1,094,660	.....
(F) C. J. Montag & Sons.....	.....	.....	.....	.....	\$6,792,500
(G) American Pipe and Construction Co.....	.....	.....	.....	.....	.....
(H) Chicago Bridge and Iron Co., and Consolidated Western Steel Corp.....	.....	.....	.....	.....	6,890,000
(I) Southwest Welding & Manufacturing Company.....	.....	.....	.....	.....	7,289,000

SCHEDULE NO. 1

25-Foot Diameter Concrete Pipe

Station 382 + 51.43 S. L. AH. to Station 403 + 44.98 S. L. and from Station 485 + 96.81 S. L. to Station 511 + 35.00 S. L.

	(A)	(B)	(C)	(D)
3,000 cu. yds. excavation, common, for structures.....	\$ 1.80	\$ 1.90	\$ 1.00	\$ 2.20
165,000 cu. yds. excavation, rock, for structures.....	1.80	1.90	1.50	2.20
12,000 mi. cu. yds. hauling selected material for backfill.....	0.35	0.30	0.35	0.30
95,000 cu. yds. backfill.....	0.40	0.45	0.50	0.30
11,000 cu. yds. compacting backfill.....	3.50	2.75	4.00	5.50
420 cu. yds. concrete in gravel trap.....	55.00	30.00	50.00	50.00
1,600 cu. yds. concrete in transitions.....	80.00	67.50	80.00	80.00
32,000 cu. yds. concrete in concrete pipe.....	27.20	24.84	24.00	32.00
10,300,000 lbs. furnishing and placing reinforcement bars.....	0.105	0.113	0.12	0.10
300 sq. ft. furnishing and placing elastic filler in joints.....	3.00	2.00	7.00	2.20
126,000 lbs. furnishing and placing metal water stops in joints.....	0.30	0.35	0.40	0.30
5,000 lbs. furnishing and installing miscellaneous metalwork.....	0.50	0.60	0.50	1.00
39,000,000 gals. furnishing water and filling and emptying siphon.....	450.00	700.00	800.00	600.00

SCHEDULE NO. 2

22-Foot 4-Inch Diameter Steel Line Concrete Pipe

Station 403 + 44.98 to Station 485 + 96.81 S. L.

	(A)	(B)	(C)	(D)
110,000 cu. yds. excavation, common, for structures.....	\$ 1.10	\$ 0.40	\$ 0.40	\$ 2.20
160,000 cu. yds. excavation, rock, for structures.....	1.80	1.90	1.50	2.20
40,000 cu. yds. excavation, common, for drainage channels.....	0.45	0.25	0.40	1.00
14,000 mi. cu. yds. hauling selected material for backfill.....	0.35	0.30	0.35	0.30
190,000 cu. yds. backfill.....	0.40	0.45	0.50	0.30
9,000 cu. yds. compacting backfill.....	3.50	2.75	4.00	5.50
60 sq. yds. dry rock paving.....	8.00	7.00	12.00	20.00
43,000 cu. yds. concrete in steel-lined concrete pipe and blow-off structures.....	28.00	24.84	22.00	30.00
240 cu. yds. concrete in box culvert.....	55.00	50.00	70.00	60.00
15,300,000 lbs. furnishing and placing reinforcement bars.....	0.105	0.113	0.12	0.10
6,000,000 lbs. furnishing and installing plate steel liner.....	0.325	0.30	0.30	0.30
18 joints furnishing and installing contraction joints in steel-lined concrete pipe.....	4,200.00	2,200.00	1,500.00	1,500.00
15,000 lbs. furnishing and installing blow-off pipe, valves, and fittings.....	0.65	0.65	0.60	0.60
42,000 lbs. furnishing and installing miscellaneous metalwork.....	0.50	0.60	0.60	0.60

SCHEDULE NO. 3

25-Foot Diameter Concrete Pipe

Station 382 + 51.43 S. L. AH. to Station 404 + 00 S. L. and from Station 485 + 10.60 S. L. AH. to Station 511 + 35.00 S. L.

	(A)	(B)	(C)	(D)
3,000 cu. yds. excavation, common, for structures.....	\$ 1.10	\$ 0.40	\$ 0.40	\$ 2.20
170,000 cu. yds. excavation, rock, for structures.....	1.80	1.90	1.50	2.20
12,000 mi. cu. yds. hauling selected material for backfill.....	0.35	0.30	0.35	0.30
100,000 cu. yds. backfill.....	0.40	0.45	0.50	0.30
11,000 cu. yds. compacting backfill.....	3.50	2.75	4.00	5.50
420 cu. yds. concrete in gravel trap.....	55.00	30.00	50.00	50.00
1,600 cu. yds. concrete in transitions.....	80.00	67.50	80.00	80.00
33,000 cu. yds. concrete in concrete pipe.....	27.20	24.84	24.00	32.00
10,800,000 lbs. furnishing and placing reinforcement bars.....	0.105	0.113	0.12	0.10
300 sq. ft. furnishing and placing elastic filler in joints.....	3.00	2.00	7.00	2.20
129,000 lbs. furnishing and placing metal water stops in joints.....	0.30	0.35	0.40	0.30
5,000 lbs. furnishing and installing miscellaneous metalwork.....	0.50	0.60	0.50	1.00
39,000,000 gals. furnishing water and filling and emptying siphon.....	450.00	700.00	800.00	600.00

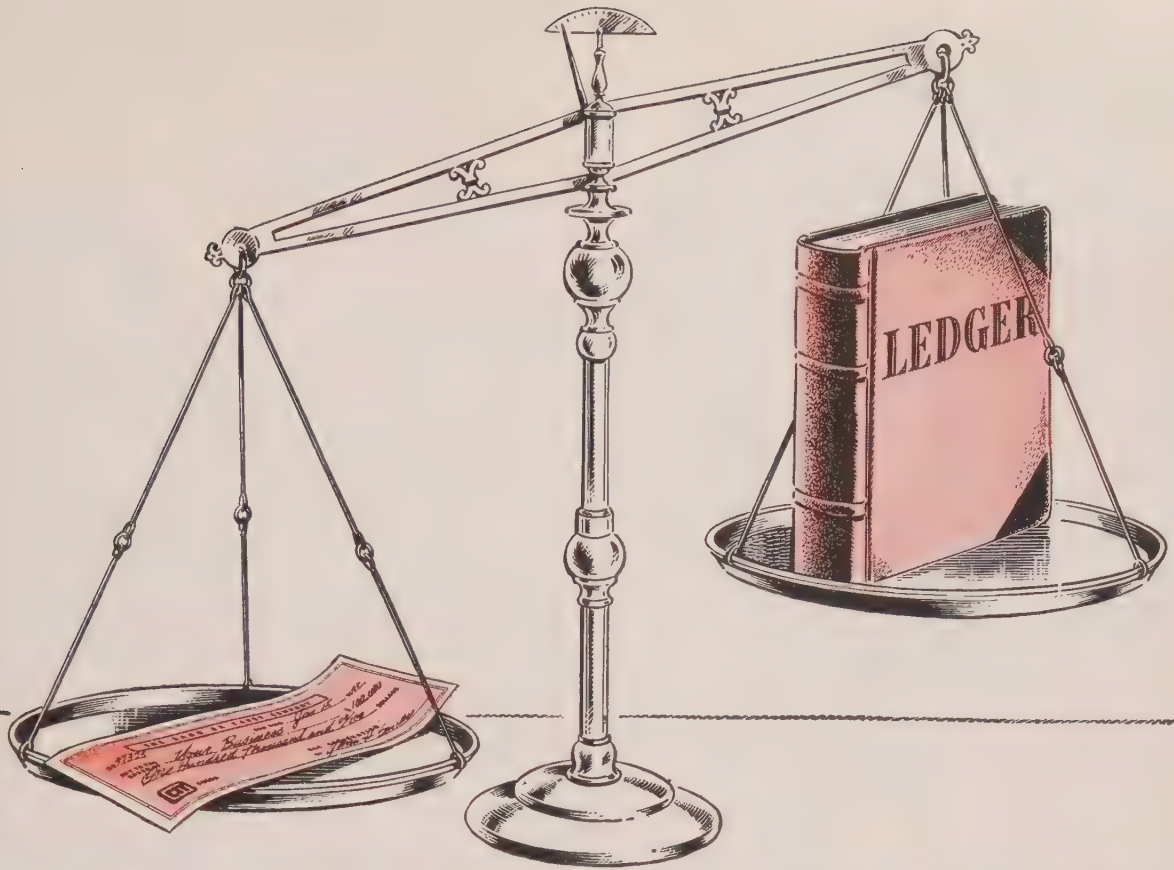
SCHEDULE NO. 4

Concrete Piers, Anchors, and Blow-Off Structure

Station 404 + 00 S. L. to Station 485 + 00 S. L. Alternate Back

	(A)	(B)	(C)	(D)
70,000 cu. yds. excavation, common, for structures.....	\$ 0.70	\$ 1.50	\$ 2.20	\$ 2.20
70,000 cu. yds. excavation, rock, for structures.....	1.70	3.00	3.00	3.00

(Continued on next page)



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25,000 cu. yds. excavation, common, for drainage channel.....	0.35	1.00
50,000 cu. yds. backfill.....	0.50	0.40
200 cu. yds. compacting backfill.....	4.00	2.50
60 sq. yds. dry-rock paving.....	8.00	6.00
13,000 cu. yds. concrete in piers and blow-off structure.....	29.00	20.00
5,800 cu. yds. concrete in anchors.....	27.00	20.00
900,000 lbs. furnishing and placing reinforcement bars.....	0.11	0.10
5,000 lbs. furnishing and installing blow-off pipe, valves, and fittings.....	0.50	0.60
33,000 lbs. furnishing and installing miscellaneous metalwork.....	0.55	0.40

SCHEDULE NO. 5

Plate Steel Pipes and Steel Supports
Station 404 + 00 S. L. to Station 485 + 00 S. L. Alternate Back

	(G)	(H)	(I)
Lump sum furnishing and erecting plate-steel pipe and steel supports.....	\$6,792,516	\$6,890,000	\$7,289,000

Highway and Street . . .

Arizona—Coconino County—P. R. A.—Grade and Surf.

Wallace & Wallace, Phoenix, Ariz., submitted a low bid of \$449,551 to the Public Roads Administration, San Francisco, Calif., for 8.2 mi. grade, surface, and miscellaneous work on the Grand Canyon-Old Timpani Highway, located in the vicinity of Kaibab National Forest. Unit Bids were submitted by the following:

(1) Wallace & Wallace.....	\$449,551	(3) Bowen & McLaughlin.....	\$509,000
(2) Tiffany Construction Co.....	465,045		

	(1)	(2)	(3)
Force account, maintenance of special detours.....	\$6,000.00	\$6,000.00	\$6,000.00
Force account, extra & misc. force account work.....	4,200.00	4,200.00	4,200.00
112,300 cu. yd. unclassified excavation.....	1.25	1.25	
1,750 cu. yd. unclass. excav. for structures.....	3.00	3.00	
14,000 cu. yd. unclass. excav. for borrow, Case 1.....	0.60	0.40	
250,000 sta. yd. overhaul (500 ft. free haul).....	0.02	0.02	
20,000 cu. yd. mi. special overhaul of borrow (500 ft. free haul).....	0.25	0.25	
250 hr. rolling existing ground & bottoms of cuts.....	7.00	7.00	
25,500 lin. ft. furrow ditches.....	0.08	0.10	
Force account, obliteration of old roadways.....	460.00	460.00	460.00
3,000 mi. gal. watering of embankment, Item 29.....	2.50	3.00	
3,400 mi. gal. watering of base course, Items 50 & 52A.....	2.50	3.00	
Lump sum, provide and maintain power plant or plants.....	1,500.00	2,000.00	1,500.00
155,000 ton selected borrow base course.....	0.70	0.85	
23,000 cu. yd. pit stripping (Art. 6.1) for Item 50.....	0.20	0.25	
34,300 ton crushed gravel or crushed stone base course, Class 2, Grading D-1.....	1.20	1.10	
1,840 ton Type 3, blotter material for bituminous preservative treatment.....	3.50	4.00	
530 ton medium curing cutback asphalt, Grade MC-2, for bit. pres. treat.....	42.00	38.00	
255 ton medium curing cutback asphalt, Grade MC-5, for bit. pres. treat.....	43.00	38.00	
292 cu. yd. concrete, Class Y.....	62.50	60.00	
25,200 lb. reinforcing steel.....	0.13	0.13	
500 lin. ft. 24-in. CGSM culvert pipe.....	4.50	4.50	
112 lin. ft. 30-in. CGSM culvert pipe.....	6.00	6.00	
232 lin. ft. 36-in. CGSM culvert pipe.....	9.00	9.00	
48 lin. ft. 60-in. CGSM culvert pipe.....	21.00	20.00	
105 lin. ft. 90-in. field assem. metal plate culvert (1.5-10-8 or 1.75-10-8).....	62.00	45.00	
70 lin. ft. 135-in. field assem. metal plate culvert (1.5-7-5 or 1.75-10-8).....	76.00	75.00	
636 lin. ft. removing, cleaning & stockpiling or relaying salv. culvert pipe.....	2.50	2.50	
42 ea. right of way monuments, Type A.....	9.00	7.00	
2 ea. concrete maintenance marker posts.....	15.00	10.00	
34 ea. timber culvert markers.....	6.00	5.00	
Force account, cattle guards.....	3,300.00	3,300.00	3,300.00
85,500 lin. ft. barbed wire fence (5-wire).....	0.17	0.15	
6 ea. gates (Type 1).....	40.00	50.00	

California—Solano County—State—Grade

Parish Brothers, Benicia, at \$1,179,479, have submitted the low bid to the Division of Highways, Sacramento, Calif., for the construction of two reinforced concrete bridges, and about 4.7 miles of grading & surfacing between Ledgerwood Creek and 3.5 miles east of Fairfield in Solano County. Unit bids received from the following:

(1) Parish Brothers.....	\$1,179,479	(5) Fredrickson & Watson Const. Co.....	\$1,244,400
(2) Morrison-Knudsen Co., Inc.....	1,198,565	(6) A. Teichert & Son, Inc.....	1,268,800
(3) Harms Brothers & N. M. Ball Sons 1,205,736		(7) Peter Kiewit Sons' Company.....	1,324,400
(4) Fredrickson Brothers.....	1,241,462		

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1,810 cu. yd. remov. conc.....	3.75	3.00	5.00	3.50	2.80	4.00	2.30
Remov. existing bridge.....	2,500	2,500	3,000	1,800	1,200	1,200	1,600
279 sta. clearing and grubbing.....	56.00	35.00	50.00	22.50	70.00	15.00	20.00
367,000 cu. yd. roadway excavation.....	.46	.56	.54	.49	.54	.55	
3,420 cu. yd. structure exc.....	2.75	2.75	3.25	2.80	3.00	3.00	2.25
3,750 cu. yd. ditch and channel exc.....	1.25	1.00	1.25	1.70	1.15	1.20	1.10
18,800,000 sta. yd. overhaul.....	.0036	.004	.003	.0042	.0025	.004	
127,000 sq. yd. comp. original ground.....	.06	.07	.05	.06	.05	.05	
93,000 tons imported borrow.....	1.15	1.02	1.30	1.20	1.45	1.20	1.10
123,500 sq. yd. mix. and comp. (cem. tr. subgrade).....	.30	.30	.25	.28	.23	.25	
3,360 bbls. Portland cem. (cem. tr. subgrade).....	4.25	4.50	4.00	4.10	4.45	4.00	4.00
Dev. wat. sup. and furn. wat. equip.....	7,000	5,000	5,000	5,500	3,000	11,000	5,000
22,100 M. gal. applying water.....	1.50	1.50	1.50	1.75	1.75	1.50	1.10
279 sta. finishing roadway.....	20.00	25.00	15.00	20.00	21.00	20.00	10.00
33,400 tons untreated rock base.....	2.66	2.60	2.50	2.80	2.45	3.00	3.00
210 tons liq. asphalt, RORC-5 (cur. sl. cem. tr. subgrade).....	40.00	43.00	40.00	40.00	36.00	50.00	30.00
153 tons liq. asphalt, SC-2 (pr. ct. and pen. tr.).....	33.00	30.00	32.00	32.00	31.00	37.00	35.00
76 tons asphaltic emul. (pt. bdr. and sl. ct.).....	45.00	37.00	42.00	38.50	34.00	40.00	35.00
590 tons screenings (sl. ct.).....	6.00	4.50	6.00	5.75	6.50	7.00	7.00
295 cu. yd. sand (pr. ct. and sl. ct.).....	8.00	7.00	6.00	5.75	6.00	7.00	6.00
8,600 tons mineral aggregate (pl.-mix. surf.).....	5.00	5.00	4.80	5.50	5.90	5.00	6.00
430 tons paving asphalt (pl.-mix. surf.).....	25.00	25.00	24.00	25.00	27.00	25.00	25.00
260 lin. ft. raised bars.....	1.75	2.00	1.50	1.25	1.45	1.50	1.10
27,850 cu. yd. P.C.C. (pavement).....	14.00	13.50	14.10	15.05	15.00	15.00	15.00
19,000 ea. pavement tie bolt assemblies.....	.50	.50	.50	.40	.51	.60	
346 lin. ft. timber bridge railing.....	3.50	3.50	5.00	4.00	3.30	3.50	5.00
700 cu. yd. Class "A" P.C.C. (structures).....	50.00	60.00	56.00	58.00	58.00	55.00	64.00
1,860 lin. ft. furnishing concrete piling.....	3.50	2.75	3.00	3.00	3.20	3.00	2.00
62 ea. driving concrete piles.....	105.00	120.00	110.00	110.00	120.00	120.00	110.00
30 cu. yd. broken concrete riprap.....	20.00	12.00	20.00	10.00	13.00	10.00	10.00
310 cu. yd. Class "A" P.C.C. (curbs & gutters).....	40.00	50.00	45.00	45.00	43.00	60.00	43.00
115 ea. monuments.....	6.00	5.00	7.00	5.50	6.00	6.00	7.00
220 ea. culv. markers and guide posts.....	6.00	6.00	5.00	4.50	5.00	6.00	5.00
14 ea. access, opening markers.....	10.00	10.00	10.00	8.50	10.00	12.00	9.00

(Continued on next page)



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6 ea. drive gates.....	50.00	40.00	50.00	40.00	38.00	50.00	55.00
190 lin. ft. 8-in. C.M.P. (16 ga.).....	1.55	1.50	1.50	1.55	1.80	1.60	1.80
1,669 lin. ft. 18-in. C.M.P. (16 ga.).....	2.80	3.00	3.00	2.90	3.10	2.70	3.20
1,535 lin. ft. 24-in. C.M.P. (14 ga.).....	4.20	4.50	4.00	4.25	4.60	4.20	4.50
160 lin. ft. 36-in. C.M.P. (12 ga.).....	7.80	8.00	9.00	8.00	8.50	8.30	7.90
30 ea. spillway assemblies.....	36.00	30.00	37.50	22.50	39.00	40.00	50.00
329 lin. ft. 8-in. C.M.P. down drains (16 ga.).....	1.60	1.50	1.50	1.70	2.00	1.30	1.90
310 lin. ft. salvaging pipe culvert.....	1.25	1.25	1.50	1.25	1.15	1.50	1.00
177 lin. ft. relaying salvage C.M.P.....	1.75	1.25	1.50	1.25	1.45	1.50	1.00
23 ea. cast steel frames & cov. for drop inlets.....	70.00	90.00	75.00	57.50	64.00	70.00	75.00
389,000 lbs. furnishing bar reinforcing steel.....	.057	.07	.06	.07	.06	.07	.05
389,000 lbs. placing bar reinforcing steel.....	.023	.02	.03	.02	.025	.03	.02
Engineer's office.....	3,500	500	3,000	2,500	2,800	3,000	1,000

Colorado—Clear Creek County—P. R. A.—Grade

Wyoming Construction Co., Laramie, Wyo., submitted a low bid of \$300,039 to the Public Roads Administration, Denver, Colo., for 4.5 mi. of clearing, grading and structures on the Colorado Forest Project Echo Lake Highway in Colorado. Unit bids were submitted by the following:

(1) Wyoming Construction Company.....	\$300,039	(5) Leach Brothers.....	\$361,700
(2) C. L. Hubner Company.....	316,437	(6) Knisely-Moore Company.....	374,500
(3) Lowdermilk Brothers.....	359,027	(7) Platt Rogers, Inc.....	391,300
(4) Larson Construction Company.....	361,410		

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
36 acre clearing and grubbing.....	500.00	600.00	575.00	800.00	750.00	\$1,000	700.00
218,000 cu. yd. unclassified excavation.....	1.00	1.00	1.18	1.18	1.20	1.20	1.10
1,200 cu. yd. unclass. excav. for structures.....	5.00	4.00	5.00	5.00	5.00	4.00	4.00
16,000 cu. yd. unclass. excav. for borrow, Case 1.....	.75	1.00	1.00	1.25	1.00	1.00	1.10
160,000 sta. yd. overhaul (1,000-ft. free haul).....	.03	.04	.03	.03	.03	.03	.03
12,000 cu. yd. mi. spec. overhaul of barrow (1,000-ft. free haul).....	.23	.15	.30	.30	.25	.30	.20
Contingent sum, obliteration of old rdwys.....	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
4,541 mi. finishing earth graded roads.....	100.00	500.00	750.00	500.00	600.00	600.00	500.00
4,500 unit watering embankment, item 29.....	1.00	1.50	1.50	1.00	1.25	1.50	1.10
Lump sum, prov. & maint. water plant or plants.....	100.00	500.00	500.00	500.00	500.00	\$1,500	500.00
1,500 hr. sheepfoot or tamping roller, item 29.....	2.50	8.00	5.00	4.00	3.00	5.00	3.00
Lump sum, prov. & maint. sheepfoot or tamping roller or rollers on the project.....	100.00	350.00	\$1,500	500.00	100.00	\$1,000	500.00
1,000 lb. struct. steel, furn., fab. & erected.....	.30	.25	.75	.35	.30	.30	.20
100 cu. yd. cement rubble masonry.....	75.00	60.00	75.00	50.00	70.00	60.00	50.00
326 lin. ft. 8-in. C.G.S.M. culvert pipe.....	2.00	2.00	3.00	2.00	2.50	2.50	3.00
2,808 lin. ft. 24-in. C.G.S.M. culvert pipe.....	6.00	5.00	6.00	6.00	6.00	5.50	5.50
400 lin. ft. 6-in. perf. C.G.S.M.P. underdrain.....	5.00	7.00	5.00	5.00	6.00	6.00	5.00
5 ea. emb. spillway inlet assemblies.....	25.00	25.00	70.00	25.00	25.00	25.00	50.00
25 ea. concrete maint. marker posts.....	12.00	10.00	20.00	15.00	15.00	20.00	10.00
170 ea. timber guide posts with warning reflectors (treated).....	5.00	5.00	6.50	5.00	6.00	10.00	5.00

Wyoming—Carbon County—State—Grade and Surf.

Northwestern Engineering Co., Denver, Colo., was awarded a \$200,860 contract by the Wyoming State Highway Department, Cheyenne, for about 4 mi. of grading, draining, surfacing, construction of a steel bridge, a reinforced concrete culvert, and miscellaneous work on the Savary, Wyo., and Slater, Colo., Roads. Unit bids were received from the following:

(1) Northwestern Engineering Co.....	\$200,860	(4) S. Birch & Sons Construction Co.....	\$209,200
(2) Inland Construction Co.....	204,490	(5) Knisely-Moore Co.....	212,200
(3) Lichty Construction Co.....	207,087	(6) Peter Kiewit Sons' Co.....	227,200

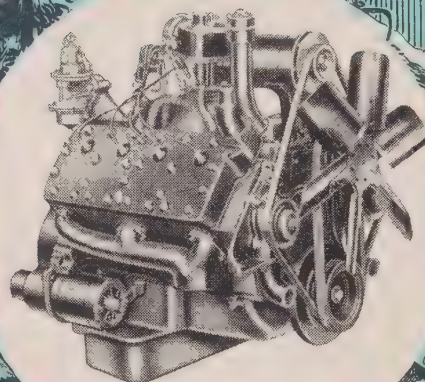
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
158,000 cu. yd. excavation.....	\$.32	\$.29	\$.29	\$.27	\$.32	\$.32	\$.32
60,000 cu. yd. sta. overhaul.....	.01	.01	.01	.01	.01	.01	.01
22,500 cu. yd. mi. cubic yard mile haul.....	.20	.27	.20	.20	.25	.25	.25
2,220 mil. gal. watering (emb.).....	2.00	2.20	2.50	1.75	2.50	2.50	2.50
440 hr. sheep's foot roller operation.....	12.00	13.00	12.00	10.00	11.00	11.00	11.00
40 hr. equipment roller operation.....	12.00	14.00	14.00	10.00	13.00	14.00	14.00
1,162 lin. ft. 18 in. C. M. P.....	3.60	3.70	3.94	4.00	3.50	4.00	3.50
1,154 lin. ft. 24 in. C. M. P.....	5.55	5.70	6.25	6.50	5.50	6.00	5.50
188 lin. ft. 30 in. C. M. P.....	6.65	7.00	7.75	8.00	6.50	7.00	6.50
202 lin. ft. 36 in. C. M. P.....	10.00	10.75	12.51	12.00	10.50	12.00	12.00
470 lin. ft. 48 in. C. M. P.....	14.80	19.50	15.00	15.50	15.00	17.00	17.00
118 lin. ft. 60 in. C. M. P.....	22.75	29.10	24.64	25.00	23.00	25.00	25.00
890 cu. yd. excavation for pipe culverts.....	2.25	2.00	3.00	2.00	2.00	2.00	2.00
705 hr. mechanical tamping.....	5.80	7.00	7.00	6.00	7.00	7.00	7.00
170 cu. yd. Class I riprap.....	6.20	13.70	12.00	15.00	15.00	10.00	10.00
36 ea. right of way markers.....	8.60	11.00	15.00	12.00	12.00	12.00	15.00
1 ea. R. C. project markers.....	24.60	*20.00	25.00	40.00	25.00	40.00	40.00
43,000 lin. ft. standard R/W fence (6 wire).....	.16	.165	.20	.24	.18	.18	.18
75 ea. brace panels.....	9.35	10.25	12.00	15.00	11.00	12.00	12.00
40 ea. end panels.....	13.00	15.00	15.00	18.00	12.00	12.00	12.00
1 ea. cattle guards.....	295.00	410.00	340.00	400.00	300.00	900.00	900.00
15,050 ton crushed gravel base course (2 in. max) grading B.....	.90	.50	.90	.80	1.00		
6,000 ton crushed gravel base course (1 in. max).....	.95	.95	.95	1.00	1.15		
3,070 ton crushed gravel surfacing (3/4 in. max).....	1.05	.95	1.00	1.10	1.15		
420 ton stone chips (Type A).....	2.85	5.00	6.00	5.00	6.00		
70,450 ton mi. haul of surfacing material.....	.10	.14	.12	.12	.12		
42,200 sq. yd. processing.....	.07	.06	.10	.15	.08		
106 ton asphaltic material MC-0.....	43.00	45.80	43.00	50.00	55.00	39.00	39.00
52 ton asphaltic material RC-3.....	42.00	44.80	43.00	47.50	55.00	39.00	39.00
143 ton asphaltic material MC-3.....	41.00	38.60	43.00	47.00	45.00	39.00	39.00
175 hr. roller operation (base).....	6.15	6.85	10.00	9.00	7.00	6.00	6.00
430 mil. gal. watering (base).....	2.50	2.20	2.50	1.75	2.50	2.00	2.00
47.1 cu. yd. Class C concrete.....	60.00	61.65	54.00	57.00	58.00	60.00	60.00
212.1 cu. yd. Class B concrete.....	61.50	60.30	54.00	57.00	57.00	60.00	60.00
29,920 lb. reinforcing steel.....	.16	.165	.16	.17	.16		
55,580 lb. structural steel.....	.20	.19	.20	.20	.18		
115 cu. yd. structure excavation.....	3.75	2.75	3.00	5.50	3.00	3.00	3.00
70 cu. yd. dry excavation for bridges.....	7.50	4.10	3.00	5.50	5.00	6.00	6.00
260 cu. yd. wet excavation for bridges.....	12.50	12.35	11.00	14.00	12.00	8.00	8.00
130.33 lin. ft. 120 in. M. P. C. M. pipe (57-15).....	70.00	91.00	65.00	80.00	60.00	75.00	75.00
Lump sum, removing existing structures.....	400.00	548.00	750.00	400.00	1000.00	2000.00	2000.00
286.0 lin. ft. metal plate guard rail.....	2.60	3.45	4.00	6.00	3.00	5.00	5.00
20 cu. yd. grouted riprap.....	19.75	23.50	22.00	20.00	25.00	15.00	15.00
15 hr. non-participating in Federal aid mechanical tamping.....	5.80	7.00	7.00	6.00	7.00	6.00	6.00
Lump sum, removing and resetting water line.....	195.00	350.00	250.00	450.00	200.00	500.00	500.00
0.4 mi. removing and resetting telephone line.....	250.00	275.00	200.00	600.00	500.00	1000.00	1000.00
3 ea. 30 ft. telephone poles.....	18.50	21.00	20.00	50.00	40.00	70.00	70.00
5 rod telephone wire.....	.20	.15	.50	.60	1.00		
Lump sum, removing and resetting sheds.....	125.00	550.00	500.00	300.00	500.00	300.00	300.00

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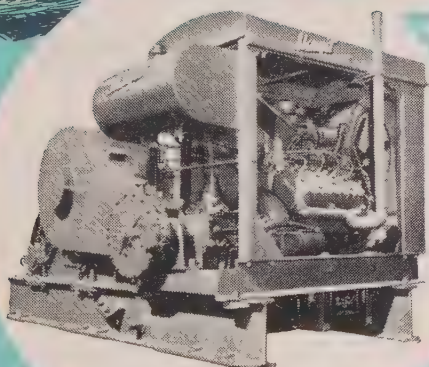
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Contracts . . .

Summary of Major Construction Contracts Awarded Last Month

Utah Construction Co., San Francisco, Calif., and **Winston Brothers Co.**, Azusa, Calif., have been awarded a \$7,614,728 contract by the Bureau of Reclamation, Coulee Dam, Wash., for the construction of the Soap Lake Siphon of the Columbia Basin Project. Work included will be a structure 12,883 ft. long which will carry West Canal water across a coulee north of the resort town of Soap Lake, Wash. About 4,000 ft. of the siphon will be reinforced concrete pipe, 25 ft. in diameter. About 8,000 ft. will be steel-lined concrete pipe, 22 ft., 4 in. in diameter. With its capacity of 28,250 gals. per second, the siphon will carry enough water to serve 280,000 acres of land, and it will rank as the largest of its kind in the Pacific Northwest.

Max J. Kuney Construction Co., Spokane, Wash., have been recommended for a \$2,421,928 contract by the Public Roads Administration, Juneau, Alaska, for the construction of a 19-mi. road along Turnagain Arm, near Anchorage, Alaska. Work on the contract is expected to begin in April, 1949, with completion due by December, 1950. The road, to parallel the Alaska Railroad, is part of a highway to connect Anchorage and Seward.

Morrison-Knudsen Co., Inc., Los Angeles, Calif., have been awarded a \$10,500,000 contract by the Dominion Government, Colombo, Ceylon, for the construction of the Galoya River Dam in Eastern Ceylon, which will provide power for the irrigation of 42,000 acres.

S. Patti-MacDonald Construction Co., St. Louis, Mo., were recently awarded a contract of \$7,957,000 by District Corps of Engineers, Seattle, Wash., for the completion of Barracks Buildings at Fort Richardson, Alaska, 2.3 mi. from Anchorage, Alaska.

Shaw & Estes, Dallas, Texas and Houston, Texas, were awarded a \$2,383,346 contract by the U. S. Atomic Energy Commission, Los Alamos, New Mexico, for the construction of camp building

facilities Group 2 at the Los Alamos Project, White Rock, N. Mexico.

Gasland Construction Co., Bellingham, Wash., received a \$598,757 contract from the District Corps of Engineers, Seattle, Wash., for completion of construction of family units at Ladd Field, Territory of Alaska.

Barrett & Hilp, San Francisco, Calif., have been awarded a \$1,000,000 (approx.) contract by the Masonite Corporation, Ukiah, Calif., for the construction of a hardboard manufacturing plant at Ukiah, Calif.

C. F. Lytle Co., and **Green Construction Co.**, Des Moines, Ia., have been recommended for the award of a \$8,679,142 contract by the Civil Aeronautics Administration, Seattle, Wash., for the construction of an airport southwest of Anchorage in Spenard-Lake Hood area, Alaska.

Kuckenberg Construction Co., Portland, Ore., have received a \$1,277,597 contract from the Oregon State Highway Commission, Salem, for the construction of a west-side ramp and approach to Steel Bridge in Portland, Ore.

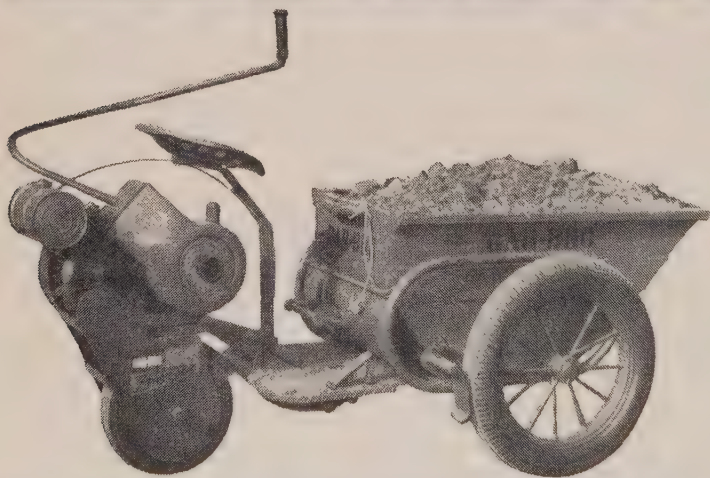
Morrison-Knudsen Co., Inc., and **Peter Kiewit Sons, et al.**, Seattle, Wash., have been awarded a contract of \$1,988,519 by the District Corps of Engineers, Seattle, Wash., for completion of a 500-man barracks at Ladd Field, Alaska.

Morrison-Knudsen Co., Inc., and **Peter Kiewit Sons, et al.**, Seattle, Wash., have received contracts totaling \$7,250,000 (second group) from the District Corps of Engineers, Seattle, Wash., for the construction of 500-man barracks at Ladd Field and Fort Richardson, Alaska.

Scheumann & Johnson, Seattle, Wash., have been awarded a \$915,950 contract by the Bureau of Reclamation, Denver, Colo., for the First Unit of the Deschutes Basin Project. The unit will consist of a dam and spillway to be built as an extension from Fifth Avenue, Olympia, across the mouth of the Deschutes waterway. Damming the waterway will create a lake about 5 mi. long which will eventually be surrounded by a park connected with the state capitol grounds in Olympia.

S. Birch & Sons, Seattle, Wash., and **Morrison-Knudsen Co., Inc.**, Seattle, have been awarded a \$2,885,453 contract by the Public Roads Administration, Juneau, Alaska, for the improvement

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Note the large front wheel where the bulk of the load is carried. Dumping is easy because load is balanced in the tray. Hauls all construction materials. Loads directly from mixer. Specifications: 81½" long; 39½" wide. Maximum load: 1500 lbs., 9 cubic feet of concrete . . . Bulletin #77 tells the full story . . . shows the Power-Cart in use. Write for it, or contact Gar-Bro distributors.

The facts and figures prove that this new Gar-Bro product helps cut construction job costs and builds up real profits. Designed to carry as much concrete as three ordinary wheelbarrows or two carts, it relieves "concrete men" for less back-breaking jobs. It's simple to operate as the steering and transmission are controlled by one lever—a tiller. Forward and reverse speed is foot-throttle controlled. Power unit is detachable from cart. Tractor-type seat reduces operator fatigue.

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(PAT. PEND.)

A NEW PRODUCT MANUFACTURED BY

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nt of the Richardson Highway between Big Delta and a point
mi, south of Fairbanks, Alaska.

bler Brothers and Rogers Construction Co., Portland, Ore.,
ve been recommended for award of \$1,126,570 on their bid to
e Public Roads Administration, Juneau, Alaska, for grading,
facing 65.6 mi. of the Richardson Highway, Sec. B, Fourth
dicial Division, Territory of Alaska.

heumann & Johnson, Seattle, Wash., were awarded a \$930,950
ntract by the State of Washington, Olympia, for construction
an earth fill dam, concrete spillway, and road construction at
ympia, Wash.

rker, Steffans and Pearce, San Francisco, Calif., have been
arded a \$1,792,000 contract by the Sequoia Hospital District,
edwood City, Calif., for the construction of a 100-bed hospital
the Redwood City Area, Calif.

chtel Corp., San Francisco, Calif., have been awarded a \$1,-
0,000 contract by the Hercules Powder Co., Hercules, Calif.,
r the construction of an ammonia unit at Hercules, Calif.

sen & Larsen, San Francisco, Calif., received a \$1,000,000
ntract from the Atlas Imperial Diesel Engine Co., Oakland,
alif., for construction of the first portion of work, which in-
udes various buildings, in the City of Hayward, Calif.

Birch & Son, and Morrison-Knudsen Co., Inc., have been
arded a contract for \$1,283,444 by the Alaska Road Commis-
on, Juneau, for road asphalt storing and handling facilities at
anchorage and Valdez, Alaska.

ller Construction Co., Madras, Oregon, have received a \$1,034,-
1 contract from the Bureau of Reclamation, Glen Ullin, N.
ak., for construction of Dickinson Dam, Heart River Unit, N.
ak., Missouri Basin Project. The work is situated on the Heart
ver about 2 mi. west of Dickinson, N. Dak. Principal features
olve an earth-fill dam across the Heart River, a combined
illway and outlet works structure at the right abutment. The
m will be about 2,275 ft. long at the crest and reach a maximum
ight of about 69 ft. above the lowest foundation.

ited Concrete Pipe Corporation, Baldwin Park, Calif., at
204,272 (Sch. 43P) and \$43,058 (Sch. 44P) received a contract
om the Metropolitan Water District of Southern California,
os Angeles, Calif., for the construction of about 6.8 mi. of pipe
e in unincorporated territory of Los Angeles County and in
e cities of Los Angeles, Gardena, Redondo Beach and Man-
ttan Beach, Calif.

olte, Inc., Oakland, Calif., and United Concrete Pipe Corpora-
on, Baldwin Park, Calif., have received a \$1,435,160 contract
om the East Bay Municipal Utility District, Oakland, Calif.,
r the installation of Section 4 of the North Interceptor Sewage
isposal Project. This section of the Interceptor, from Potter
reet in Berkeley, Calif., to the treatment plant site, will consist
7,800 lin. ft. of line to be constructed by the open cut method
d 996 lin. ft. to be constructed in tunnels. At the Ashby Avenue
d Powell Street approaches to the Eastshore Highway, and at
e intersection with the Key System tracks, the line will be con-
ructed by tunneling under the roadway in order not to disrupt
e flow of traffic.

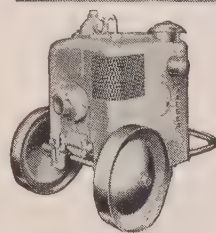
NEW BOOKS . . .

INTRODUCTION TO HIGHWAY ENGINEERING
—By John H. Bateman, Professor of Civil Engineering,
Louisiana State University. Published by John Wiley &
Sons, 440 4th Ave., New York 16, N. Y. Fifth Edition.
540 pages, 6 x 9½. Price \$5.50.

This is an expanded and revised edition of a well-es-
tablished and time-honored civil engineering book. It includes
comprehensive treatment of the fundamentals of highway
engineering, including practical illustrations and problems.
ext matter, tables, illustrations, problems and appendixes
the new edition have been subjected to a general over-
ruling and pertinent information has been added. All mate-
al on highway subgrade soils has been extensively revised.
ata on soil-cement and bituminous-soil base courses have
en added. And an enlarged treatment of concrete pave-
ments with reference to concrete mixtures and use of air-
training admixtures has been included.

ENGINEERING CONTRACTS AND SPECIFICA-
TIONS—By Robert W. Abbett, M.S., C.E. Published by
John Wiley & Sons, 440 4th Ave., New York 16, N. Y.
Second Edition, 330 pages, 5½ x 8½. Price \$3.75.

The first edition of the book was written during the war

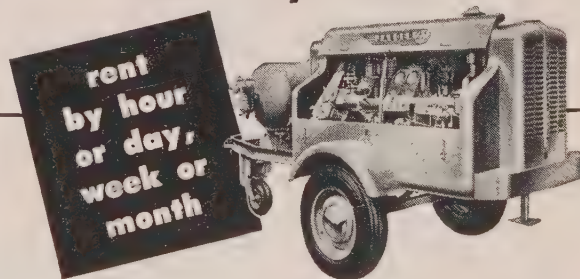


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185 ft. instead of 160	600 ft. instead of 500

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ANDREWS EQUIPMENT SERVICE.....	Spokane 9, Wash.
CENTRAL MACHINERY CO.....	Great Falls, Mont.
TRACTOR & EQUIPMENT CO.....	Sidney and Miles City, Mont.
WORTHAM MACHINERY CO.....	Cheyenne, Wyo., Billings, Mont.
J. B. COGGINS & CO.....	Albuquerque, N. M.
MILES CITY EQUIPMENT CO.....	Miles City, Mont.
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and was designed to meet the requirements of the large volume of construction work in progress at that time, much of which was executed by the government. In this second edition, increased emphasis is placed upon contract procedure for private work, although the original material on government methods has been retained and brought up to date. An entirely new chapter on construction insurance has been added, and the sections on prequalifications and arbitration have been rewritten and expanded. The original chapter on specification writing has been expanded into three chapters. The purpose of the first edition, expanded in this edition, is to present some of the legal and business aspects of the engineering profession in compact form suitable for reference and text-book use.

SELLING TO THE NAVY—Published by the Navy Department, Washington, D. C. Designated Navy Form P-548. Paper cover, 40 pages, 6 x 9. Copies available from the Navy Department or from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., at 15 cents per copy.

This booklet is published particularly for the assistance of smaller business concerns to spell out the manner in which Navy contracts are obtained and the steps involved from the receipt of the contract until final payment. The booklet covers the Navy purchasing activities throughout the U. S. and the directory of the field inspectors of Navy material provides the primary contact points for suppliers. This is the third edition of a booklet first published in 1922.

MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS—prepared by the Joint Committee on Uniform Traffic Control Devices and published by the Public Roads Administration of the Federal Works Agency. Stiff paper cover, 220 pages, 6 x 9. May be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., at 50 cents per copy.

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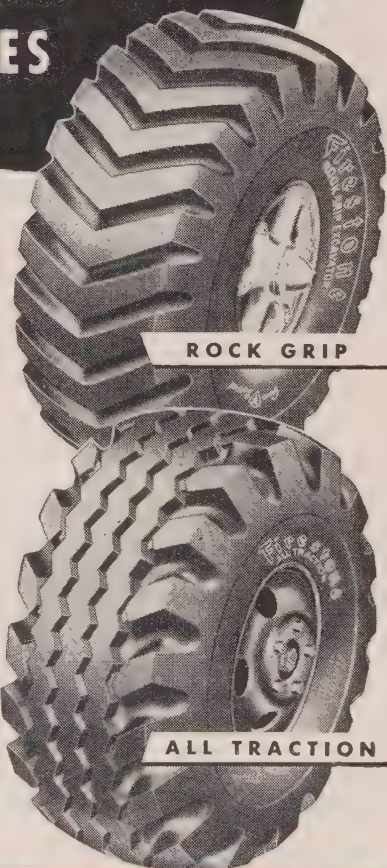
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410 LBS.

The AMERICAN UTILITY HOIST will lift brick, tools, cement blocks, roofing or any other load up to 500 lbs. more profitably than any big hoist on the market. And compared to hand work, it's worth two or three extra men on the payroll.

Here, at last, is a light hoist that's an all-around performer, offering exactly the kind of speed and power you need. The drum will spool 1700 feet of $\frac{3}{8}$ " wire rope, or 400 feet of $\frac{3}{4}$ " manila. With standard gearing it lifts 500 lb. loads at 200 feet per minute. If you want extra power, order special gearing to

handle 650 lbs. at 150 FPM; or for extra speed you can have it geared for 200 lbs. at 500 FPM.

This hoist goes anywhere . . . and anybody can run it. Haul it on a light truck . . . wheel it to the job like a wheelbarrow . . . counterweight it with a heavy plank in the slotted frame, and you're ready for work. Fingertip throttle control is right on the brake lever. Has 14" disc clutch, 16" external band brake, governor-controlled air cooled engine. Immediate delivery from stock. Call your distributor, or write us direct, for catalog.

American Hoist and DERRICK COMPANY

St. Paul 1, Minnesota

Plant No. 2: So. Kearny, N. J.

Sales Offices: NEW YORK, CHICAGO, PITTSBURGH

AMERICAN HOIST & Derrick Co.
ST. PAUL 1, MINNESOTA

Please send literature and prices
on the AMERICAN Utility Hoist.

Name

Company

Address

City State

9118

17

This manual is the generally recognized official national standard, covering highway signs, pavement markings, traffic signals, islands, and similar devices used in the guidance, warning and regulation of traffic. Members of the Joint Committee are outstanding traffic engineers of State and City highway departments, the Public Roads Administration and numerous national organizations concerned with highway use and safety. The new Manual superseding editions of 1935 and 1942, has been entirely rewritten and expanded to provide a clear exposition of each subject. Proper use of traffic control devices is illustrated by 57 drawings and photographs.

SIMPLIFIED DESIGN OF STRUCTURAL TIMBER—Harry Parker. Published by John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. 220 pages, 5 x 8. Price \$3.25.

Dealing primarily with wood members that support loads in building, the book includes a full explanation of the principles of mechanics involved in the design of these members. The up-to-date design procedure is based on the most recent recommendations of leading authorities on timber construction. Forty-five tables and numerous practical examples and problems are featured in the book. Harry Parker, well known for his books in the structural engineering field, is Professor of Architectural Construction at the University of Pennsylvania.

"AUTHORITY in TVA Land" by Tennesseean, W. V. Howard, is a new and well-written book answering many of TVA's disputed claims. The author's on-the-ground analysis tells of the good that has come from TVA, but he also seen through propaganda, and refutes many claims that have been made for or by the Authority. For example:

Mr. Howard shows that TVA is not paying its way, its rates are "cheap" at the expense of the taxpayers of the U. S., and that its "yardstick" is about 18 inches long.

He shows that Tennessee's farms are less well-supplied with electricity than those of 43 other states, and because is the famed TVA "yardstick" which reduces rates to the point where many sections cannot qualify for REA loans.

He shows that TVA dams have permanently flooded more fertile river bottom land than was previously subjected to temporary floods.

He says that TVA has made major contributions to erosion control, that in so doing, it has kept the Soil Conservation Service, whose methods are much more effective, out of the region.

"Authority in TVA Land" is published by the Frank Glenn Publishing Co., 1113 W. 12th St., Kansas City 6, Mo. cost \$2.50.

TRADE WINDS

News of Men Who Sell to the Construction West

CALIFORNIA

Thomas J. Lingle, new Western Division Manager for TAYLOR PIPE & FORGE WORKS, Chicago, Ill., will be in charge of manufacturing operations at the company's new Fontana, Calif., plant and also will direct West Coast sales. Lingle was formerly with C. F. Braun Co. of Alhambra, Calif. The Fontana plant already has begun production of spiral pipe and forging operations will begin soon.

☆☆☆

CUMMINS SERVICE & SALES, Cummins Engine distributors for Southern California, headed by **Jim Flanagan** and **Syd Cook**, have opened considerably expanded facilities at Bakersfield, Calif., to serve Cummins users in Kern County and adjacent neighborhood. The expanded facilities will be under the management of **Earl Swallow**, who has been Cummins manager in this area for several years. **Cliff Woods** remains in charge of service.

☆☆☆

GENERAL ELECTRIC CO., Schenectady, N. Y., has opened a new \$3,000,000 motor manufacturing plant on a 57-ac. tract near San Jose, Calif. The factory ultimately will produce all of the company's output of single-phase integral horsepower motors.

☆☆☆

Frank L. Johnson has been named Division Sales Manager by THE OSGOOD CO. and THE GENERAL EXCAVATOR CO. of Marion, Ohio. His division will include the entire states of Washington, Oregon, California, Nevada, and parts of Montana and Idaho, and his headquarters will be in San Francisco. Johnson will devote his time to the sales and service of Osgood and General power shovels and material handling equipment, and will work closely with distributors of the equipment within his division.

☆☆☆

Two important personnel changes for the Pacific Coast operation of WHITE MOTOR CO., of Cleveland, Ohio, have been announced by **Wilson D. Patterson**, White's Regional Manager. **C. M. Thom-**

sen, Service Manager for White in San Francisco for the past eight years, becomes Bus Service Manager in the San Francisco Coach Division. **G. R. Wynne**, Shop Superintendent of White's Portland, Ore., branch for the past year and a half, takes over the position of Service Manager in San Francisco.

☆☆☆

Harold Gearin has joined the sales staff of FLUOR CORP., LTD., constructors and engineers of Los Angeles, Calif., and will currently assume the responsibility of sales coordinator among the company's



GEARIN



VAN HORN

various district offices on refinery and construction projects. He previously held executive sales positions with Shell Oil Co. and Bendix Aviation Corp. **Lee Van Horn** has been named by the company as chief process engineer. He has been intimately connected with the development of refining processes, such as Hydroforming, Fluid Catalytic Cracking and others, for the past 20 years.

☆☆☆

TIMBER STRUCTURES, INC., has announced the formation of an affiliated corporation, **TIMBER STRUCTURES, INC., OF CALIFORNIA**. **Frank Benzon**, new manager, and **MacGregor "Mac" Graham**, sales manager, are both long experienced in timber fabrication and erection. **T. C. "Ted" Combs**, previous manager, is transferring to the Portland, Ore., headquarters where he will become Vice President in Charge of Sales. **C. H. "Andy"**

Anderson is chief engineer for the new organization; **Bruce Thurber** is Auditor, and **J. A. Finelli** is Production Manager. The company's offices in Oakland, Calif., have been enlarged.

☆☆☆

PREST-GLASS CORP. of New York has appointed a western manager, **Edward A. Altshuler**, 1605 Cahuenga Blvd., Los Angeles, Calif., to set up distributors among lumber, glass and building specialty suppliers for Prest-Glass, their new fiber-glas building and decorative material.

☆☆☆

INDUSTRIAL ENGINE SERVICE, formerly at 7825 Santa Fe Ave., Huntington Park, Calif., have moved to a new 2¼-ac. location at 1436 Rosemead Blvd., Rosemead, Calif. The firm rebuilds and repairs gas and Diesel engines and contractor's highway equipment. **Charles J. Rounds**, general contractor formerly occupying space at the old address, shares the space at the new location.

☆☆☆

C. H. Hallett has been appointed manager of sales at the Los Angeles, Calif., plant of **JOSEPH T. RYERSON & SON, INC.**, steel distributors with home offices at Chicago, Ill. He became associated with Ryerson in 1941, his most recent capacity being as assistant to the sales manager at the company's Chicago plant.

☆☆☆

FRUEHAUF TRAILER CO. has announced the appointment of **ZIMMER-KELLER, INC.**, Detroit, Mich., to handle all phases of their advertising program. The advertising program for the coming year will include the use of national consumer publications, business papers, newspapers and radio. Since June of 1948, Zimmer-Keller has handled Fruehauf's Sunday afternoon network radio program, Harrison Wood in "This Changing World."

☆☆☆

Appointment of **Morris "Mike" Rhine** as Assistant to the Pacific District Manager of the Apparatus Department of **GENERAL ELECTRIC CO.**, Schenectady, N. Y., has been announced by **Allen G. Jones**, District Manager. Rhine will be special consultant and counsellor for the company's major sales negotiation in California, Arizona and western Nevada. **Kurt Steindorff** has been named to the newly created position of Manager of the San Francisco office of the Apparatus Depart-



CLOSING Plus
POWER
WHEN AN OWEN BUCKET
Clamps Down

It's the "Plus" features in a product that contribute largely to outstanding performance and build user satisfaction and profits.

Relax and swing an Owen from your boom. Closing Power PLUS is there when required for licking the toughest excavating jobs which will confront you.

OWEN BUCKET CO., LTD.

Berkeley, California

Dealers: Los Angeles, Spokane, Seattle, Portland, Salt Lake City, Honolulu.



ment. **E. S. Bjonerud** has been appointed Manager of the Resale Section of the Industrial Division, San Francisco office. **Herbert C. Bosch** is the new Manager of the Oakland Sales Office, succeeding **Samuel G. Gearhart**, who has been made Manager of the Industrial Division's San Francisco office.

☆☆☆



W. B. "Bill" Worden has been appointed factory representative to Noble dealers according to **H. L. Vines**, general sales manager for **NOBLE CO.**, Oakland, Calif., manufacturers of cement and aggregate batching equipment. Worden replaces **Les Horton**, who has been promoted to industrial

sales. For the past five years Worden was district representative and central sales manager for **R. G. LeTourneau, Inc.**

☆☆☆

Paul W. Cotton is the appointed Management's Representative at the South San Francisco Plant of **BETHLEHEM PACIFIC COAST STEEL CORP.** In the position, he will have charge of the plant's Industrial Relations Department.

☆☆☆

Walter W. Harvey, formerly with the War Assets Administration on construction equipment, is the appointed retail sales manager for the **FOSTER TRAILER CO.**, of Los Angeles, Calif. **Conrad P.**

Herman has been named national sales manager for the company's distributors and dealers. He was formerly with **Reynolds Aluminum Truck Body Division.**

☆☆☆

Appointment of **Sherman A. Bishop** as general manager of the **CALIFORNIA REDWOOD ASSOCIATION**, San Francisco, has been announced by the Board of Directors. A third-generation redwood lumberman, with 14 years of service with **Union Lumber Co.** of San Francisco, Bishop will have general charge of promotion, research, grading and inspection services of the organization. He succeeds **Kenneth Smith**, who resigned to join the **Pacific Lumber Co.** of San Francisco.

☆☆☆

George B. McMeans has been appointed by **KAISER CO., INC.**, as General Superintendent of the Kaiser Steel Plant at Fontana, Calif. He joined the Kaiser organization in February, 1947, as Assistant General Superintendent. McMeans succeeds **C. H. Lenhart**, who resigned recently.

☆☆☆

J. M. McLain is the appointed District Sales Manager for the Pacific Coast Territory of **THEW SHOVEL CO.**, Lorain, Ohio, power crane and shovel manufacturers. Since the end of the war, he served as District Sales Manager for the West Central territory with headquarters in Detroit. His new headquarters will be in San Francisco.

☆☆☆

BRUNNER & LAY, INC., of Chicago, Ill., recently purchased the **VERMONT TOOL & SUPPLY CO.**, in Los Angeles,

Calif. An extensive modernization program was carried out with the installation of forging and heat treating equipment for the manufacturing of moil points, clay spades, drill steels and all associated pneumatic tool accessories. Western state sales for the company will be carried out henceforth from the Los Angeles office. **Bill Schaefer** is the General Manager of the new office, and **Mark T. Kasper** is the Sales Manager.

☆☆☆

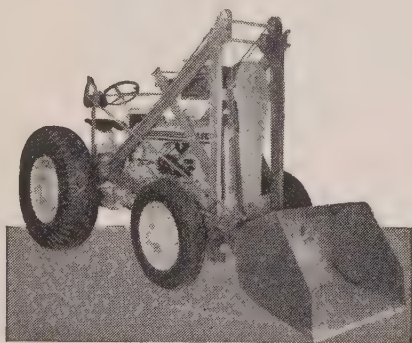


C. J. Moran, until recently manager of **MACK TRUCKS**, Allentown, Pa., factory, has been transferred to the company's Western Division and will headquarter at Mack's Los Angeles office. In his new position, he will direct off-highway operations and sales, with special emphasis on Mack's

largest models, the LR, LV and LRSW, trucks designed for mining and heavy construction.

☆☆☆

HERCULES POWDER CO., Wilmington, Del., has announced plans for construction of an anhydrous ammonia unit to be located at its Hercules, Calif., plant. The unit will be an addition to other production equipment already in operation at the Hercules plant. The additional ammonia produced by the unit will be used mainly by Hercules in its own operations. The company recently announced plans for



White Front End Loaders Have Extensible Booms

The extending boom feature of White Loaders has been greatly commended by all users. It permits loading standard trucks without hand spreading. It is not necessary to be close to truck to discharge. It can fill high bins or extend over walls.

Bucket is close to tractor wheels when loading. At top of rise it moves forward and discharges 2½' ahead. It can be dumped at any point in its lift.

Full mechanical operation, from front of engine. Does not interrupt tractor operation nor draw-bar service. Backfiller blades interchangeable with bucket.

Made ONLY for Oliver 88; Case DI, SI, CI; Minn-Moline UT-1; International I-6, ID-6; I-30; #20.

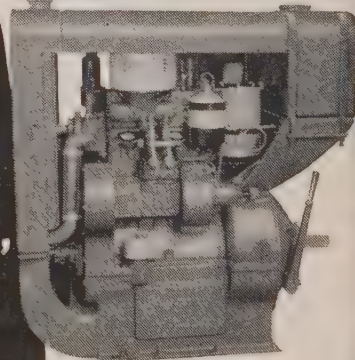
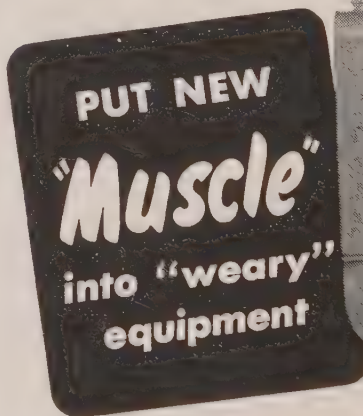
Write for Circular

White Mfg. Co.

ELKHART

INDIANA

DIESEL'S THE POWER . . . *Sheppard's* THE DIESEL



- 33 H.P. two cylinder power unit. Delivered ready for work.
- Efficient full-diesel operation on any one of 15 different fuels.
- Simplified fuel injection. No complicated assemblies.
- Available as 2,000 to 36,000 watt generating set for night lighting or auxiliary use.



Put your equipment back on a paying basis with Sheppard Diesel power. Keep it on the job 3 to 5 times longer between engine overhauls. Handle only half as much fuel . . . save up to 75% on fuel costs! Send for FREE Sheppard booklet that shows how to put new life into your "tired" machines.

DEALERS—There's a big market for 3.5 to 100 H.P. Diesels. Investigate a profitable Sheppard franchise.

SHEPPARD DIESELS, Hanover 17, PA.

Sheppard
STATIONARY AND AUTOMOTIVE **DIESELS**

Check these UNIVERSAL DESIGN FEATURES

that will give you more profits

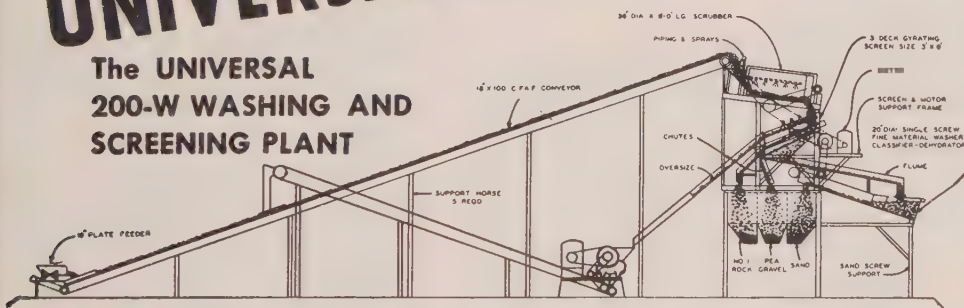
THE UNIVERSAL 200-W WASHING AND SCREENING PLANT

Built in 4 sizes with capacities from 35 to 200 yards of 1" per hour depending on actual amount of crushing.

Three stages of reduction with two crushers give capacity to tackle largest jobs—portability to handle small jobs profitably. Two sizes, capacities to 125 cubic yards of 1" per hour.

UNIVERSAL "STREAM-FLO" ENGINEERING GIVES YOU MORE YARDS PER HOUR AT LESS COST PER YARD

The UNIVERSAL 200-W WASHING AND SCREENING PLANT



For volume production of clean aggregate, washed and screened to 3 sizes.
Capacity: 100-135 tons per hour.

Depend upon UNIVERSAL for top economy and low cost production. All UNIVERSAL plants are "Stream-Flo" engineered to provide the perfect balance of high capacity units to assure a steady flow of properly graded material. No bottlenecks to cut into profits. Roller bearings throughout mean economical, smooth and quiet operation.

Yes, check and compare... and you'll see why UNIVERSAL sets the pace in engineering and field performance. Write for information.

The UNIVERSAL ENGINEERING CORPORATION

A division of PETTIBONE MULLIKEN CORPORATION • New York • Chicago
323 8th AVENUE N. W. • CEDAR RAPIDS, IOWA

State Tractor and Equipment Co. Phoenix, Arizona
Industrial Equipment Co. Los Angeles 11, California
Moore Equipment Co. Stockton and Fresno, California
Bay Cities Equipment Inc. Oakland 7, California

Nevada Equipment Service Inc. Reno, Nevada
The Harry Cornelius Co. Albuquerque, New Mexico
J. K. Wheeler Machinery Co. Salt Lake City 1, Utah
J. D. Evans Equipment Co. Rapid City, South Dakota

the erection of additional ammonia oxidation capacity at the plant.

☆☆☆

Otis R. Johnson, president of Union Lumber Co., was elected president of the CALIFORNIA REDWOOD ASSOCIATION, San Francisco, at the recent meeting of the board of directors in San Francisco. Other officers elected were: Fentress Hill, president of Northern Redwood Lumber Co., vice-president, and Selwyn J. Sharp of the Association staff, secretary-manager.

☆☆☆

Robert E. Bounds is now Staff Engineer with the Insulations Division of THE PARAFFINE COMPANIES, INC., San Francisco. He will devote himself to engineering plans and projects entailing Pabco's newest building material, Corrugated

Asbestos Siding and Accessories, now being manufactured at the company's new Redwood City, Calif., plant. Bounds was formerly an engineer in Los Angeles with the Plant Rubber and Asbestos Works, now merged with Pabco.

☆☆☆

PACIFIC NORTHWEST

Orrien K. Lynn has been named manager of the Seattle, Wash., district of the Replacement Tire Sales Division, B. F. GOODRICH CO., Akron, Ohio. He succeeds Gerald A. Geer, who has been assigned other duties.

☆☆☆

Increased service facilities in the Pacific Northwest have been provided by the TWIN DISC CLUTCH CO., Racine, Wis., through construction of a new build-

ing for its Seattle, Wash., Branch Sales Engineering Office. Their new 50 x 70-ft frame building on the west side of Lake Union at 1214 Westlake Ave., North, was designed to give maximum space for parts warehouse and service facilities. Docking area is provided alongside the building for marine installations and repairs. Jack H. McCumber is Seattle Branch Office Manager.

☆☆☆

C. W. Lord, District Manager for UNITED STATES STEEL SUPPLY COMPANY's West Coast operation, has announced the appointment of George R. Coffin as Assistant District Manager of the company's warehouse in Portland, Ore., and of Edward C. La Bart as Assistant District Manager of the company's warehouse in Seattle, Wash. Coffin has been associated with the Supply Company since March, 1948, as a salesman in the Chicago and San Francisco territories, and La Bart has been located at the Los Angeles warehouse since August, 1947. COLUMBIA STEEL CO., United States Steel Corp. subsidiary, has transferred the Portland and Seattle warehouse plants to the Supply Company.

☆☆☆

INTERMOUNTAIN

George T. Williams has resigned as Manager of the Contractors' Equipment Department of the MINE AND SMELTER SUPPLY CO., Denver, Colo., a position he held for the past five years. Before coming to the Denver firm, he was Field Engineer for the Keystone Lubricating Co. of Philadelphia, Pa.

☆☆☆

STATE TRACTOR AND EQUIPMENT CO., Phoenix, Ariz., have opened a new branch at 3525 East Speedway in Tucson, Ariz., to serve customers in that area. Gil Abrahams will be in charge of the new outlet, according to Ray Robinson, president. The firm is also erecting a new headquarters building in Phoenix.

☆☆☆

PACIFIC INTERMOUNTAIN EXPRESS has received the Trailmobile Trophy, an award made annually by TRAILMOBILE CO., Cincinnati, Ohio, to the company with the best record of safety and service on the highway. R. C. Taylor, Jr., Vice President in Charge of Sales for Trailmobile, made the presentation at the annual convention of the American Trucking Association, Inc., in Washington, D. C.

☆☆☆

AMONG THE MANUFACTURERS

WORTHINGTON PUMP AND MACHINERY CORP., Harrison, N. J., announce that the manufacturing and distributing activities of its subsidiary, RANSOME MACHINERY CO., will henceforth be conducted by the parent corporation. Manufacturing operations for the line previously manufactured by Ransome will be carried on at Worthington's Dunellen Works at Dunellen, N. J., the same location formerly used by Ransome.

☆☆☆

MARION POWER SHOVEL CO., Marion, Ohio, are beginning production operations in the recently acquired branch plant in Cambridge, Ohio. The first completed machine, a Marion Type 7200 walking dragline, was shipped from the plant during October. It is expected that two machines of this type will be manufactured each month until next summer, when pro-

WANTED!

JOBS TOO TOUGH FOR ORDINARY CONCRETE

We are looking for tough concrete jobs, in any type of construction where superior performance is required, where the concrete is to be hauled, buggied and placed under difficult conditions and where the hardened concrete must meet the highest specifications for quality.

Here are a few examples of jobs we are looking for which only DAREX Air Entrained Concrete can handle completely and economically.

JOB NO. 1. Requires concrete mix which can be successfully placed with a minimum of labor costs in complex form work containing reinforcing steel and pipes. Mix must have greatest possible plasticity and workability, slip into place evenly, smoothly and produce flawless, uniform concrete.

JOB NO. 2. Requires concrete that is easier to mix, place and quicker to finish and which will produce smoother walls of finer

texture, sharper corners, lower water absorption and greater durability.

JOB NO. 3. Requires pre-mixed concrete which can be successfully hauled long distances in open dump trucks over rough roads without segregation of bleeding, with less shrinkage and still be easy to place and finish.

JOB NO. 4. Requires concrete mix that is highly workable, easy to place, even though aggregates are harsh and less water is permitted by inspector.

*DAREX AEA can handle all of these jobs or any combination of similar tough requirements — and more, too — Darex maintains yield — saves time and labor costs which offset many times over the small initial cost — only a few pennies per cubic yard of concrete. Darex AEA is fully approved and used the world over.

Available at all Concrete Mixing Plants

ASK YOUR NEAREST DEALER ABOUT DAREX: Pacific Coast Aggregates, San Francisco; Blue Diamond Corporation, Los Angeles; Denver Fire Clay Co., Salt Lake City; Baker-Thomas Lime & Cement Co., Phoenix; Ray Corson Machinery Co., Denver; Mason's Supply Co., Portland; Darco, Inc., Great Falls; Hawaii Builders Supply Co., Honolulu.

CHARLES R. WATTS & CO.

4121 - 6th Avenue, N. W. Seattle 7, Washington
Darex AEA Distributors for Dewey & Almy Chemical Co. in 11 Western States, Alaska & Hawaiian Islands.

*T.M. Reg. U.S. Pat. Off.

Specify
DAREX AEA
it does a better job for less!

duction is scheduled to start on the Marion Type 7400 walking dragline. Heretofore, both types have been manufactured in the plant of a sub-contractor. In addition to actual machine production, the Cambridge plant is handling pre-fabrication work for the company's headquarters plant. It is anticipated that this pre-fabricating work will increase in volume with the contemplated extension of welding facilities at Cambridge. The new plant, with a floor area of 100,000 sq. ft., was originally operated by the Carnegie Sheet Mill.

☆☆☆

G. O. Britton is now Domestic Sales Manager for ATHEY PRODUCTS CORP., Chicago, Ill., advancing from the post of assistant to the position. E. B. Schlenk has taken over duties as District



BRITTON

SCHLENK

Representative for Athey's Central Territory. He was formerly employed in the sales division of Roy C. Wayne Supply Co., Inc., "Caterpillar" distributor in Louisville, Ky.

☆☆☆

HUGHES-KEENAN CORP., formerly of Mansfield, Ohio, have moved their plant to Delaware, Ohio, where it will be housed in a new modern factory now nearing completion. The company manufactures Roustabout Cranes, tractor-mounted load-handlers with hook or magnet.

☆☆☆

William F. Smith, former engineering director of the "Manhattan Project," wartime research unit of the Carbide and Carbon Chemicals Corp., has joined the UNITED STATES TESTING CO., INC., Hoboken, N. J., to organize a new engineering inspection service in conjunction with building and building material. Smith plans to create a field organization of specialists in concrete batching and placement, steel fabrication and erection, piling and wood preservation, bituminous road materials and other phases of construction. The new building materials service will be integrated with the chemical and engineering laboratories of the company.

☆☆☆

Purchase of one tract and exercise of an option on another, 1,700 ac. in all, in the Guadalupe River valley near Victoria, Texas, for a projected chemical plant has been announced by E. I. Du PONT de NEMOURS & CO., Wilmington, Del. The ammonia Department of the company has concluded preliminary engineering studies of the site with a view toward building a third plant to make chemical intermediates for nylon.

☆☆☆

A. C. Monteith, vice-president in charge of engineering and research for the WESTINGHOUSE ELECTRIC CORP., Pittsburgh, Pa., has been awarded the honorary degree of Doctor of Laws by his alma mater, Queens University. Monteith came

The NEW *Martin* Model 48 Concrete Pipe Machine

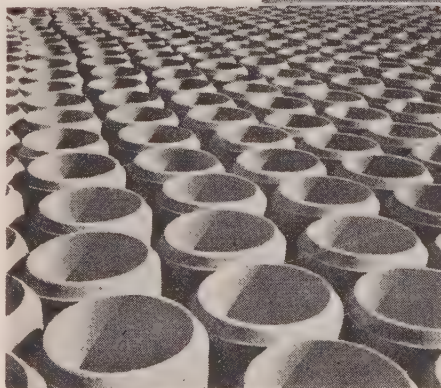
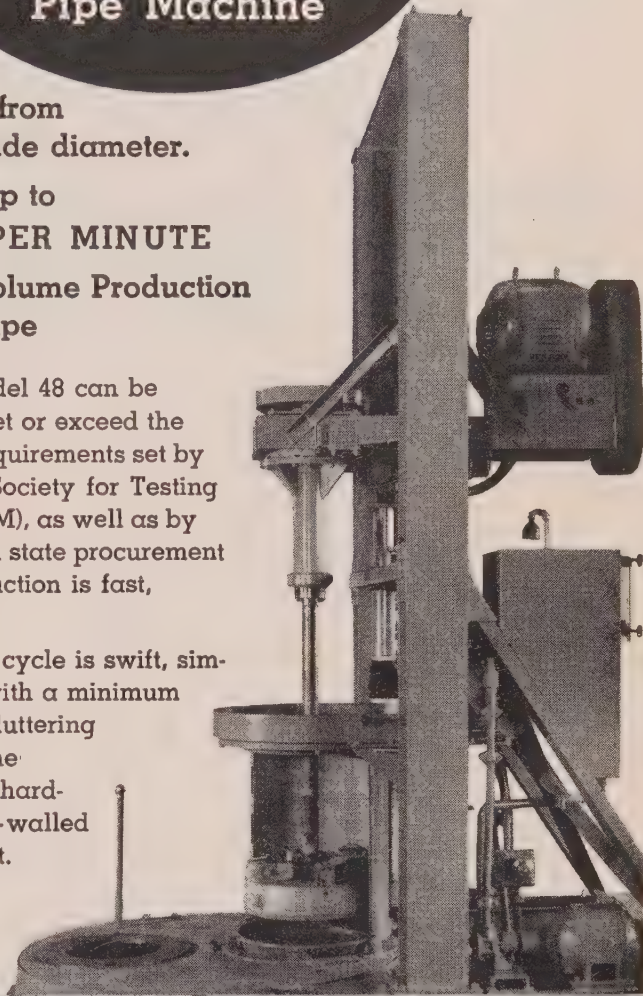
Makes pipe from
4" to 24" inside diameter.

Production up to
2 JOINTS PER MINUTE

For Large Volume Production
of Quality Pipe

The Martin Model 48 can be expected to meet or exceed the specification requirements set by the American Society for Testing Materials (ASTM), as well as by city, county and state procurement agencies. Production is fast, costs are low.

The Production cycle is swift, simple and neat, with a minimum of waste mud cluttering up the base of the machine. Good hard-packed, smooth-walled pipe is the result.



Above: A typical run of 4" Bell and Spigot Sewer Pipe.

Left: A typical two hour run of 12" Tongue and Groove Pipe on a Martin Machine.

Backed by more than 40 years' experience in the manufacture of concrete pipe equipment and irrigation gates and valves.

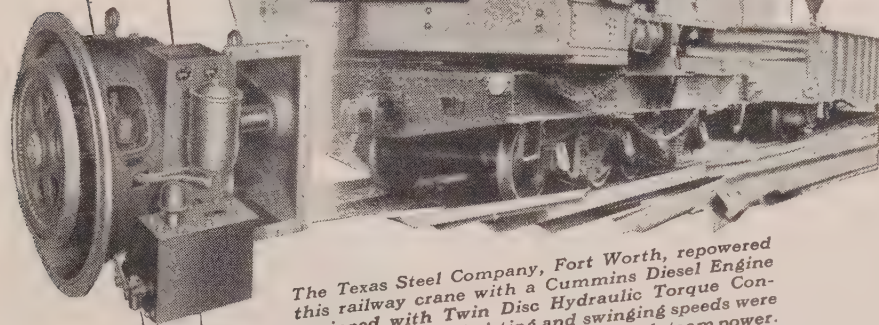
Write for Folder No. 48
**DISTRIBUTORS
WANTED**



Martin
IRON WORKS

Box 2857, Terminal Annex
Los Angeles 54, California

Faster Hoisting Cycles
Lower Upkeep Costs



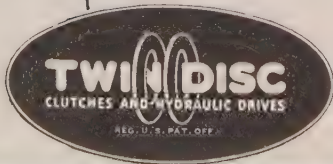
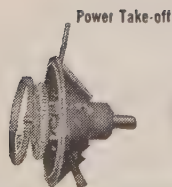
The Texas Steel Company, Fort Worth, repowered this railway crane with a Cummins Diesel Engine equipped with Twin Disc Hydraulic Torque Converter. Traveling, hoisting and swinging speeds were nearly doubled over the previously-used steam power.

Cranes equipped with Twin Disc Hydraulic Torque Converters provide the operator with a wide selection of speeds and torques for various operations of the hoisting cycle during spot or hook work. These Twin Disc units are designed for use wherever it is necessary to multiply torque for constantly-changing speed and load requirements.

Continuous smooth operation in starting, hoisting, and lowering also is assured with a Twin Disc Hydraulic Torque Converter. There is uninterrupted acceleration . . . less operator fatigue. Hoisting time is reduced because the operator is always lifting at the maximum speed for any given load.

Upkeep costs are lowered because the hydraulic nature of the drive protects the engine from destructive shock loads . . . dampens out engine torsional vibrations.

Twin Disc Hydraulic Torque Converters and Hydraulic Couplings have been proved in a wide variety of applications . . . cranes, hoists, tractors, yarders, loaders and locomotives. Write the Hydraulic Division for Bulletin No. 135-B (Torque Converter) and Bulletin No. 136 (Hydraulic Coupling). TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).



SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

up through the engineering ranks at Westinghouse, rose to the dual position of headquarters engineering manager and director of the company's educational activities in 1945, and was elected vice-president in July, 1948.

☆☆☆



Wendell V. Richards has been named Central Sales Manager for R. G. LeTOURNEAU, INC., Peoria, Ill., and will supervise the activities of LeTourneau District Representatives and Distributors in 20 midwestern states and 3 Canadian provinces. Richards has been associated with the company in sales department capacities since

the plant located in Peoria in 1936. He succeeds **W. B. Worden**, who has resigned to return to the West Coast, where he has accepted a position with the NOBLE CO. of Oakland, Calif.

☆☆☆

MARION METAL PRODUCTS CO. designers and manufacturers of truck bodies and hoists, has completed a new brick addition to their Marion, Ohio, plant according to **Gilbert Heer**, vice-president and general manager. The new building with a floor space of 26,000 sq. ft., will house the machine shop, personnel offices and an employee lunch room.

☆☆☆

Charles L. Haslup has been appointed sales manager of field operations for the READING-PRATT & CADY DIVISION of AMERICAN CHAIN & CABLE CO., INC., Reading, Pa. He has wide experience in sales supervision in the valve industry.

☆☆☆

R. G. LeTourneau, President of R. G. LeTOURNEAU, INC., of Peoria, Ill., and Longview, Texas, has appointed **Hans A. Bohuslav** as his special engineering consultant. Bohuslav, recognized throughout the engineering profession as an outstanding authority on high-power Diesel and gasoline engines, leaves a position as Vice President in Charge of Engineering and Production for Engineering Controls, Inc. of Los Angeles, Calif. Longview, Texas, will be his headquarters.

☆☆☆

James M. Herring has been named Service Manager for THE OSGOOD CO. Marion, Ohio, manufacturers of power shovels and material handling equipment. He has been with Osgood since 1928, most recently as an operator-erector in the field.

☆☆☆

The Flexwood-Flexglass division of the MENGEL CO., Louisville, Kentucky, has received a "Distinguished Service to Safety" award from the National Safety Council. The division completed 1,368,133 man-hours of operation without a lost-time injury, **Charles Westray**, manager, reports. This is the second safety award the company has received this year and the third since the war.

☆☆☆

Net sales of MASONITE CORP., Chicago, Ill., were \$36,472,950 in the fiscal year ended Aug. 31, 1948, an increase of 44 percent over the previous year. **Eugene Harland**, president of the company, in his annual report to the stockholders, said the

increase was chiefly the result of a full year's operation of a new production unit at the company's Laurel, Miss., plant. Total dividend payments for the year were \$3 a share, compared with \$2 a share in 1947.

★ ★ ★

Paul V. Galvin, President of MOTO-ROLA, INC., has announced the appointment of his son, **Robert W. Galvin**, to the post of Executive Vice-President of the Chicago, Ill., radio and television firm. The new appointee is 36 years old, has been director of the company since 1945, and has been employed since 1940 in various phases of the company's operations. The post he now occupies has been vacant since 1944, following the death of **Joseph E. Galvin**, who was a co-founder of Galvin Mfg. Co., forerunner of Motorola, Inc. Additional appointments include **Walter H. Stellner** as Vice-President of Merchandising and **Elmer H. Wavering** as Vice-President of Product Design.



★ ★ ★

Les Schraub, Vice-President and Sales Manager of the UNION WIRE ROPE CORP., Kansas City, Mo., has announced changes and additions to his sales force to enlarge upon the field rope service of the rapidly expanding company. **R. B. Boand**, formerly District Manager at Chicago, Ill., has been selected as sales manager for the company's new machine-braided sling rope. He will headquarter at the home office and factory in Kansas City. **J. J. Lester** has been appointed Sales Representative in the state of Oklahoma, and will headquarter in Oklahoma City. **C. L. Conway** was appointed Sales Representative in the State of Kansas, and will headquarter in Kansas City. Sales Representatives in the states of Montana, North Dakota, South Dakota, Minnesota and Wisconsin will be **L. A. Davis**, who will headquarter at Minneapolis, Minn. **D. E. Bedford** was appointed Sales Representative for Iowa and Nebraska, and **D. B. Currence** was named District Manager for the company in Chicago, Ill.

★ ★ ★

Formation of a general merchandising division with **Daniel J. Boone** as manager has been announced by **A. T. Kearney**, President of the ZONOLITE CO., Chicago, Ill. Boone was Zonolite's advertising and sales promotion manager. His task will be to provide selling assistance to the firm's customers and to its processing plants in 22 cities. The firm mines and processes vermiculite insulation products.

★ ★ ★

E. J. Seifert, President of PETTIBONE-MULLIKEN CORP., Chicago, Ill., and subsidiary corporation, GEORGE HAISS MFG. CO., New York City, has announced the appointment of **W. E. Madden** to Vice President of the Hais Co. Madden was appointed Sales Manager of the Conveyor Division of Hais last year and has been responsible for the development of Hais conveyors for coal, aggregates and package handling.

★ ★ ★

Stephen W. Benedict, widely known engineer, has been appointed Director of Research of THE MASTER BUILDERS CO., Cleveland, Ohio. For the past seven years Benedict has been materials engineer in the cement and concreting materials sec-

tion of the National Bureau of Standards in the capacity of assistant chief of the Cement Reference Laboratory and consultant on statistical problems in the Division of Mineral Products. Prior to joining the National Bureau of Standards staff, Benedict served as materials engineer with the Illinois Division of Highways and as structural engineer with the National Advisory Committee for Aeronautics.

★ ★ ★

Herman S. Robbins is the appointed manager of the new HILL DIESEL ENGINE DIVISION of DRAKE AMERICA CORP., New York City. Formerly in charge of export sales of Hill engines, he will now take charge of all sales activities of the division, both export and domestic. One of his first acts will be to expand the domestic distribution setup for Hill.

John A. Proven is the appointed General Sales Manager for PORTER-CABLE MACHINE CO., Syracuse, N. Y. The former vice-president and sales manager for Sterling Tool Products Co. of Chicago, Ill., will have charge of sales policies governing the national distribution of Porter-Cable's products, which include portable electric tools, floor sanding machines and abrasive belt grinders.

★ ★ ★

EATON MANUFACTURING CO., Cleveland, Ohio, purchased for approximately \$750,000 a manufacturing plant in Saginaw, Mich., from the War Assets Administration. The plant has been leased by Eaton since 1941, being used for the manufacture of the company's Mechanical Valve Lifters, Hydraulic Valve Lifters and Valve Seat Inserts.

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HOUSTON 3 • DENVER 2
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NEW EQUIPMENT

MORE COMPLETE INFORMATION on any of the new products or equipment briefly described on the following pages may be had by sending your request to Equipment Service, Western Construction News, 503 Market Street, San Francisco 5, Calif. For quicker service, please designate the item by number.

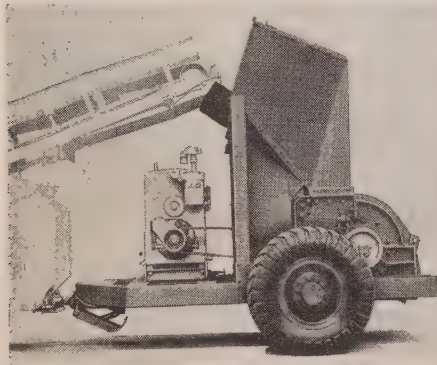
101

Portable Crusher

Manufacturer: Athey Products Corp., Chicago, Ill.

Equipment: Crushing unit for use with the Athey Force-Feed Loader.

Features claimed: The unit consists of an impact mill powered by a "Caterpillar" Diesel Engine, mounted on a 2-wheel,



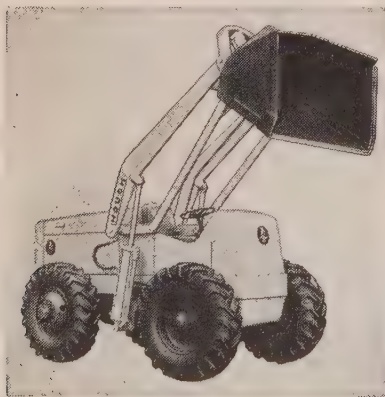
rubber-tired trailer with a V-Belt drive connecting the engine with the mill. The crusher hopper is fitted with breaker bars which pulverize material and deflect it onto a grid iron preventing the fines from entering the mill. Operated by one man, the unit picks up scarified or broken material from the road, crushes it to any required size and deposits it back on the roadway in a continuous operation.

102

Tractor Shovel

Manufacturer: Frank G. Hough Co., Libertyville, Ill.

Equipment: Model HM Payloader with four wheel drive and power boosted steering mechanism.



Features claimed: This is the first time that the 4-wheel drive principle has ever been applied to this type of equipment. The Model HM is the biggest of the Payloader line, having a bucket capacity of 1½ cu. yd.

The 4-wheel drive and 14.00-24.00 tires provide the power, traction and flotation necessary for successful off-the-road operation. Power steering on the rear wheels makes the machine easy to steer. The bucket is controlled by double-acting hydraulic rams, and the bucket booms are so designed that an automatic powerful digging action is given to the bucket independent of the forward motion of the tractor. The new Payloader is designed to dig, load trucks and other vehicles, to spread, level, strip, skim, carry and bulldoze, to charge hoppers and conveyors, plow and load snow, and to lift and push.

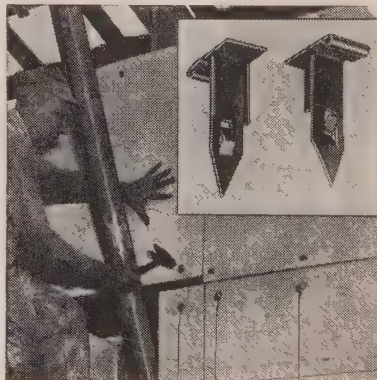
103

Insulation Fastening

Manufacturer: Lexington Supply Co., Cleveland, Ohio.

Equipment: Quick-drive fastening to attach insulation to sheet steel.

Features claimed: The clip consists of a sharply pointed, hardened and tempered steel shank with a flat head as shown in the illustration. The slightly rounded shank provides strength for driving. The two shoulders prevent penetration beyond the thickness of the insulation, and the special



lock, stamped into the shank, locks the clip securely into place. An ordinary hammer is all that is required for use with the clips. The pointed shank will penetrate any metal thickness up to 18 gauge.

104

Powerful Motor Grader

Manufacturer: Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

Equipment: Grader designed for heavy construction and maintenance work.

Features claimed: The new AD-4 Motor Grader incorporates many famous features of earlier AD models in addition to new developments. Important among the exclusive features is the special frame design developed and introduced by Allis-Chalmers. The twisting strains and shocks constantly imposed on graders are more easily absorbed by cylindrical sections through a flexing action. A complete blade range to

handle any job is accurately achieved by hydraulically controlled front mounted lift cases which provide direct down pressure and low cuts measured to a fraction of an inch. A 30-in. throat clearance enables the AD-4 to handle bigger windrows without interference. Designs that reduce fatigue and improve operator performance are numerous on the new model.

105

Snow Plow Wax

Manufacturer: Pennsylvania Refining Co., Cleveland, Ohio.

Equipment: Wax suitable for spray, as well as brush application.

Features claimed: Applied to moldboards and wings, this wax creates a hard



slick surface off which snow slides easily. The wax can be sprayed on with an ordinary paint spray gun or applied with an ordinary paint brush, and the plow can be placed in service shortly after waxing. One gallon of sprayed wax covers approx. 300 sq. ft. of plow working surface.

106

Side-Dump Earthmover

Manufacturer: Euclid Road Machinery Co., Cleveland, Ohio.

Equipment: Euclid earthmover with down-folding side gates and 13-cu. yd. capacity.

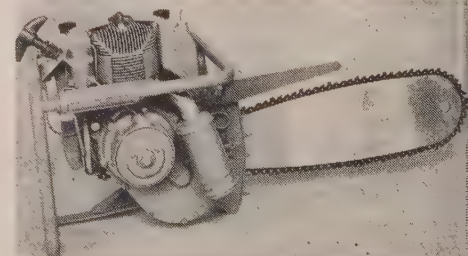
Features claimed: The side gates on the Model FDT-98W Side-Dump Euclid open automatically by mechanical linkage when the body is raised by the Euclid hydraulic twin hoists. Either right or left side dumping can be selected by the operator. The trailer body is of heavy welded construction for hauling rock and ore and for heavy excavating. The tractor is powered by a 200-h.p. Diesel engine and provides a top speed of 33.4 m.p.h.

107

Chain Saw

Manufacturer: Reed-Prentice Corp., Worcester, Mass.

Equipment: Saw with addition of a helper's end.



Features claimed: The "Timberhog" is a portable chain saw complete with blade, chain, guide bar and bumper plate, the unit weighing 55 lb. A pressure-fed diaphragm carburetor permits cutting at any angle, eliminating the need for swiveling the blade or carburetor. With the addition of a helper's end, it's a two-man saw; without it, it's a one-man saw. A 4-h.p. gasoline engine provides power.

108

Hard Hat

Manufacturer: E. D. Bullard Co., San Francisco, Calif.

Equipment: New Hard Boiled Hat with resilient, non-shattering crown.

Features claimed: Crown of the new hard hat is made up of continuous reinforcements of long, interlocked fibers bonded together with a weather and acid-defying resinous binder. Most of the shock of a blow is absorbed by the resilient crown, and 6-point hammock suspension distributes the balance of the blow evenly over the entire hammock assembly. Moisture will not penetrate the material of the hat and it passes all dielectric strength tests. Plenty of ventilation is provided by the air space between hatband, hammock and crown.

109

Dump Truck

Manufacturer: Four Wheel Auto Drive Co., Clintonville, Wis.

Equipment: FWD Model YU, rated at 28,000 lb. gross vehicle weight.

Features claimed: A standard model before the war, the YU has been entirely redesigned. The new model features a 142-h.p. motor, rated at 2,250 r.p.m. Standard



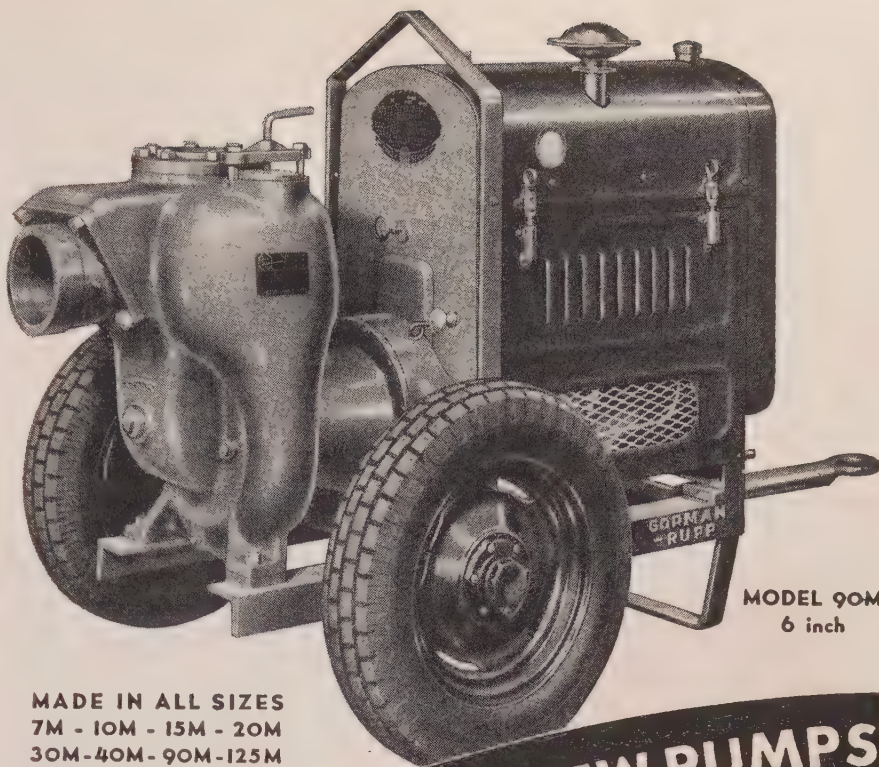
wheelbase is 150 in. The five speed transmission contains helical gears in all forward speeds, and spiral-bevel ring gears and pinions are provided in both front and rear axles. The YU is the second FWD model to feature the new FWD all-steel safety cab. The cab is of welded construction, three-point mounted to permit it to move as an independent unit, relieving the cab structure of strains when traveling over uneven ground. The new vacuum-operated center differential lock permits locking of the differential, providing positive power to both front and rear axles for climbing steep hills or plowing through mud or sand. For winter highway operation, the front skirting and bumper can be easily removed by taking out a few bolts, permitting mounting of every type of snow plow.

110

Extension Hand Light

Manufacturer: Neoline, Inc., Los Angeles, Calif.

Equipment: Hand light with many unusual safety features.



MODEL 90M
6 inch

MADE IN ALL SIZES
7M - 10M - 15M - 20M
30M - 40M - 90M - 125M

GORMAN-RUPP'S NEW PUMPS

CHALLENGE ANY PUMP TO MATCH THEIR PERFORMANCE

With a new complete line of Contractors' Pumps, Gorman-Rupp has topped their own past high record of performance with a better pump—

QUICKEST PRIMING — HIGHEST PRIMING PUMPS MORE DIRTY WATER

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And the Gorman-Rupp is still the most simple pump—no ports, no valves, no clean-out plates, nothing to cause stoppages.

*SEA LEVEL

Write for the new Contractor's
Bulletin 8CP-11

THE GORMAN-RUPP

Guarantee

Our distributor's are authorized to put a Gorman-Rupp Contractor's Pump on any pumping job, anytime, anywhere, alongside any other make pump, size for size. The Gorman-Rupp pump is guaranteed to pump more dirty water, more hours, using less gasoline, to prime quicker and at higher suction lifts than any other self-priming pump. If it isn't the best all around pump, our distributor will accept the return of the Gorman-Rupp pump and pay the user any installation expense incurred.

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Pacific Hoist & Derrick Co.	Seattle, Washington
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The Sawtooth Co.	Boise, Idaho
The Lang Company	Salt Lake City, Utah
Harron, Rickard & McCone Co.	of So. Calif., Los Angeles, Calif.
Francis Wagner Company	El Paso, Texas
Neil B. McGinnis Co.	Phoenix, Arizona
Fresno Equipment Service Inc.	Fresno, California
Bay Cities Equipment Inc.	Oakland, California
Nevada Equipment Service Inc.	Reno, Nevada
Moore Equipment Co.	Stockton, California
Studer Tractor & Equipment Co.	Casper, Wyoming
Western Machinery Co.	Spokane 11, Washington
John W. Stang Corp.	Bell, California

THE  GORMAN-RUPP COMPANY
MANSFIELD, OHIO

Features claimed: The Neogard lamp can be used in high voltage work or submerged in salt water without fear. All areas are made of non-metallic materials and the need for a ground is eliminated. Even the lamp guard contains no exposed metal parts. This guard throws off a red glow when lighted as a safety signal. A special triple seal assures its being completely waterproof and permits its safe use in underwater operations.

111

Rust-Inhibiting Chemical

Manufacturer: Calgon, Inc., Pittsburgh, Pa.

Equipment: Chemical additive to prevent corrosion of metals by salt used for ice and snow removal.

Features claimed: One part of the chemical, Banox, to 100 parts salt creates a protective film on metal surfaces against which the street brine is splashed. This film is tough, continuous and flexible, although invisible, and it forms in joints or wherever the salt reaches. The chemical is non-toxic, odorless, and harmless to the skin, eyes or clothing. It will protect against corrosion on bridges, guard rails, and other metal roadside structures, as well as the underbodies of vehicles.

112

Compacting Roller

Manufacturer: Gardner-Byrne Construction Co., Inc., Los Angeles, Calif.

Equipment: Grid-type roller for compacting fills, subgrades and base courses.

Features claimed: More efficient under certain conditions than the sheepfoot, the Grid Roller compacts from bottom to top without leaving a loose surface layer, and depresses or pulverizes oversize stones. The device is essentially a 5-ft. diameter wheel made of heavy cast steel segments that are individually replaceable. High pressure points are formed at the overlaid with clear openings adjacent to them, combining maximum compression with ample provision for movement of the individual aggregate particles into their most advantageous positions. At the same time, the movement is localized, thus avoiding material lateral displacement. Each unit contains a simple mesh-cleaning device, and provision for varying the weight of applied pressure is optional. The equipment is offered in 5-ft. width double section tow units which can be used singly or in multiple combinations.

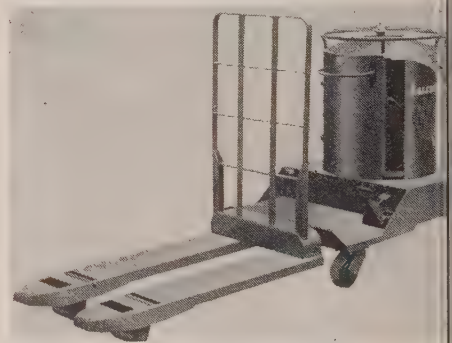
113

Materials Handling Truck

Manufacturer: Salsbury Corp., Los Angeles, Calif.

Equipment: Truck designed for use in factories or warehouses where operations are chiefly palletized.

Features claimed: The new truck is equipped with two 9-in. forks, 48-in. long and spaced 9 in. apart, with tapered forward ends for picking up practically any pallet. A 4-in. lift is provided for ample clearance above the floor and there's the widely spaced four-point suspension that characterizes the Salsbury Turreteer platform model. This truck is also fully articulated to permit handling pallet loads over sharply pitched irregularities in floor levels without danger to load stability. The truck can negotiate aisles but slightly wider than the pallet being handled and turns in its own length.



114

Propellor Shaft Box

Manufacturer: SKF Industries, Inc., Philadelphia, Pa.

Equipment: Rubber-cushioned shaft box to absorb vibration occurring in trucks operating at high speeds.

Features claimed: The device, which supports the shaft joining the transmission to the rear axle, consists of a housing whose outer and inner rings are separated by an oil-resistant rubber "cushion" and a self-aligning ball bearing free to move lengthwise in the shaft box. The rubber is held in place by mechanical friction, thus eliminating the need for vulcanizing.

115

Pneumatic External Vibrator

Manufacturer: Viber Co., Burbank, Calif.

How Pioneer Rubber helps Western Industry...

Make the chips fly

Make the chips fly from chipper to digester! *Speed* and more *speed*... for paper and more paper... tissue, kraft, newsprint, butcher, breadwrap, shipping containers for the Western market. Again **PIONEER RUBBER** research provides a belt that does the job month in, month out—16 to 20 hours a day. For continuous process paper production, and for material moving problems in every other industry, keep costs down and efficiency up with **PIONEER RUBBER** belting.

Meeting such demands of Western industry's particular problems has been the specialty of Pioneer Rubber Mills for more than 60 years.

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PIONEER RUBBER MILLS

353 Sacramento Street • SAN FRANCISCO 11, Calif.
BRANCH OFFICES: Los Angeles • Chicago • St. Louis

Equipment: Vibrator for use in the manufacture of many concrete products.

Features claimed: Weighing only 40 lb., the vibrator is 5½ in. in diameter and 12 in. long. It is adequately cooled by circulation of exhaust air through its housings and is so designed that it may be mounted at any angle. The correct amount of amplitude is obtained through proper selection of a rotating weight, available from a wide range of sizes. It is driven at the desired speed by regulating the air pressure.

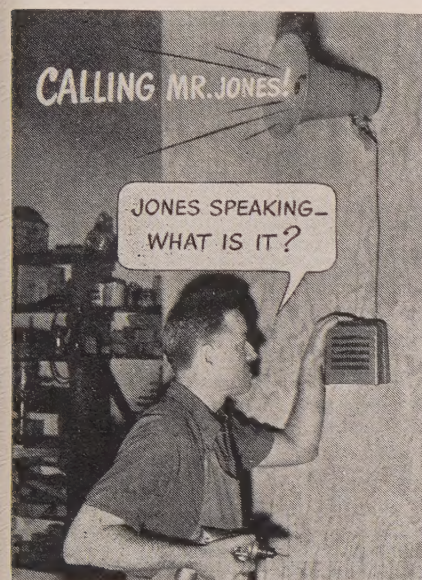
116

Intercom Circuit

Manufacturer: Executone, Inc., New York City.

Equipment: Intercom system to solve high noise level communication problems.

Features claimed: The new circuit combines the coordinated operation of a Trumpet type paging recorder and two-



way Staff station. When the system is used to page a person in a high noise level area, the page message is reproduced at high volume through the Trumpet station. To reply, the person called merely depresses a lever on the nearest conveniently located staff station. The Trumpet is automatically cut out and two-way conversation at normal voice level can be carried on between the person paged and the originator of the call.

117

Chain Vises

Manufacturer: Chain Belt Co., Milwaukee, Wis.

Equipment: Vises to simplify the process of taking roller chain apart.

Features claimed: The forged steel jaws of the vises securely hold the chain while properly applied blows with an ordinary drift will quickly remove the pin. Each vise has the jaws so shaped that the pin link to be removed has a firm seating on the edges of the jaws. The vises are easily adjustable to fit chains from ½ to 2-in. pitch.

118

Material Hauling Rig

Manufacturer: R. G. LeTourneau, Inc., Longview, Texas.

Equipment: The Tournahauler, a vehicle designed to haul heavy length loads such as pipe, timber, steel, etc.

Features claimed: Features of the new rig are the Tournamatic Torque Proportioning Differential, electric power steer permitting a full 90-deg. turn in relation to the rig, proper distribution of load on both front and rear wheels, and the elimination of exposed springs and other vital assemblies under the frame. 26,000-lb. pipe loads can be pulled through mud conditions so severe as to submerge the rear wheel hubs. With this piece of equipment, necessary loads can be moved to the job even during rains that would normally wash out operations.

119

Saw Shop

Manufacturer: DeWalt, Inc., Lancaster, Pa.

Equipment: Saw unit designed especially for small shops.

Features claimed: This unit is actually a complete saw shop in one machine. Featured is the one-h.p. motor driving a 10-in. diameter saw blade. Technical improvements include a heavy-duty roller traveling head riding on machined tracks inside the arm and mechanical aligning adjustments at all moving positions to maintain precision accuracy.

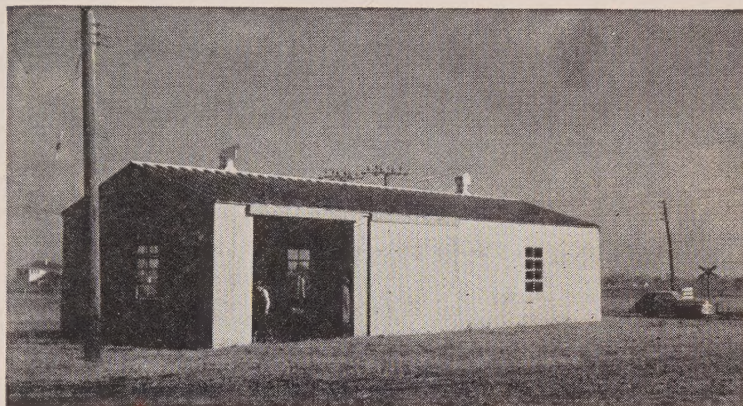
120

All-Wheel-Drive Trucks

Manufacturer: Marmon-Herrington Co., Inc., Indianapolis, Ind.

Equipment: New line of heavy-duty All-Wheel-Drive converted Ford trucks.

Features claimed: In building the new "Q" Series, Marmon-Herrington started with standard Ford F-7 models. The following changes were then made: The orig-



ever hear the one about the "TRAVELING BUILDING"

Ask any contractor who owns a Standard ARMCO STEELOX Building. He'll tell you how these economical, all-steel structures can be quickly and easily moved from job to job.

A small, unskilled crew can put up a STEELOX Building or take it down in a matter of hours. And even after several "moves" it will remain tight and dry.

But that's only part of the story . . . These sturdy, long-lasting structures are also ideal for permanent locations. They are fire-resistant and lightning-safe. Maintenance costs are low because paint lasts longer on the special galvanized ARMCO PAINTGRIP Steel.

You'll like STEELOX for field offices, tool sheds, garages, shops and similar uses. Write us today.

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ARMCO STEELOX BUILDINGS

Construction Approved: Uniform Building Code

inal front axle assembly was removed and new front driving axle installed; a new two-speed auxiliary transmission was installed; necessary changes were made in the steering assembly and brake connection; the frame was lengthened and reinforced and a third driving axle and wheel assembly was installed; tires were replaced for increased flotation, and special accessories were added for adaptation to special operations. Thus, the company presents the first heavy-duty All-Wheel-Drive ever offered in the medium price field.

121

Masonry Saw

Manufacturer: Martin Fireproofing Corp., Buffalo, N. Y.

Equipment: Dust-free, dry-cut masonry saw.

Features claimed: The "Fireproof" masonry saw eliminates the dust hazard by means of a powerful vacuum which collects dust particles from the brick or tile as well as at the rotating saw blade and filters the dust-laden air through a specially designed filtering bag. It will enable the constructor to capitalize on the speed, accuracy and efficiency of dry-cutting without costly delays for dust removal. Both the saw blade and the vacuum are powered by individual, 1½-h.p., 60-cycle A. C. electric motors, and the model is constructed as a single, welded all-steel unit.

122

Lubrication Grease

Manufacturer: Pennsylvania Refining Co., Cleveland, Ohio.

Equipment: Grease for truck wheels,

track idlers and support rollers of Allis-Chalmers "H-D Series" Track Type Tractors.

Features claimed: Marketed under the trade name of Penn Drake A.C. Track Roller Grease, the product appears on



Allis-Chalmers' list of approved lubrication for use in their equipment. It is reputed to possess good pumpability and cold temperature characteristics, to cling tenaciously and lubricate constantly without separation despite exposure to weather, moisture and other extreme service conditions. The base is a solvent-treated high

viscosity index oil and contains an antioxidant.

123

Pile Driver Hose

Manufacturer: United States Rubber Co. New York City.

Equipment: Oil resistant, high pressure steam hose for pile drivers.

Features claimed: The hose is especially designed to withstand the deteriorating effects of a combination of steam and heat which occurs when lubrication is applied to pile driving tools through steam pressure lines. It is constructed of a rubber core, two or three plies of braided steel wire, one ply of asbestos cord, and a heat resistant rubber cover. The braided wire construction gives it unusually high bursting strength and acts as an armor to withstand heavy external abuse.

124

Reversible Power Shovel

Manufacturer: Stockland Road Machinery Co., Minneapolis, Minn.

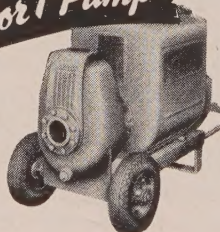
Equipment: Reversible rear end power shovel for hydraulically equipped tractors.

Features claimed: The Hydro-Scoop, a 10-cu. ft. shovel that uses hydraulic power to scoop or shovel, lift, carry and dump earth or other bulky products. The reversible feature makes it easy to get the shovel in close to buildings, fences, etc. Loads can be dumped in a pile or spread and leveled. The shovel fits International H or M as well as Ford, Ferguson, John Deere A or B and Leader tractors, and a special hitch adapts it to fit International's new Model C tractor.



THERE'S NO BETTER TIME THAN NOW TO SWITCH TO BARNES

**The 33,000 for 1" Pump*



* Delivers 33,000 gallons of water on one gallon of gasoline.

Distributed By:

Lee & Thatro Equipment Co., Los Angeles, Calif.

The Rix Co., Inc., San Francisco, Calif.

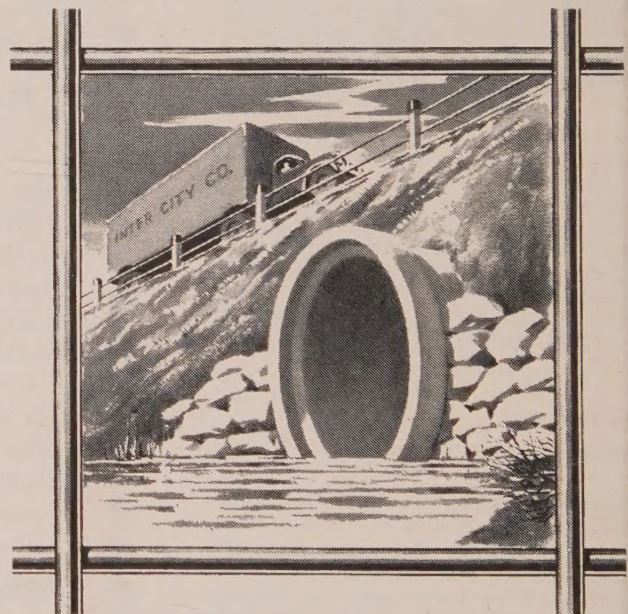
The C. H. Jones Equipment Co., Salt Lake City, Utah

H. W. Moore Equipment Co., Denver, Colorado

R. L. Harrison Co., Inc., Albuquerque, New Mexico

The O. S. Stapley Co., Phoenix, Arizona

BARNES MANUFACTURING CO., MANSFIELD, OHIO



Built to Endure...

**Concrete Pipe Reinforced with
CLINTON WELDED WIRE FABRIC**

Among Other CF&I Products: Reelock Fence, Wickwire Rope, Cutting Edges for Scrapers, Dozers, Graders & Snowplows.

The Colorado Fuel and Iron Corporation
General Offices: Denver, Colorado

Pacific Coast Sales: The California Wire Cloth Corporation, Oakland, Calif.



LITERATURE FROM MANUFACTURERS...

Copies of the bulletins and catalogs mentioned in this column may be had by addressing a request to the Western Construction News, 103 Market Street, San Francisco 5, California.

125

CONVEYOR CATALOG — The Jeffrey Manufacturing Co., Columbus, Ohio, has published a 168-page catalog which is virtually a handbook on the subject of belt conveyors. Many conveyor problems can be answered by using a standard conveyor and this catalog provides a complete selection of Jeffrey Standardized Units. These standardized units have been so indexed and classified that by referring to the proper tables it is easy to determine the correct conveyor to suit a given need. There is also listed a complete line of anti-friction idlers in cast iron or steel, to meet any service requirement. All other necessary equipment usually required in the application of belt conveyors, such as belting, trippers, take-ups, and power transmission machinery is also listed. Photographs, cut-away drawings and specification charts amplify the text.

126

WELDING APPARATUS — Tweco Products Company, Wichita, Kan., has published two new bulletins. The new two-page bulletin entitled "Causes and Cures for Hot-Running Welding Cables and Connections" simplifies for easy understanding the arc welding process. Individuals charged with operating and maintaining welding cables will find many helpful hints to every-day problems. The second release is a 12-page "Twecolog" which fully describes the complete line of Tweco Welding Electrode Holders, Ground Clamps, Cable Connectors, Machine Terminals, Cable Splicers, Lugs and Carbon Holders. Quantity price and parts information is included. The bulletin shows new models.

127

VELOCITY POWER DRIVER — Mine Safety Appliances Co., Pittsburgh, Pa., has published a color leaflet describing the details of operation of the Velocity-Power Driver Model B which anchors pipe hangers and conduit boxes to structural plate or concrete. This 4½ pound tool utilizing the discharge of a blank cartridge as its only source of power was introduced at the National Metal Trades Congress in the latter part of 1947. Photographs of the driver in action and pictures of its various parts simplify the text.

128

WROUGHT IRON — A. M. Byers Company of Pittsburgh, Pa., has just made available for distribution a 20-page illustrated booklet that described wrought iron, oldest ferrous metal known to man. The title is "The ABC's of Wrought Iron." The booklet tells in non-technical terms what wrought iron is, why it resists corrosion and withstands shock and vibration, how it is made, and how it is bent, welded and threaded. The various services for which wrought iron pipe and plates are used in the industrial, railroad, sewage and waterworks, construction, refrigeration, marine and plumbing and heating fields also are depicted.

129

PORTABLE ENGINE DRIVEN COMPRESSORS — Schramm Inc., West Chester, Penna., have recently released

Bulletin #4801, which describes the complete line of Schramm Portable Engine Driven Compressors. These compressors are built in sizes ranging from 105 to 420 cu. ft. of actual air and include both gasoline and Diesel engine driven units featuring the In-Line construction which brings all the points of production and maintenance to the outside within easy reach of the operator. Photographs, blueprints and compressor and engine specifications are given for the various units. Schramm live hose reels and tools are also pictured and described.

130

TERRA-COBRA EARTHMOVER — Wooldridge Manufacturing Company, Sunnysvale, Calif., has released a 12-page bulletin illustrating and describing the improved operation and construction features of the Wooldridge Terra-Cobra high-speed self-propelled earthmovers. Descriptive data is combined with on-the-job photo-

graphs. The positive two-wheel hydraulic steering action, plus the flexibility articulated oscillating king pin pivot are among the features covered in detail by the new bulletin.

131

FOR BETTER HIGHWAYS — Littleford Bros., Inc., Cincinnati, Ohio, has released a well illustrated, green and black broadside, "4 Units for Better Highways." The Spray Master pressure distributors, road brooms, "tankar," steam heater, and supply tanks are described; the function of each unit and the difference in the various models is explained.

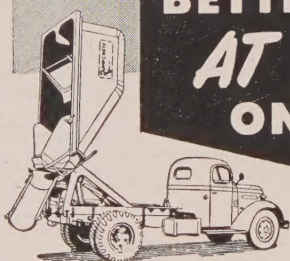
132

EXCAVATORS — Insley Manufacturing Corp., Indianapolis, Ind., has put out an eight-page color booklet covering the Insley Model K-12 with complete detail and specifications. The type K-12 shovel, hoe, dragline, crane, clamshell and lorry

IN
DENVER
IT'S
DUMPCRETE
CONCRETE*
AGAIN!



BETTER CONCRETE
AT LOWER COST...
ON ALLEY PAVING JOB

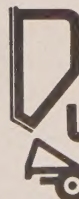


The Dumpcrete Body

Lightweight, watertight, loads fast, dumps fast or slow, places anywhere, costs less to buy and run. Ideal for hauling aggregate, coal and earth.

...

* **Dumpcrete Concrete** is central-mix air-entrained concrete hauled and placed with the speedy, low-cost Dumpcrete. Provides top-quality, plastic, workable and non-segregating concrete, saving up to \$1.00 per yard.



DUMPCRETE DIVISION

MAXON CONSTRUCTION CO., INC.
515 Talbot Bldg., Dayton 2, Ohio

M. R. Latimer of Denver is getting compliments on his low-cost Dumpcrete Concrete. He writes, "The city inspector says our concrete is superior to that mixed in transit."

Latimer mixes his air-entrained concrete at a central plant where the mix can be carefully controlled. "After a recent 13-mile, 35-minute haul," he reports, "concrete was well-graded and uniform, with no surface water on the load; and it could have been hauled a lot farther without segregation."

"Best of all," he continued, "our overall costs have been substantially reduced."

Concrete men in 42 states are getting better concrete at lower costs with the Dumpcrete. You can too. Write for more information.

specifications and working range dimensions are given. Drawings to scale of each type excavator are also pictured.

133

LIFT TRUCKS AND CRANES — Hyster Company of Portland, Ore., has sent off the press a condensed lift truck catalog which describes, pictures and lists specifications on the complete line of Hyster lift trucks, straddle trucks, and mobile cranes, all specially designed for operation on pneumatic tires. All of the trucks are powered by gas engines and vary in capacity from 2,000-lb. lift to 30,000-lb. lift.

134

RUBBER-TIRED DOZERS — R. G. LeTourneau, Inc., Peoria, Ill., has prepared a new broadside, illustrating and describing the new, big rubber-tired Model C Tournadozer. The large folder opens to 23 in. by 33 in., and illustrates photographically how the speed and mobility of the C Tournadozer can be used to advantage on stockpiling, backfilling, pusher loading and stripping. All of the new design features in this high-speed 'dozer are explained by large-size job action photos.

135

TRACTOR POWER—Allis-Chalmers Manufacturing Co., Tractor Division, Milwaukee, Wis., has just released a six-page folder describing the new HD-19 Torque Converter tractor. A three-page center spread heralding the HD-19 as the "World's Largest, Most Powerful Tractor" lists many of the new unit's prominent features. Another part of the brochure provides illustrations of the tractor's large comfortable operator platform, its six-cylinder General Motors engine, and a cut-away view of the truck wheels which require greasing attention only once every 1,000 hrs. A pictorial page of on-the-job views portrays application of the HD-19 on a variety of jobs such as stump removal, road building, logging, bulldozing, and earthmoving with scrapers. A full page of specifications relative to engine construction, steering design, speeds and drawbar pull, and general dimensions of the new tractor completes the folder.

136

SIMPLIFIED ARC WELDERS—The Hobart Brothers Company of Troy, Ohio, now has available a new 36-page, three color catalog containing illustrations, descriptions, dimensions and specifications on its complete line of "Simplified" arc welders which include electric motor driven DC welders in 5 sizes from 150 to 600 amperes; gasoline engine driven welders in 4 sizes from 200 to 600 amperes; AC transformer

type welders in 3 sizes from 200 to 500 amperes; welding generators only in 4 sizes from 150 to 400 amperes; gasoline engine driven welders with auxiliary AC or DC power generators; and other models in all sizes for special arc welding applications. Various features comprising the machines are individually illustrated and described, and helpful information is given for various welding problems. Also listed is the complete line of Hobart arc welding electrodes and accessories.

137

TYPE 604 — Lima-Hamilton Corp., Lima, Ohio, has recently published a new 24-page bulletin containing a complete, detailed description of the Lima Type 604 shovel, crane and dragline. Many illustrations are contained in the bulletin showing details of construction and operating advantages including the application of "precision" air control. Liberal space is given to specifications, capacities, and working ranges. As a shovel the Type 604 has a capacity of 1½ cu. yds.; as a crane, 30 tons; and as a dragline, variable.

138

SHEETS AND SCRAPERS — American Tractor Equipment Corp., Oakland, Calif., announces the publication of new specification sheets on their lines of land-leveling scrapers, bulldozers, roadbuilders, and hydraulic P.V.T. assemblies. The sheet contains photographs of the equipment, as well as detailed information on construction and operating features. A four-page illustrated bulletin discussing the new two-wheel scrapers has also just been published. Designed for high-speed use with wheel tractors, the open-top scrapers feature a low center of gravity, independent front apron, and a rear apron that cleans the scraper bowl sides as the load is dumped.

139

PILE HAMMER — McKiernan-Terry Corp., New York City, has available a revised edition of their bulletin on Double-Acting Pile Hammers and Extractors. The bulletin has been given a new cover, a new section of operating instructions, revised specifications and a new page of anvils and base attachments. Ten sizes of hammers are illustrated along with full specifications, dimensions and lists of duplicate component parts.

140

No. 60 CRAWLER — Schramm, Inc., West Chester, Pa., has released a color-bulletin covering the new Schramm No. 60 Crawler, a unit designed for maintenance and construction engineers who want utility and flexibility. The No. 60 Crawler

packs the power for a variety of pneumatic tool jobs and many other emergencies. This model is a versatile unit that not only excels in furnishing air for pneumatic tools, but offers in addition the possibilities of operating many other attachments, some of which are illustrated on the back page of the bulletin, as well as the tractor feature that lends itself to towing, climbing and pushing.

141

GENERATOR PRODUCTS — Motor Generator Corp., Troy, Ohio, has just released a black and white folder covering a review of the company's products that are now being offered for sale. Included are motor generator capacities ranging from ½ to 20 kw., metal-plating equipment; metal coloring and finishing and finishing equipment; materials handling equipment; electroplating; railway battery charging equipment; special battery chargers; electronic power units; buffers and grinders; air compressors; magnet service generators; modern aviation service equipment; and automotive battery charging equipment. This folder illustrates and describes the complete line of products.

142

WIRE ROPE SLING—A. Leschen & Sons Rope Co., St. Louis, Mo., recently issued an 8-page two-color bulletin giving details of the "HERCULES" Red-strand Flat-Laced Wire Rope Sling, which is a sling made of six parts of wire rope laced together to form a flat, strong and flexible lifting device. The booklet gives details of design, advantages and applications, photographs and diagrams of the various types of loops, thimbles and hooks. Specifications charts amplify the text.

143

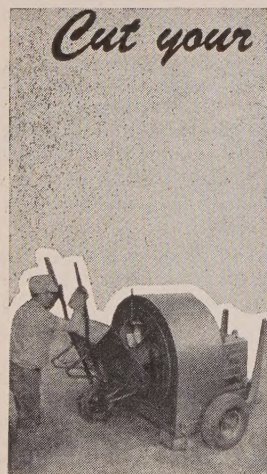
MORSE-FORMSPRAG CLUTCHES —Morse Chain Co., Detroit, Mich., has a 16-page, 2-color catalog ready for distribution describing the construction, development and working principle of the new Morse-Formsprag Full Complement Over-Running Clutch. The catalog gives engineering diagrams of special designs at work with the clutch integrated within the designs. Successful applications described include jet aircraft engines, press roll feeders, generators, blower fans and many other versatile drive mechanisms.

144

AIR METER FOR CONCRETE TESTING — Charles R. Watts & Co., Seattle, Wash., Western distributors of Dares AEA, have available a 6-page folder on determining the air content of fresh concrete by use of the Roll-A-Meter, a precision instrument utilizing the rolling method in testing for entrained air by washing the air out of the concrete. The instrument is multiple purpose, being also used for making specific gravity tests, mortar tests and aggregate moisture determinations.

145

SCRAPERS — LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa, has made available two new folders illustrating and describing the hydraulic and cable-operated scrapers. The hydraulic scraper pamphlet shows many action pictures of the company's four-yard scraper at work on a variety of jobs and describes the type of work to which the scrapers are best adapted. It illustrates how the two-wheel scraper can be used with most types of industrial rubber-tired tractors of sufficient draw-bar horsepower while the four-wheel scraper can be used with any track-type tractor within 35-55 draw-bar horsepower range. The pamphlet is a practical textbook on scraper design.



Cut your Asphalt Costs on those small mix jobs!

The Foote Kinetic Asphalt Mixer with its new mixing method will give you eight to ten batches more per barrel of asphalt.

This will soon pay for the mixer! It can be towed behind any truck or car, handles any cold mix without additional equipment and can handle hot mixes in conjunction with kettles.

Capacity 3 cu. ft. in 30 seconds. Ask for Bulletin K-100.

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