WESTERN CONSTRUCTION NEWS

CIVIL ENGINEERING AND CONSTRUCTION IN THE FAR WEST

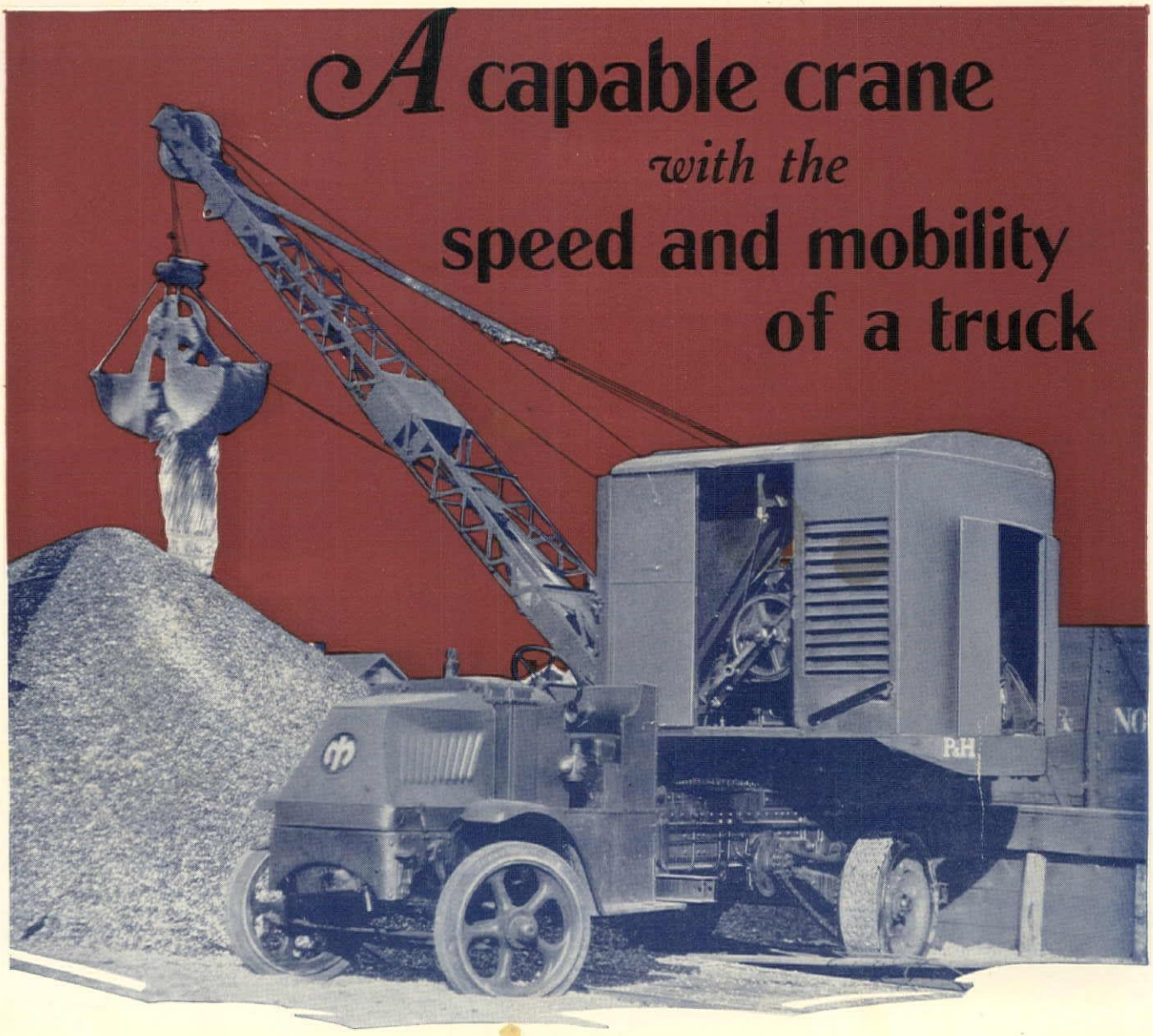
PUBLISHED SEMI-MONTHLY
VOLUME V NUMBER 1

SAN FRANCISCO, JANUARY 10, 1930

25 CENTS A COPY
$3.00 PER YEAR

SAN CLEMENTE DAM, CARMEL RIVER, FOR MONTEREY COUNTY WATER WORKS, CALIFORNIA

A capable crane *with the* speed and mobility of a truck



P & H TRUCK CRANE

HERE is the most versatile material-handling unit conceivable. Many present difficulties will vanish when you put a Truck Crane on the job. It is as mobile as any truck . . . just as speedy. It can be used on the ground, on a car or, in fact, anywhere a truck can go. It is a sturdy P & H ½-yard Crane, gasoline operated and with fast line and swing speeds.

Add one of these capable P & H Truck Cranes to your present equipment and see how it will lower handling costs all down the line. You will find that this crane can profitably handle scattered jobs on which you could not afford to put a large crane.

Descriptive literature on request.

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Established 1884

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ROBERT M. TAYLOR, *Pacific Coast Manager*

Service Stations, Complete Repair Part Stocks and Excavators at San Francisco, Los Angeles and Seattle, Wash.

A Complete Line of Crawler Cranes—Capacities from ½ to 3½ cu. yds.

Let's GO!

AT LEFT: East Bay Water Company, Oakland, digging pipe ditches with *Rix* 6. CENTER: One of several *Rix* sixes operated by Griffith Company, Los Angeles, in road construction. AT RIGHT: Pacific Gas & Electric Co., San Francisco, breaking paving with *Rix* power.

FIGHTERS will win in 1930. Are you ready? If you want to be sure of *profit* you've got to be sure of your *equipment.* RIX "SIX" Compressors (equipped with patented *Super-Chargers*) will enable you to figure closer, operate cheaper, work faster. In 52 years of service these stalwart pioneer rigs have met and conquered every problem and condition a rugged West could impose upon building equipment. And RIX *"Express"* service goes with every RIX rig. Start 1930 with equipment you can *depend* upon; equipment you *know* will help you cut cost, save time, and increase profit. Let's go. Write NOW for Bulletin 8-N.

The RIX CO., Inc. - San Francisco Los Angeles Portland Seattle

SINCE 1877

The *Pioneer* RIX line includes vertical and horizontal compressors in all sizes for all purposes, compressor service and supplies, and pneumatic tools. RIX is the only compressor equipped with the *Super-Charger* (patented). Rix Co. are also agents for COCHISE Drills, and exclusive distributors for THOR Pneumatic Tools in Los Angeles and Seattle territories.

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You need AIR
You need RIX

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VOLUME V JANUARY 10, 1930 NUMBER 1

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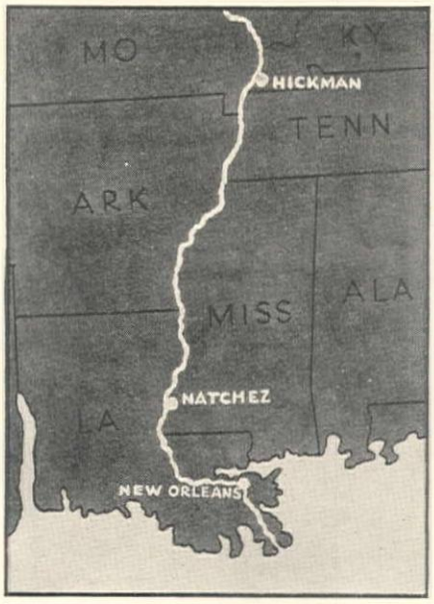

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2 plants—U. S. Engineers
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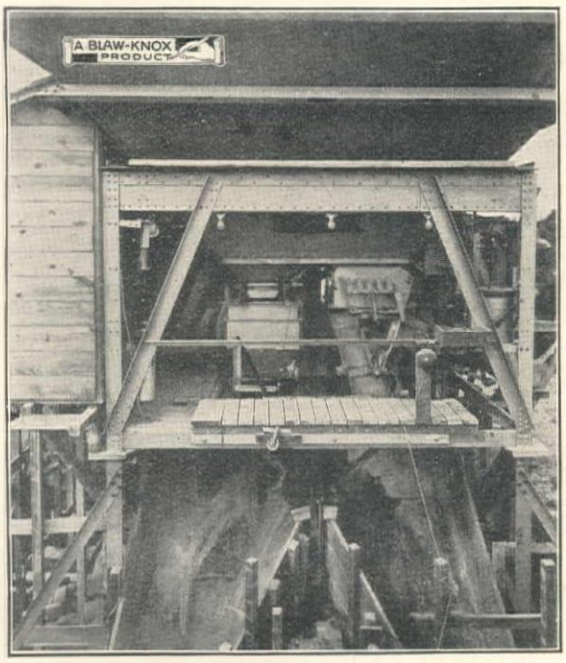
ALONG *the Mississippi*

INUNDATION

is the curse and the cure . . . .



This Blaw-Knox Central Mixing INUNDATION Plant is arranged to feed two mixers.

"Old Man River's" own life's blood will throttle his yearly depredations.

For the scientific use of water to saturate sand is the basis of the Blaw-Knox INUNDATION System for constant, high-strength, easily workable and economical concrete.

FIVE Blaw-Knox Central Mixing INUNDATION Plants are now being used by United States Engineers and private contractors to combat floods with the construction of an extensive series of concrete revetments and spillways.

This flood prevention program requires that *high-strength, durable* concrete be used.

The Blaw-Knox Inundation System is a complete and efficient proportioning machine, controlling water-cement ratio, accurately proportioning aggregates and compensating for the bulking action of moist (job) sand.

Completely described in Bulletin No. 996—a copy of which will be sent upon request.

In the selection of the Blaw-Knox Inundation System and Blaw-Knox Central Mixing Plants, the engineers and contractors who are waging this war against the Mississippi reflect and justify the opinions of other contractors and engineers throughout the world who have used INUNDATION on thousands of concreting jobs.

TRADE MARK. REG. U.S. PAT. OFFICE. BLAW-KNOX

BLAW-KNOX

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Send me a copy of Bulletin No. 996—"The Blaw-Knox Inundation System."

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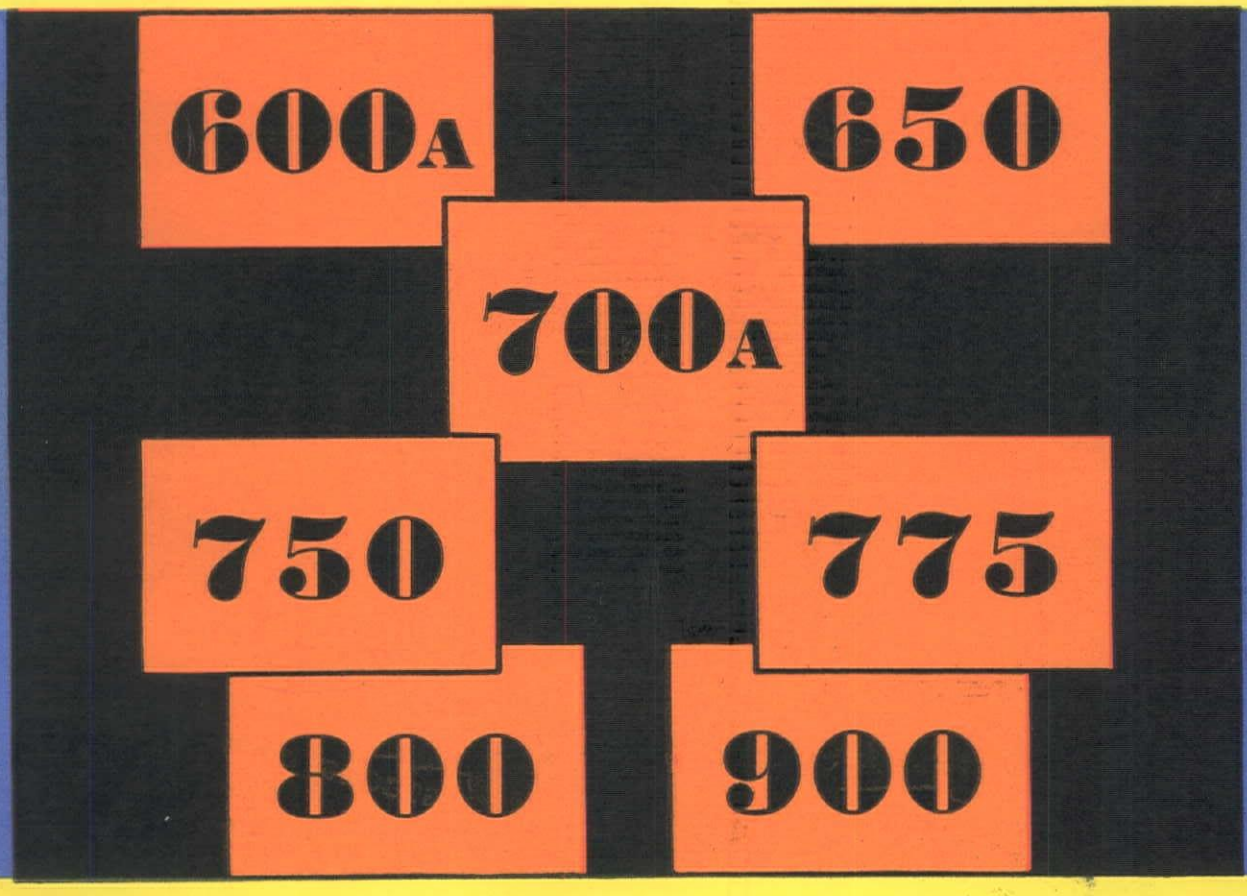
7 NEW

P&H EXCAVATORS

with performance-proven features



Backed by the experience gained in building . . .

3000 GAS and DIESEL EXCAVATORS

P&H

Performance Building over

Diesel Economy

All new P & H machines can be provided with Diesel engines. These engines have proved themselves thoroughly dependable in excavator service for more than six years.

The P & H Diesel uses cheap fuel . . . costing one-third to one-half as much as gasoline. Only one-half as many gallons are consumed with the Diesel, reducing fuel cost from 75 to 85%. In addition the Diesel will turn out from 10 to 15% more yardage because it pulls through heavy digging without stalling. The torque actually increases when speed is slowed down below 50% of normal.

During the past 16 years, 3000 P & H Gasoline and Diesel Excavators have gone into service—many more than any other make.

The new P & H models are the result of this long experience. All have many performance-proven features. See opposite page.

A P&H for every purpose

Proven Features Perfected in 3000 GAS and DIESEL Excavators . . .

COMPLETE

These seven new machines complete the famous P & H Line of full-revolving excavators, which also includes these performance-proven models:

300A ½ Yd.

400 ¾ Yd.

1. *New Diesel Motors*—Fully enclosed, dust-tight—10 to 15% more yardage than gas machines—75 to 85% lower fuel cost.
2. *Improved Chain Crowd* with high speed return—greatly increased yardage output.
3. *Fish-Belly Shovel Boom*—The fish-belly type gives greater strength and rigidity.
4. *New Shock-Absorber Power Clutch*—Shock absorbing springs assure finer control and prevent band breakage.
5. *Improved Swing Clutches*—No sticking, no jerking.
6. *Roller Bearings* for more efficient power transmission.
7. *Unit Cast Steel Construction*—Car body, revolving frame, side stands and traction frames are single piece steel castings, assuring rigidity.
8. *Motor Mounted Directly on Revolving Base*—Perfect alignment with main machinery at all times.
9. *Mobile, Non-Clogging Tractions*—Double sprocket drive, bushed links, two speeds.
10. *Effective Steering*—Machines steered from cab in any position. Steering brakes permit turning in either direction in long or short radius.
11. *Alloy Steels*—Liberally used at points of greatest stress.
12. *Cut Gearing, Ground Shafting*—Assure minimum friction loss and wear.
13. *Safety Worm Boom Hoist*—Provided with special safety brake. The safest type known to engineers.
14. *Trussed Type Crane Boom*—Exceptional rigidity. Lighter than any other boom of equal strength.
15. *Quickly Convertible*—Into shovel, crane, dragline, trench-hoe or skimmer-scoop.

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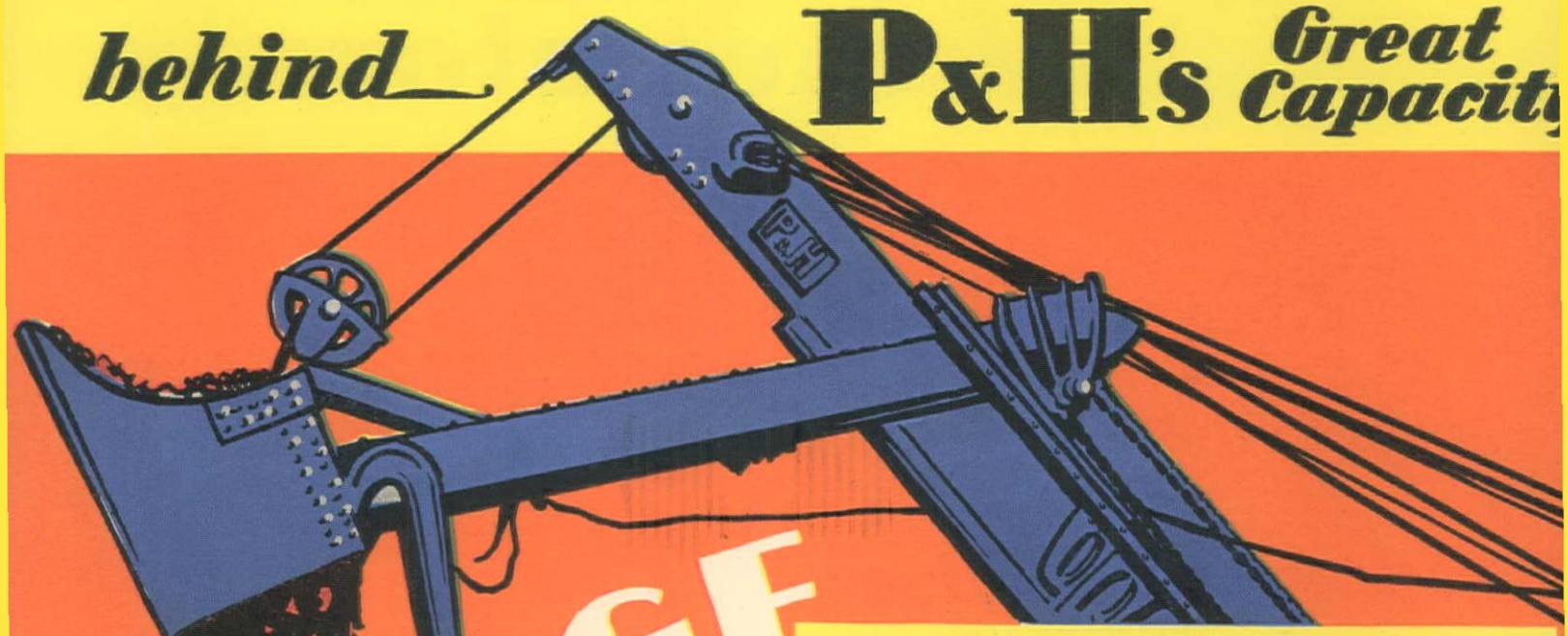
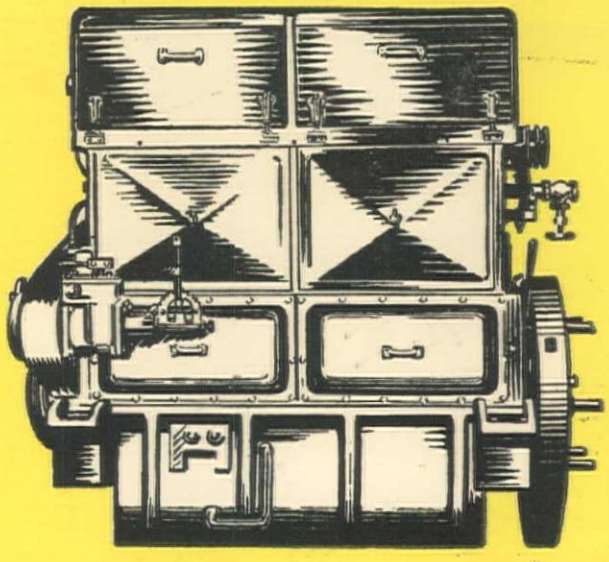
FULL DIESELS
behind P&H's *Great Capacity*



YARDAGE



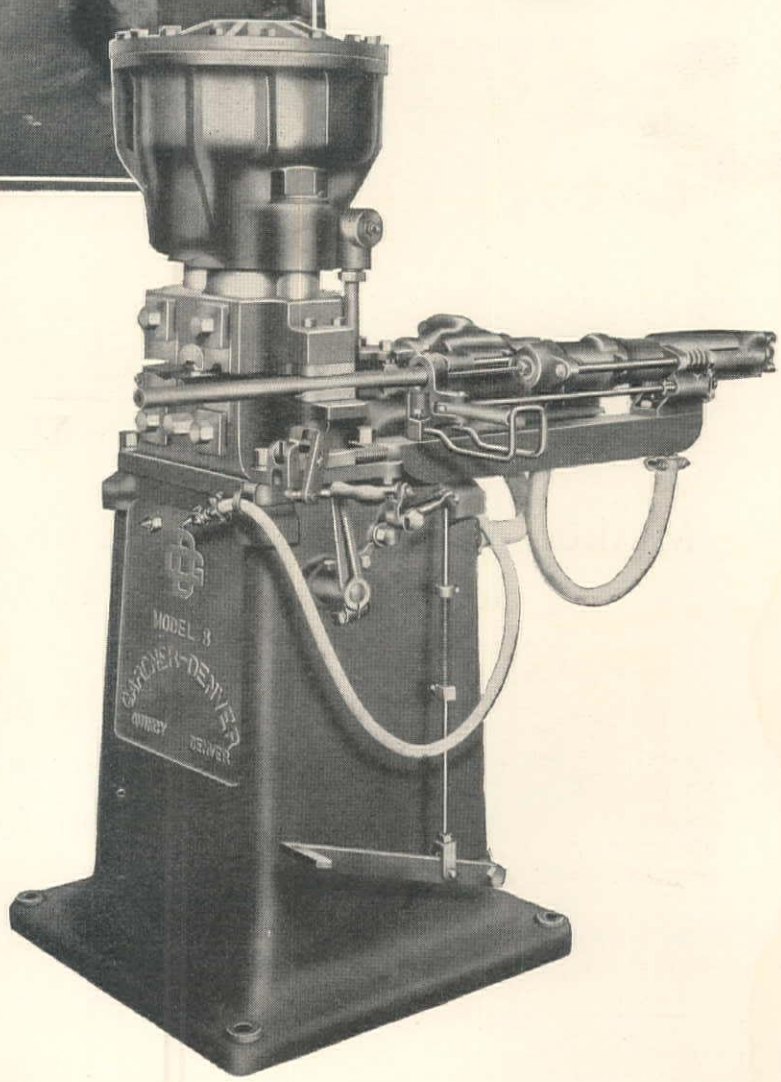
Behind P & H's Big Yardage

Diesel power is the modern power for excavators. Shovels, Cranes and Draglines powered with Atlas Imperial Diesels* are the cheapest, fastest dirt-moving machines ever conceived. Burning cheap, low-grade fuel oil, costing only ⅓ to ¼ as much as gasoline—and consuming only ½ to ⅓ as much—fuel savings of 75 to 85 per cent are made. Under heavy load, and consequent lower speed, where a gas engine normally stalls, the Atlas Imperial Diesel lugs. As it is thus pulled down in speed, its lugging power (torque) is uniquely increased. Because, with its common rail fuel system, proper atomization is maintained in the Atlas Imperial Diesel under all speeds. First to adapt and prove the full Diesel engine for excavators, more Atlas Imperials are being used for this service than all other Diesel engines made.

***Made by the Atlas Imperial Diesel Engine Co., Oakland, California**

For Sharp Drill Steel

Model DS-8 Sharpener



FOR many years the Model DS-8 has met all requirements of discriminating users of Drill Steel Sharpeners the world over. Although continually improved as time has gone by, no major or radical change has been necessary to keep this machine abreast of the times. The purchase of a Model DS-8 is equivalent to the purchase of perfect drill bits and shanks in large daily quantities at very low cost for operation and maintenance.

Combined with a Model HP-20 Bit and Shank Punch and supplemented by a Model DF-1 Oil Forge, the Model DS-8 makes an ideal installation where a large quantity of drill steel is required.

Write for Bulletin

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ROCK DRILL DIVISION
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Sales Offices Throughout the World

GARDNER-DENVER

Here it is...

A brand new Le Roi 4 Cylinder Engine . . . that is compact and sturdy, a job capable of developing a maximum of horsepower under capacity load . . . unquestionably the acme of engineering skill . . . that's Le Roi's newest triumph in gasoline engine design.

Think of it... this new engine is ball bearing equipped... it will develop 7-12 h. p. This engine is lighter in weight than two cylinder models of less horsepower, while it is small in size, still it has all the elements of strength and power. And with all this, it will be placed on the market in the range of 2 cylinder prices. Let us send you complete details.

LE ROI CO., Milwaukee, Wis.

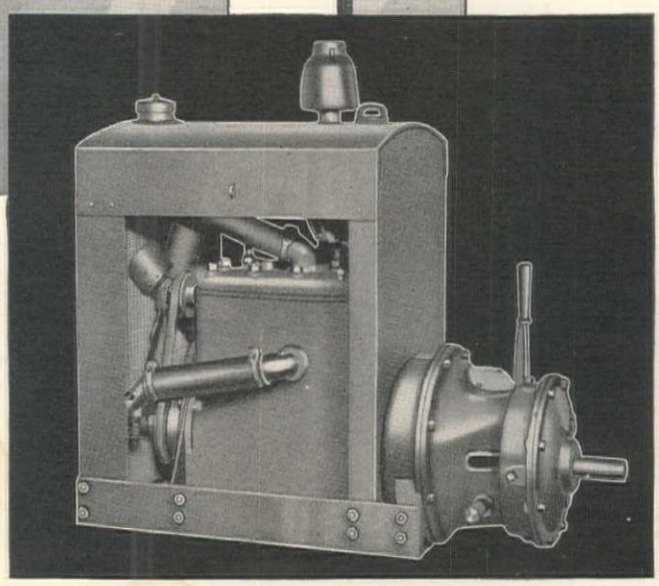
The New LE ROI

BALL BEARING EQUIPPED

4

CYLINDER ENGINE

A 4 CYLINDER ENGINE IN THE PRICE RANGE OF A 2



LE ROI ENGINES

for dependable power!

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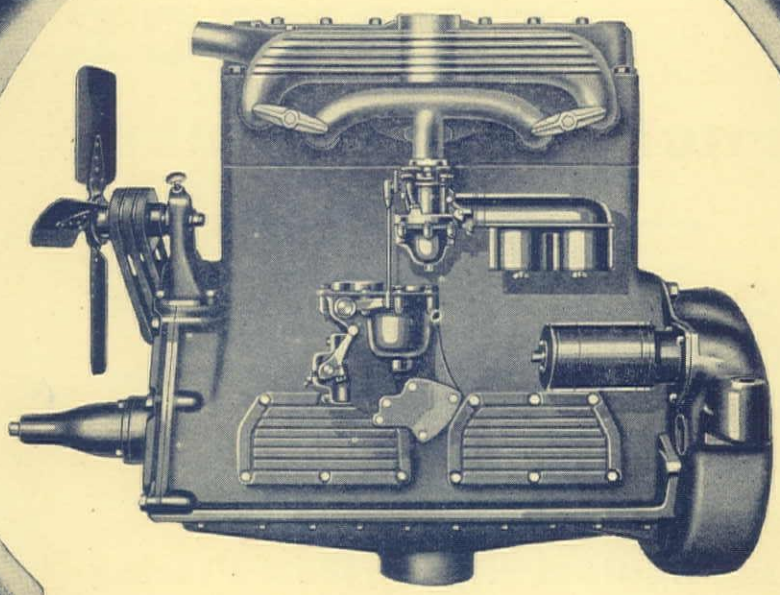
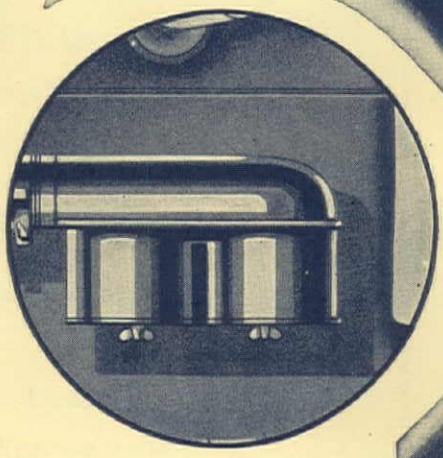
{SEE EIGHT JENISON MACHINERY COMPANY PAGES FOLLOWING}





THE rapid progress which Heavy Duty Continental Engines are making in the industrial field is a striking indication of their real worth to contractors and other users.

Marked by a time-tested reliability, and characterized by a steady flow of power which brings results, Heavy Duty Continental Engines are factors in pushing up the production curve and adding steadily to the daily profits.

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Continental Engines

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Smashing Power in the THEW LORAIN 75B

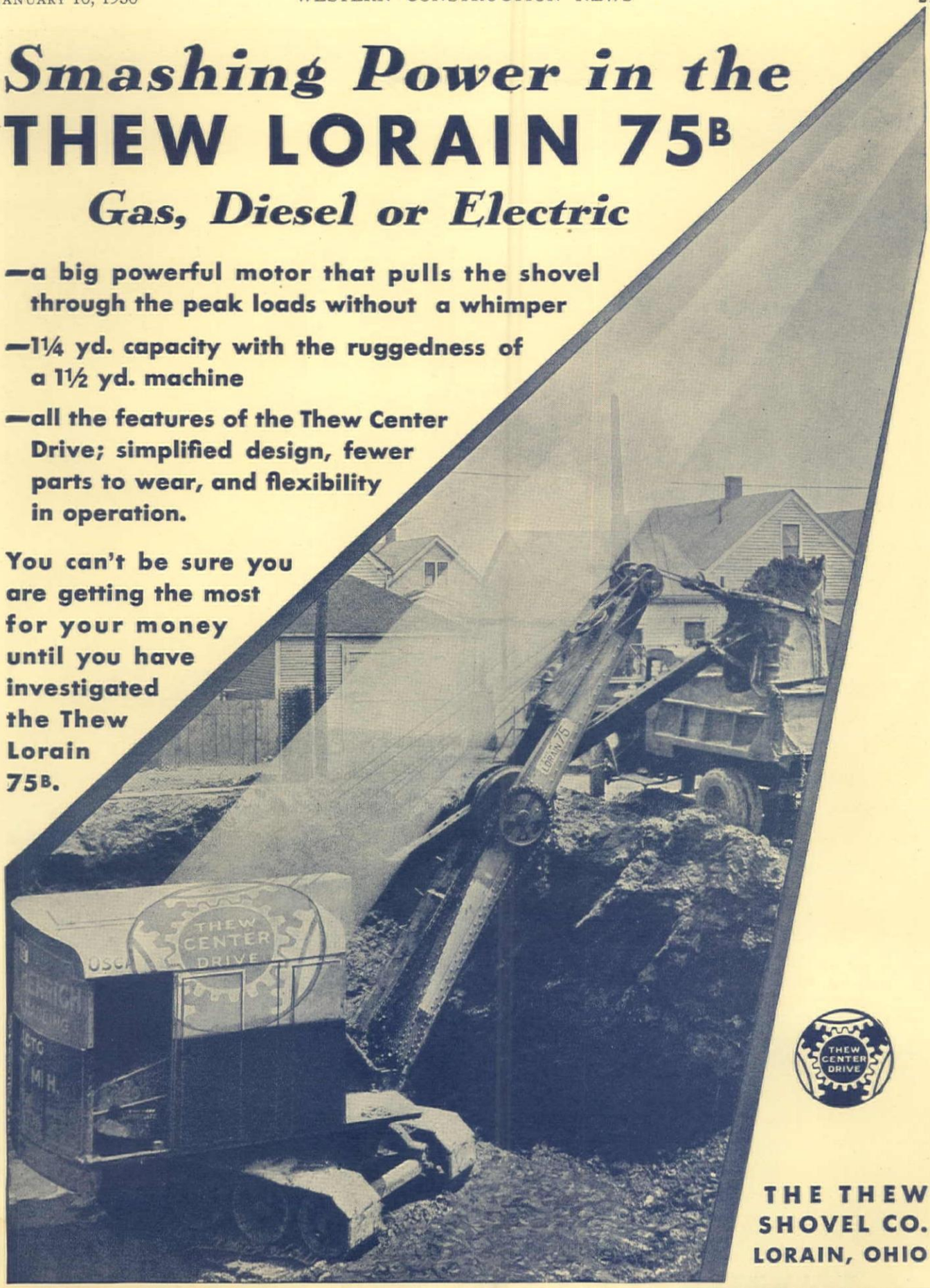
Gas, Diesel or Electric

—a big powerful motor that pulls the shovel through the peak loads without a whimper

—1¼ yd. capacity with the ruggedness of a 1½ yd. machine

—all the features of the Thew Center Drive; simplified design, fewer parts to wear, and flexibility in operation.

You can't be sure you are getting the most for your money until you have investigated the Thew Lorain 75B.



THEW CENTER DRIVE

THE THEW SHOVEL CO. LORAIN, OHIO

THEW LORAIN

★ LOCAL STOCKS JENISON MACHINERY COMPANY AND SERVICE ★

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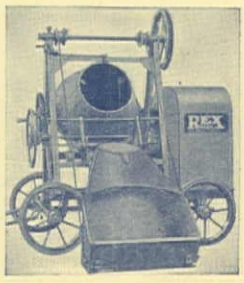
For Small High-Speed Concrete Mixing

Built to give Contractors the Value Desired

THE REX half bag Tilter with its low original price, its low upkeep, its unusual high speed and low operating costs is the contractors assurance of bigger profits for many seasons to come. It is actually faster than the ordinary tilter. Its drum in charging position is only 43 inches from the ground — for faster and easier shoveling. The big handwheel tilts the drum quickly and easily. All Rex Tilters have spring mounted axles for fast safe traveling. Each part of the mixer is built extra strong and of the finest materials. If contracting profits are considered and value is desired, this half bag Rex Tilter is a necessity on every small concrete job. That is why there are so many Rex Tilters working in every state in the Union. If you do not already own a Rex Tilter send for a new catalog and check these points for yourself.



The Rex Half Bag Tilter with Power Loading Skip

REX MIXERS

REG. U.S. PAT. OFF.

20 Years of Manufacturing Construction Equipment

JENISON MACHINERY CO.

58 Fremont Street , , San Francisco, Calif.

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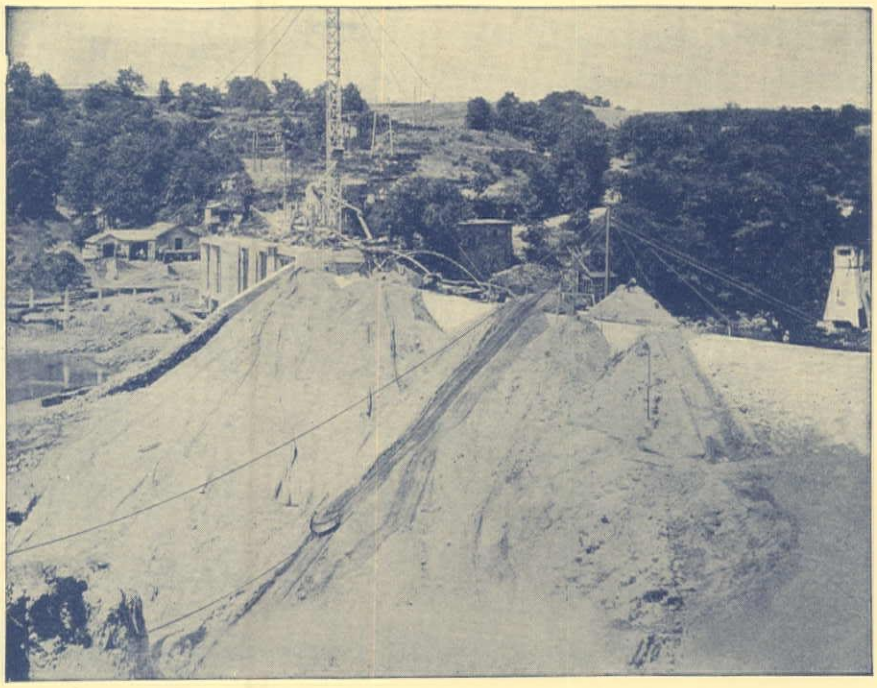
"On the Job" Views of Sauerman Scrapers

SAUERMAN *Scraper with Self-Propelling Head-Tower on Embankment Work*

Small SAUERMAN *Scraper Cutting a Grade Along Side of Hill*

Making a Long Cut-and-Fill



Constructing an Earth Dam

A Powerful, Low-Cost Excavator

with a Wide Range of Usefulness

FOR digging gravel from a bank, making a cut-and-fill, grading rough land, or doing any work where material has to be excavated and hauled a distance of several hundred feet, there is no machine quite the equal of a Sauerman Power Drag Scraper. Excavating and conveying are merged into one when you use this machine. Your equipment investment is less, your operating expense is less.

One man operating a Sauerman Power Drag Scraper will dig and move 150 to 4000 cu. yds. of earth materials per 10-hour day, these figures representing the capacity range from the smallest portable units to the big Sauerman stripping and levee-building machines equipped with scraper buckets which will take 10 cu. yds. at a "bite."

The "Crescent" scraper bucket, which is an exclusive feature of Sauerman installations, possesses remarkable digging force and great strength; at the same time it is light in weight and will handle a given tonnage of material with less power than required by other types of scrapers—all due to its unique design and construction.

The complete story of this remarkable money-saving excavator-conveyor is told in a 96-page Catalog, illustrated with over 100 diagrams and photographs. Write for YOUR *free copy of this interesting book* NOW.

SAUERMAN BROS., Inc., CHICAGO, ILLINOIS

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OF a Motor Patrol Grader means that your operator will do more work and better work with less effort. Galion E-Z Lift Motor Patrol Graders are the easiest operating Motor Graders ever designed. All controls are within reach of the operator and all adjustments are easily and quickly made from the operator's platform.

Galion E-Z Lift Motor Graders are scientifically designed and perfectly balanced, sturdy, rigid and chatterless and will give you years of satisfactory, uninterrupted service.

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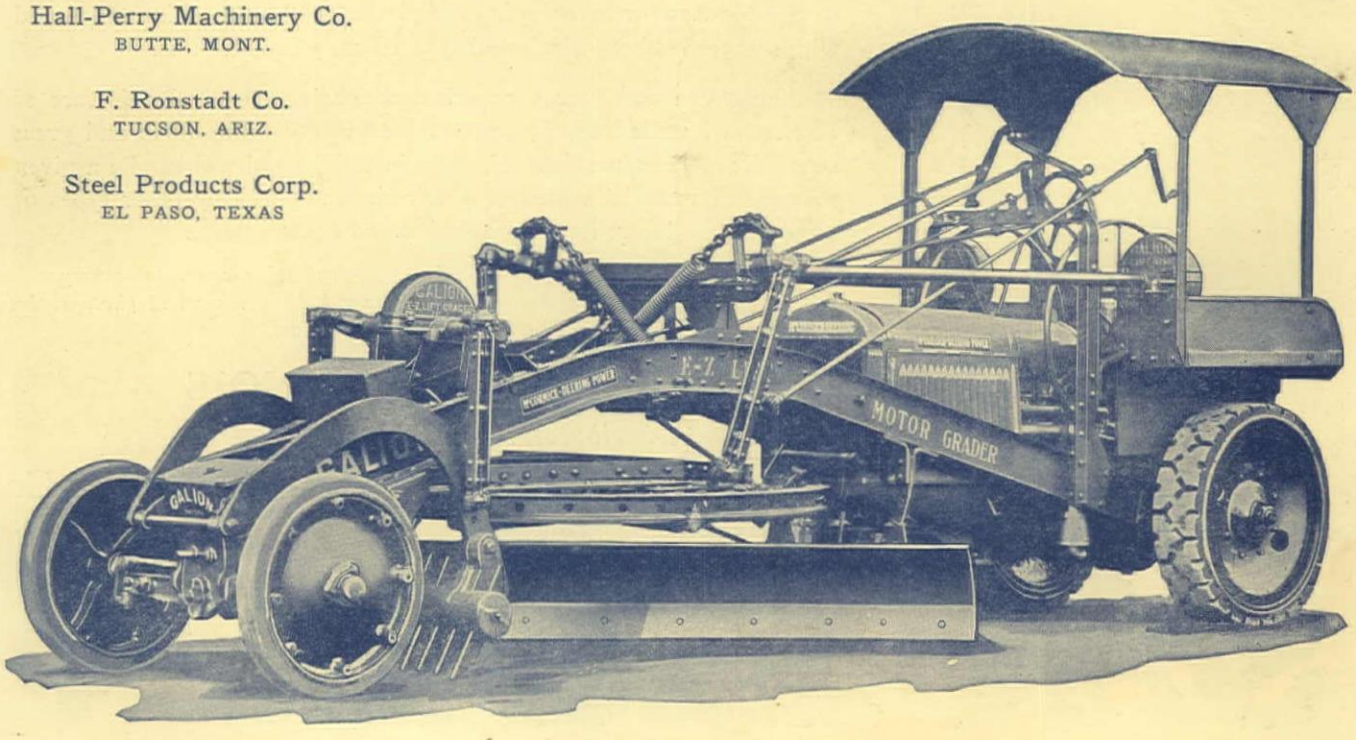
The
GALION IRON WORKS & MANUFACTURING COMPANY
Galion, Ohio



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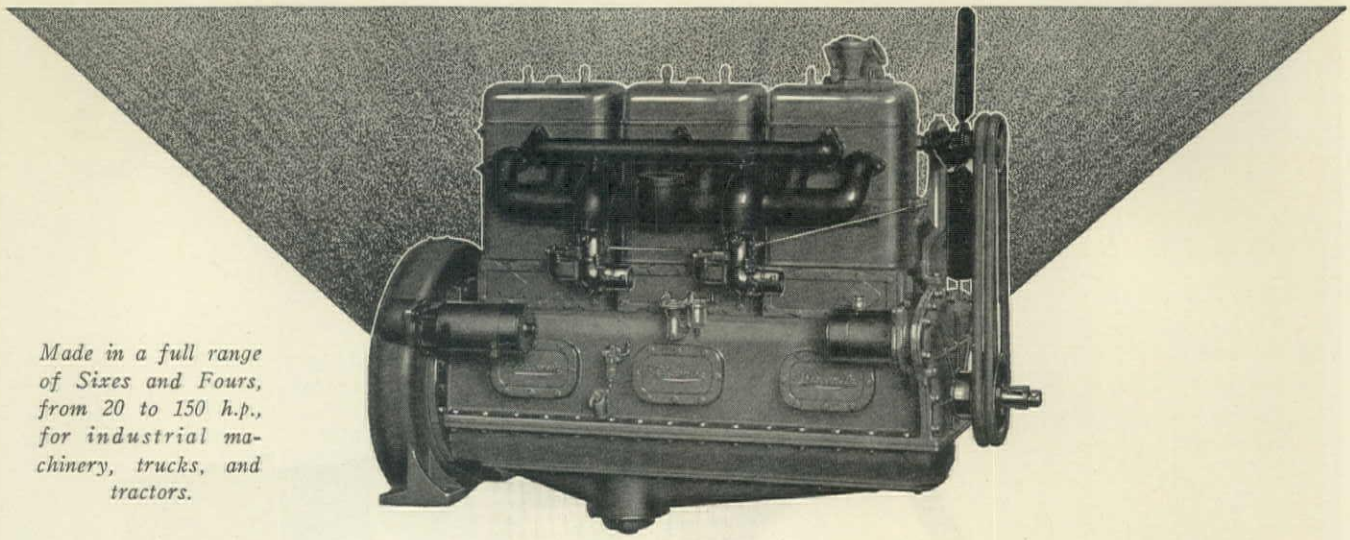

Made in a full range of Sixes and Fours, from 20 to 150 h.p., for industrial machinery, trucks, and tractors.

Steadfast Power

Unwavering steadfastness in an engine demands the utmost soundness in materials and engineering. You'll find this soundness in Wisconsin Motors. It is that inherent strength, born of over-size construction throughout, which stands up under extremes of service. Heavy going, long runs, mean operating conditions — in tropic heat or polar cold — that's when Wisconsin Motors' steadfast power is much in evidence.

Put one of these motors on your test block and find out for yourself just what it will do.

Wisconsin Motor Co., - Milwaukee, Wisconsin

Wisconsin

CONSISTENT

MORE POWER per CUBIC INCH

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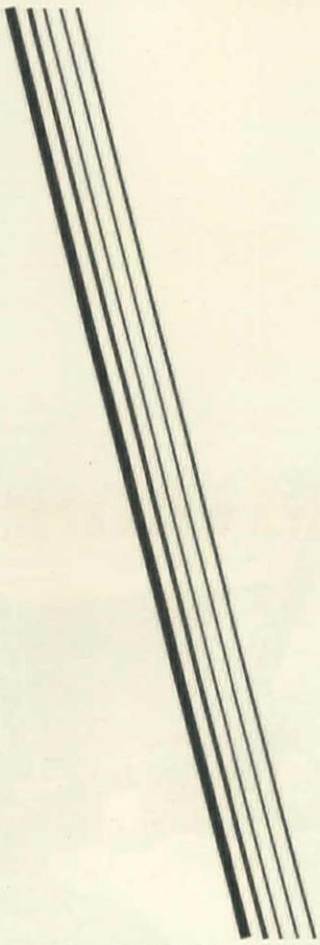
THE GREATEST SINGLE SOURCE OF FACTS ON DIESEL EXCAVATORS



SEE US AT THE ROAD SHOW
SPACE 214

Power shovels, clamshells, cranes, draglines, dragshovels — ½ to 16-yard capacity—electric, steam, gasoline, Diesel, gas + air, Diesel + air.
Dipper hydraulic and placer mining dredges.
A-21—1-10-30—WCN

BUCYRUS ERIE

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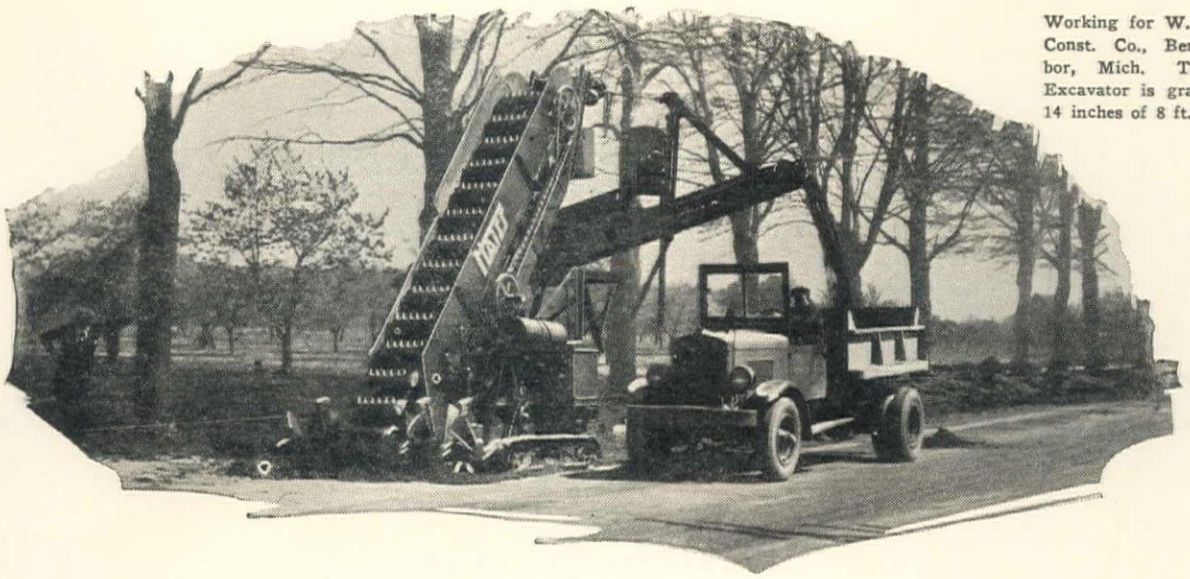

Working for W. J. Lange Const. Co., Benton Harbor, Mich. This Haiss Excavator is grading 9 to 14 inches of 8 ft. wide cut.

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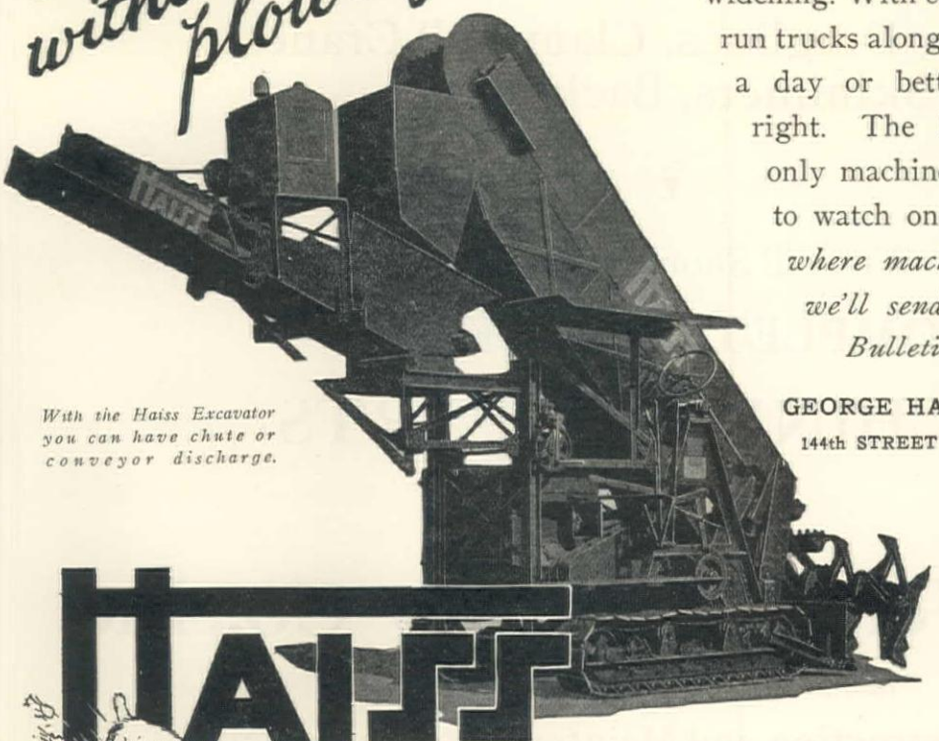

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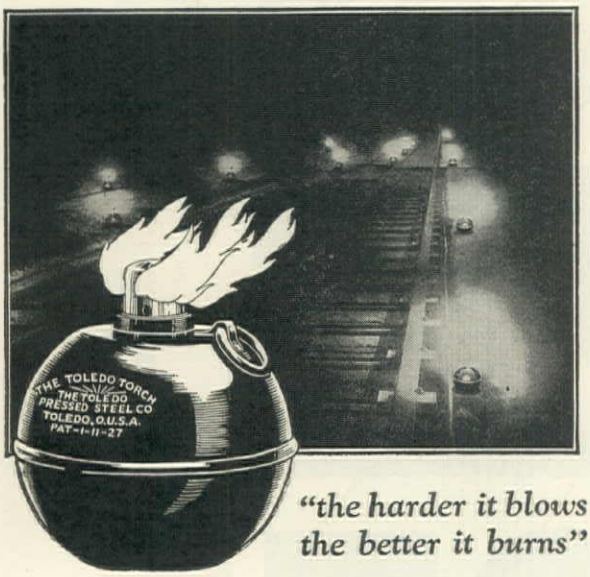

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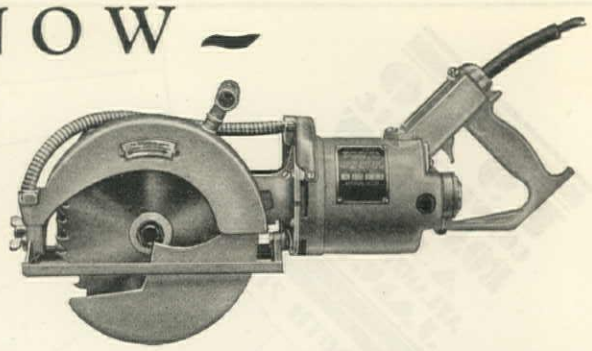

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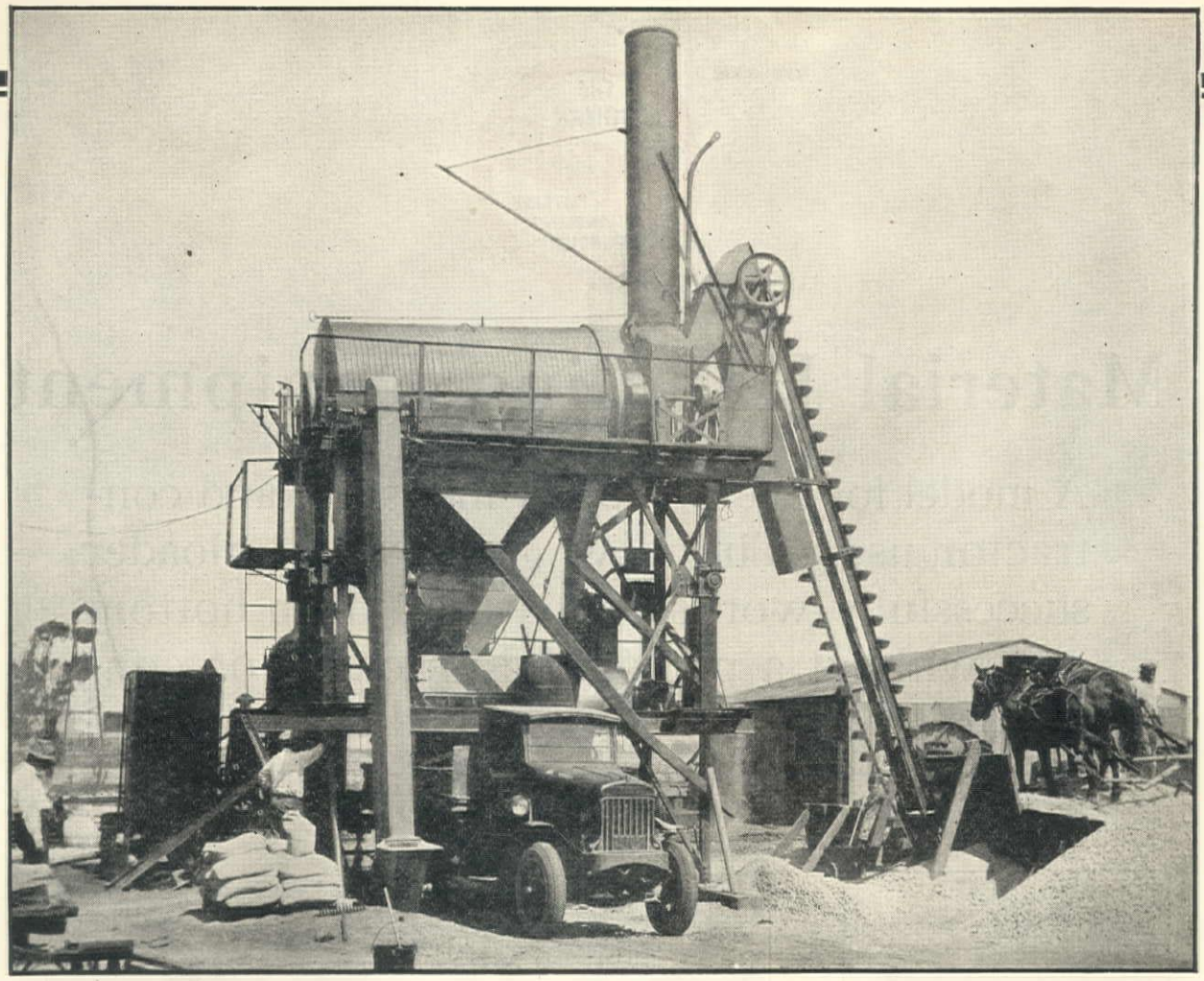

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The Madsen Mobile Asphalt Paving Plant is a finished job, thoroughly tested, proved. In the plant you contract for now, you secure the benefit of months of close observation of early plants in actual operation. Your plant will deliver, dependably, from the day you set it up. Your expense of dismantling and setting up will be less, your labor cost will be lower, you can bid more closely, realize a better profit on every job. You can go after and secure jobs that you cannot touch with present stationary equipment.

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Madsen 1000-lb. 2-unit Mobile Paving Plant No. 1, Job No. 1, operated by C. O. Sparks, owner, 2309 E. 9th St., Los Angeles, Calif.

Total amount of material—6673 tons of Asphalt base and top.

Length of run—26 days.

Average output per 8-hour day—266 tons. (Mixing 1500-lb. batches.)

Labor cost per ton of material mixed—$0.2584. (Including two fresno teams for handling aggregate to elevator hopper.)

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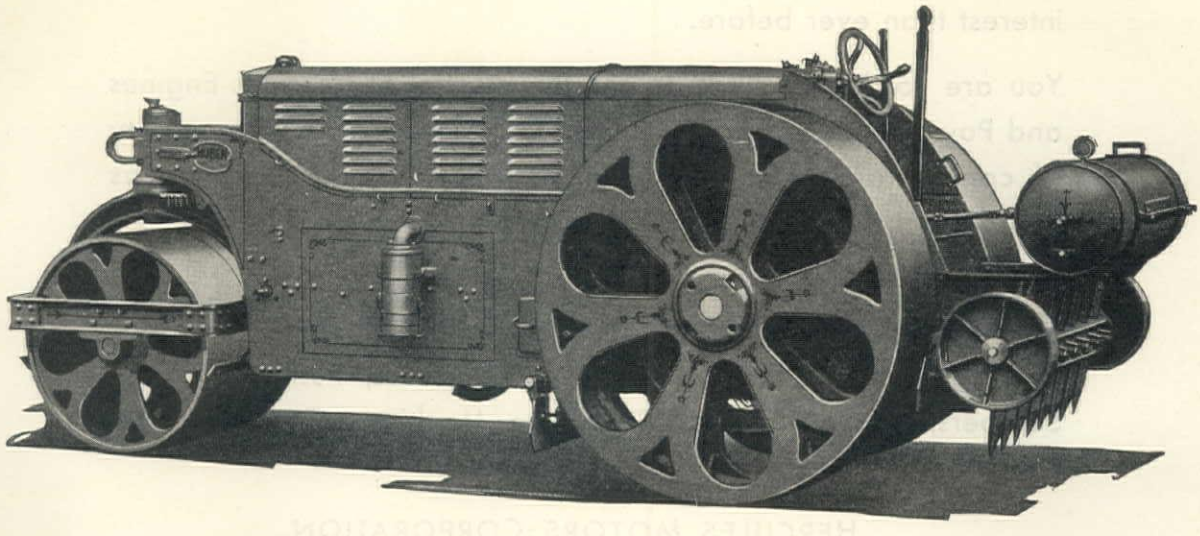

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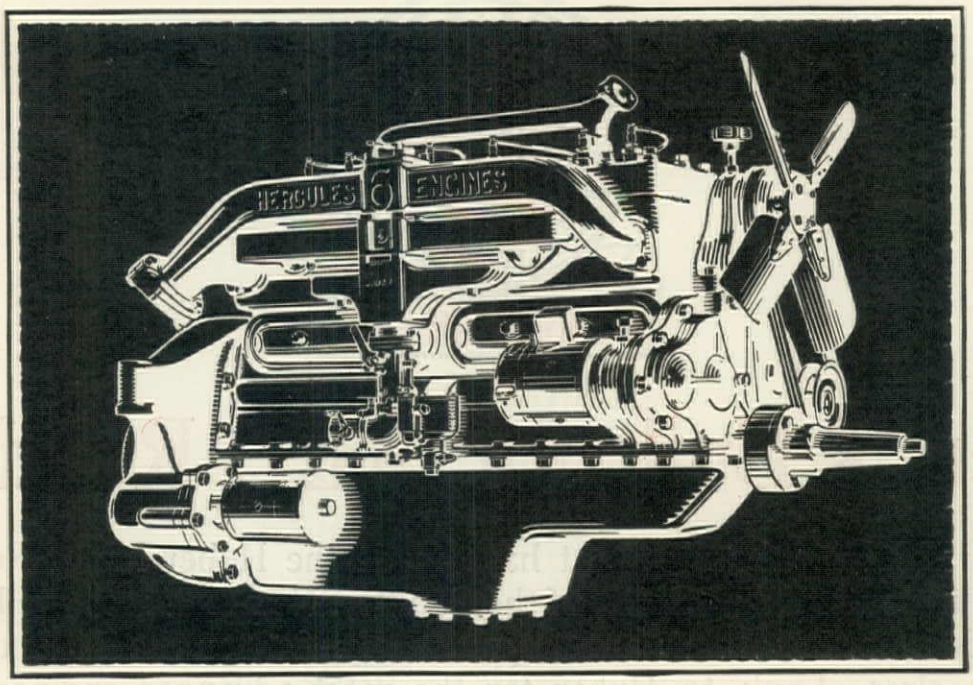

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VOLUME V | JANUARY 10, 1930 | NUMBER 1

This issue is largely devoted to forecasts of engineering construction for 1930 in the far west. Seventy-five of the major projects of $500,000 and over total more than $1,000,000,000, most of which will be well under way during the year. No engineer or contractor should suffer from shortage of work.

Construction Prosperity for the Far West

Highway contractors, engineers, and equipment and material men serving the eleven western states, will find signs of a satisfactory year from forecasts in the 'Far West Highway Program for 1930', in this issue. In a unanimous response to our recent questionnaire, the deputy chief engineer of the U. S. Bureau of Public Roads, Western Region, his four district engineers, and the state highway engineers of the eleven western states, have given their available funds, outlined where and on what type of work the money is to be spent, and have named the administrative assistants who will be in responsible charge of new construction, reconstruction, or maintenance.

The 1930 Highway Program

The total program on state highway works under state funds, Federal Aid, National Park and National Forest roads, and forest development work is $112,000,000. This does not include city and county work, where, for a leading example, the counties of California will spend $50,000,000.

Grouped by states, the probable 1930 highway program is:

State	State Highways	National Parks	National Forests
Arizona	$ 8,000,000	$ 490,000	$ 523,000
California	38,000,000	1,301,000	827,000
Colorado	9,000,000	650,000	328,000
Idaho	4,000,000	.....	491,000
Montana	5,500,000	531,000	456,000
Nevada	3,000,000	.....	94,500
New Mexico	8,000,000	.....	202,000
Oregon	7,000,000	10,600	1,457,000
Utah	3,000,000	3,000	166,000
Washington	10,000,000	748,000	333,000
Wyoming	3,000,000	289,000	280,000

We believe that this forecast will furnish a compact and authentic index of this year's activity in road building—the principal single type of construction in the far west. A few reprints of the forecast are available.

No less an authority than 'The Constructor', the official organ of the Associated General Contractors of America, strongly advocates—editorially in the December, 1929, issue—more publicity for contractors through the medium of advertising. The editor points specifically to the extensive advertising campaign of one large eastern contractor, and comments as follows:

Contractors Should Advertise

"Advertising of this character we believe to be of constructive service not only to the advertiser but to the industry at large. It establishes in the minds of those who read it a conception of high standards of service which become a criterion for judging the skill, integrity, and responsibilty of all constructors. * * * Advertising is still a neglected tool so far as constructors are concerned."

Advertising has not reached its zenith by any means—we are to see more and better advertising.

George Harrison Phelps, the originator of Dodge Bros. and other automotive advertising, in his new book, 'Tomorrow's Advertisers and Their Advertising Agencies', makes the following prediction:

"Advertising will be done on a scale never before heard of, and why should it not be, when business is already being done on a scale straining our present imagination?

"Tomorrow's advertiser will not be satisfied to advertise because his competitors do, or because it seems to be 'the thing' * * * he will advertise on a scale commensurate with the importance of the job to be done. He will recognize that quarter-page whispers are a waste of breath when trying to attract the great mass of people milling in the hubbub of the marketplace."

When he wrote this prophecy of tomorrow's advertising, Phelps thought not only of the advertising of products but also the advertising of services. Thus, a great volume of future advertising may be that of service to business—public or private, service to the individual, service to humanity as a whole.

Exactly—Consistent, attractive advertising with a message will leave an indelible impression on the reader. Contractors look for these messages from the manufacturers of equipment and materials. Why should not the contractor advertise his achievements and ability for the benefit of the engineers and officials.

Far West Highway Program For 1930

Federal Government and Highway Departments of Eleven Western States Will Expend $112,000,000

Owing to fluctuations of the securities market and the present financial condition, great interest is being shown in the program for highway construction during the coming year. As road building is the principal single construction activity in the Far West, the following 1930 forecasts by engineers of the U. S. Bureau of Public Roads in the Western Region and the eleven state highway engineers in that territory indicate a promising season for all connected with the industry. **Western Construction News** will cover in detail the construction progress on many of the projects outlined below.

UNITED STATES BUREAU OF PUBLIC ROADS, 1930 CONSTRUCTION FORECAST

Federal Aid Program Matching State Funds; Also Funds Recommended or Apportioned for Forest Highway and National Park Highway Construction in the Western Region

By L. I. HEWES*

Deputy Chief Engineer, U. S. Bureau of Public Roads, Western Region, San Francisco

Federal Aid—In accordance with President Hoover's policy of stabilization, the Secretary of Agriculture on December 2, one month ahead of the usual date, apportioned the $75,000,000 Federal Aid appropriation

L. I. HEWES
Deputy Chief Engineer, Western Region, U. S. Bureau of Public Roads

for the fiscal year 1931. The apportionment for the eleven states in the Western Region amounts to $13,737,577, segregated as in Table I.

TABLE I

Arizona	$1,062,190
California	2,501,170
Colorado	1,390,524
Idaho	932,594
Montana	1,552,865
Nevada	960,845
New Mexico	1,190,296
Oregon	1,197,667
Utah	850,752
Washington	1,156,219
Wyoming	942,455

*Member, American Society of Civil Engineers.

These funds constitute the major portion of the money to be paid for Federal Aid construction, the balance being supplied by the states and local agencies. The Federal Aid system embraces selected state highway routes and constitutes the main system of through and lateral roads.

The Federal Aid apportionment made for the fiscal year 1931 (July 1, 1930-June 30, 1931) is substantially the same as for last year. The apportionment is available as cash for construction on July 1, 1930, but the states can now begin to submit plans and let contracts based on the next year's money. There is no reason to anticipate any decrease by the states in matching Government funds during the coming year. In fact, one or two states will increase their expenditures.

Holdover Federal Aid funds from the past construction season (as of October 31, 1929) available for new projects are given in Table II.

TABLE II

Arizona	$1,960,484
California	26,088
Colorado	1,099,714
Idaho	485,570
Montana	2,095,353
Nevada	48,734
New Mexico	605,985
Oregon	424,095
Utah	198,972
Washington	230,961
Wyoming	7,385

National Park and National Forest Highways—The Bureau of Public Roads in the Western Region put under contract in 1929 approximately $7,000,000 of National Park and National Forest highway construction. It will do better than that in 1930. This construction of National Park and National Forest roads in the west is the principal direct road construction that the Government does.

The Bureau of Public Roads occupies the unique position of operating for two outside organizations, the Forest Service in its own department, and the Park Service in the Department of the Interior. Under its direction during the 1930 season, there will be spent approximately $10,000,000 in the 11 western states and Alaska. The forecast of the allocation of this money given below is from the best authentic information obtainable at this time, but both the Park and Forest programs are yet subject to final approval of the director of the National Park Service and the chief of the Bureau of Public Roads, and the respective Secretaries of Interior and Agriculture.

The tentative allocation of funds for major construction in the Western Region of the Bureau of Public Roads during the calendar year of 1930 is given in Tables III and IV.

TABLE III
National Park Roads

Park	Probable Authorizations
Bryce Canyon	$ 3,000
Crater Lake	10,600
Glacier	531,000†
Mt. Rainier	748,000
Grand Canyon	490,000
Lassen Volcanic	208,000
Sequoia	379,000
Yosemite	714,000†
Mesa Verde	150,000
Rocky Mountain	500,000
Wind Cave	27,700
Yellowstone	289,000
Devils Tower	16,500
Hawaii	151,000
Total	$4,217,800

TABLE IV
National Forest Roads

State	Forest Highway Funds Basis $4,500,000 (Approximate)	Cooperative Funds
Arizona	$ 343,900*	$179,000
California	727,000*	100,000
Colorado	328,000	0
Idaho	491,000	?
Montana	456,000*	?
Nevada	94,500	?
New Mexico	202,000	?
Oregon	684,000*	773,000
South Dakota	39,500	?
Utah	166,000	?
Washington	333,000	?
Wyoming	280,000*	0
Alaska	650,000*	?
Totals	$4,794,900	($1,500,000 probable for all states)

It is estimated that there will be 25 contracts on Park roads and 75 contracts on Forest roads during the calendar year 1930. The above figures do not include $3,000,000 Forest Development funds for roads and trails to be built by the U. S. Forest Service.

Personnel—The Bureau's administrative personnel for the Western Region includes: L. I. Hewes, deputy chief engineer, San Francisco, covering Districts 1, 2, 3, 11, and 12, and National Park work in Hawaii; J. S. Bright, construction engineer and first assistant to Hewes; Walter N. Frickstad, senior highway engineer, in charge of Federal Aid; G. W. Mayo, senior highway bridge engineer, in charge of Forest Highways and national Park highways.

THE 1930 PROGRAM FOR DISTRICT NO. 1, BUREAU OF PUBLIC ROADS (OREGON WASHINGTON, AND MONTANA)

By W. H. LYNCH

District Engineer, Portland, Oregon

Division of Work—Surveys; preparation of plans, specifications, and estimates; contract letting, and the supervision of actual construction, of Forest Highway and National Park roads in District No. 1, are under the administrative direction of W. H. Lynch, district engineer. J. A. Elliott, highway engineer, has general supervision of all forest road work and also looks after work in the National Parks. H. D. Farmer, highway engineer, is his assistant in direct charge of Oregon projects, while F. E. Andrews, highway engineer, supervises the Washington projects. A sub-office is maintained in Missoula, Montana, with A. C. Clark, highway engineer, in charge of both Forest Highway and Federal Aid work within the state.

Oregon Forest Highways

The recommended allocation of Forest Highway funds for the fiscal year 1931 to Oregon projects is as follows:

Siuslaw Highway—Bids for grading 7.7 miles between Rainrock and Cushman, estimated cost $600,000, will be opened January 3, 1930. In the first work, a new roadbed will be constructed for the railroad and the tracks will be shifted.

W. H. LYNCH
District Engineer, District No. 1,
U. S. Bureau of Public Roads

Sections where there is no encroachment on the railroad right-of-way will be built later.

Roosevelt Coast Highway—It is proposed to surface 14 miles of previously graded road south of Newport, between South Beach and Waldport; also to surface one mile of road which the State will build to make connection with the Newport ferry slip. The state has under construction or contract all of the work south of Waldport in Lincoln county. For surfacing on the Roosevelt Coast highway, $155,000 has been programmed.

Weston-Elgin Highway—It is proposed to surface a 5.4-mile grading project which was started in August, 1929, and $30,000 of Government money has been set aside for this project.

Willamette Highway—The Bureau has completed grading a 5.4-mile section and it is now proposed to surface this as well as a portion graded by the state. The total length to be surfaced is 13.4 miles and the estimated cost is $112,000.

Canyon City-Burns Highway—The Bureau has set up $100,000 from Forest Highway funds to complete the grading of 8 miles from Seneca south to a connection with 33 miles of highway, also built by the Bureau, on which the last section of surfacing was completed during the past season.

Salmon River Highway—The $65,000 programmed for grading 3.4 miles will continue work already completed to the post office at Rose Lodge, and will also provide money for constructing a bridge over Slick Rock creek.

Pendleton-John Day Route—The 15.5-mile Ukiah-Dale section of this route is estimated to cost $600,000, and involves some expensive canyon construction. It is proposed to build two portions, one south from Ukiah and one north from Dale, totaling 7 miles, which will give access to the central part of the project. This central portion will be built later. The work contemplated will cost $200,000.

Heppner-Spray Route—The Bureau has set aside $75,000 of Government funds for grading 5.5 miles on this route.

†Includes some funds remaining from 1929.
A small portion of the probable authorizations (Table III) is for surveys.

*Includes some funds remaining from 1929.
From 10 to 15% of the above may be needed for surveys and maintenance.

Two projects already have been graded and surfaced, one on the northerly end of the route and one on the south end. The estimated cost of the intervening section is $300,000, which it is anticipated will require 4 years to construct. The work proposed for 1930 will be a southern extension of the project on the north.

Santiam Highway—It is proposed to build 4 miles of this route between the Jefferson-Deschutes county line and Suttle lake, for which $55,000 has been programmed.

Mount Hood Loop—For widening 2.7 miles of the Mount Hood loop road from near Swim to the junction of the Wapinitia road, $60,000 has been allotted. This improvement was actually started in the fall of 1929 by the Bureau, using its own forces and equipment.

Maintenance—The law provides that Forest Highway projects shall be maintained by the Bureau for a period of 2 years immediately following construction. To meet these obligations, $35,000 has been set aside.

Montana Forest Highways

Funds for the fiscal year 1931 have been allotted to the following projects:

Columbia Falls-Glacier Park Highway—An allotment of $50,000 will be used for surfacing a portion of this project, or for additional grading or improvement of sections which traffic conditions indicate should be improved. This work will be done after the road is opened to travel.

Clark's Fork Highway—The Bureau has allotted $10,000 for this project to cover betterment of the unimproved sections on the north side of the river, so that travel can comfortably use the old county road connecting with those sections which were improved by 1930 funds.

Madison River Highway—For the continuance of work toward West Yellowstone from the end of construction done with the allotment from the fiscal year 1930 funds, $80,000 has been recommended.

West Gallatin Highway—There is a gap of 5.6 miles between the Beaver creek section and reconstruction being done with the fiscal year 1929 allotment, which should be improved to bring it up to the same standard as these sections. Betterment and surfacing of this gap, known as the Middle Section, are proposed with an allotment of $98,000.

Yellowstone Trail Highway—Several bad sections of this route have been improved with Forest Highway funds and it is proposed to eliminate some particularly objectionable sections in the vicinity of Saltese with the $90,000 recommended allotment.

Location Surveys—The Bureau has recommended that $5000 be used in extending field work and preparing plans for work which is projected for future improvement.

Maintenance—An allotment of $20,000 is proposed to carry out the 2-year maintenance obligations on completed projects.

Washington Forest Highways

The conference with the Washington State Highway officials regarding the Forest Highway program will not be held until early in January, so that a schedule of next season's construction projects is not available on this date (December 21).*

National Parks

Tentative allotments for the fiscal year 1931 on National Park projects are as follows:

Crater Lake National Park—For surveys and resurveys—$6600, and for oil processing the 3.2-mile East Entrance-Lost Creek section—$4000; authorized allotment—$10,600.

Glacier National Park—To complete the Babb-Many Glacier section, 4.4 miles, including grading, bridges, and surfacing—$226,000. For grading Logan Pass-Sun Camp, and west 2 miles of Sun Camp-St. Mary's (about 8 miles)—$300,000. Authorized allotment—$531,000.

Mt. Rainier National Park—East Boundary-White River Crossing bridges—$100,000; surfacing 10.3 miles on the White River Crossing-Yakima Park section—$90,000; grading 2.2 miles on the Klapatche Ridge-Sunset Park section—$220,000; clearing 4.0 miles of the Sunset Park-Mowich Lake section—$30,000; for the first 5.0-mile project on the Stevens Canyon route—$250,000; Stevens Canyon survey—$8000; resurfacing the West Entrance-Nisqually Glacier section (12 miles)—$40,000; and 14 miles of oil processing on the last project—$25,000. The authorized allotment for Mt. Rainier National Park is $763,000.

Federal Aid Program

All Federal Aid projects, from the approval of the project statement to the field inspection of location and, later, of construction; approval of form of contract and specifications; checking of vouchers; final approval of the completion of the project and then its subsequent maintenance, in Oregon, Washington, and Montana, are handled from the Portland district office. T. M. Davis, highway engineer, makes all the field inspections in Oregon and cooperates with the state highway department in its planning of work which may come up for Federal Aid. A. F. Morris, highway engineer, handles the same work in the State of Washington, and L. J. Caufield, highway engineer, looks after the office end of the work in the three states.

The Secretary of Agriculture early in December announced the allotment of the 1931 fiscal year Federal Aid funds to the various states. For the territory covered by District 1 of the Bureau, $1,552,865 has been allotted to Montana, $1,197,667 to Oregon, and $1,156,219 to Washington. Since the states initiate the projects on which it is proposed to expend these funds, in connection with their proportion of state funds, the Federal Aid program is more of a continuing schedule than a definitely outlined setup of funds. The allotment for the coming fiscal year does not vary much from the money which has been available to the states for the past several years, but it is up to the states to say how much of the money available they will match and when they will match it. In addition to the allotments mentioned, there are unused balances available from the 1930 apportionment in Oregon and Washington and about $2,000,000 in Montana.

Outstanding 1930 Federal Aid Projects—The outstanding projects in Washington on which Federal Aid funds will be used will probably include: paving between Pullman-Colfax and Spokane; grading in the Yakima canyon between Ellensburg and Cle Elum; grading west of Maryhill and also north of Goldendale; grading between Port Angeles and Sequim; and paving south of Port Townsend.

Oregon's activities will undoubtedly be centered on the completion of the Roosevelt coast highway, the Mitchell-Dayville route, uncompleted portions of the Central Oregon highway, and some improvements on the McKenzie highway.

The Montana program has not been arranged.*

THE 1930 PROGRAM FOR DISTRICT NO. 2, BUREAU OF PUBLIC ROADS

By C. H. SWEETSER†
District Engineer, San Francisco

Federal Aid for California, Nevada, and Arizona

The greater portion of Federal Aid work proposed for 1930 in California and Nevada consists of the im-

*Editor's Note: The program will be announced in an early issue.

†Member, American Society of Civil Engineers.

provement of existing state highways with some construction on new routes. This new work includes improvement of 25 miles of road from Wells to Contact in Nevada, the remainder of the route from Las Vegas, Nevada, to Barstow, California, and a part of the Redding-Alturas road in California. The State of Nevada proposes to oil treat about 146 miles of road by the road mix method.

The State of Arizona, in addition to an extensive reconstruction program, intends to construct 75 miles of new road, including portions of the following routes:

Florence to Tucson,
Benson to Douglas,
Globe to Safford,
Flagstaff to the Utah State line via Fredonia and the Grand Canyon (Lee's Ferry) bridge.

Forest Highways

In addition to cooperating with the States in the

C. H. SWEETSER
District Engineer, District No. 2,
U. S. Bureau of Public Roads

construction of Federal Aid highways, the Bureau directly surveys, constructs, and in certain cases maintains, for a limited period, such projects on the approved Forest Highway systems as are programmed each fiscal year by the Secretary of Agriculture under the Forest Highway sections of the Federal Highway Act. The programs for the coming fiscal year are now under consideration by the local Forest Highway boards and recommendations will be made for the Secretary's approval in due course. The list of projects is, therefore, not available at this time. On the basis of a $4,500,000 appropriation for Forest Highways for the fiscal year 1931, Arizona's share will be $283,882, California's $676,451, and Nevada's $94,196.

During December, 1929, the grading of a 1.92-mile section was let on the Idyllwild forest highway between the west forest boundary and the north fork of the San Jacinto river in Riverside county, California. The estimated cost is $26,000. This work carries over to the present year.

The Secretary recently programmed $50,000 for expenditure on the Laguna Mountain road in San Diego county, California, contingent upon San Diego county cooperating to the extent of $25,000. As soon as the necessary cooperative agreement has been executed, the work will be advertised for bids.

Construction on the following forest highway projects authorized for the 1930 fiscal year but not completed, will be carried over to next year:

Arizona—Improvement and betterment work on the V. T. section of the Fredonia-Grand Canyon highway in Coconino county. This is a 7.92-mile section adjacent to the north boundary of the Grand Canyon National Park. Estimated cost $49,250.

Improvement work on the Alpine-Springerville highway between Alpine and a point north of Nutrioso, in Apache county. Total length 14.96 miles; estimated cost $43,600.

California—Improvement of a 4-mile section of the Yuba Pass highway in Sierra county between Downieville and Shady Flat; estimated cost $10,000.

Grading and partial crushed rock surfacing on the Riverton-Kyburz section of the Placervi le-Lake Tahoe highway in El Dorado county. Length of grading 5.75 miles, surfacing 3.45 miles; estimated cost $290,000.

Grading of 8.76 miles between Coleville and the California-Nevada state line on the Topaz highway in Mono county; estimated cost $85,000.

Improvement of an 18.5-mile section of the North Fork highway between Oakhurst Junction and North Fork in Madera county; estimated cost $25,000.

Nevada—Improvement of a 10-mile section north of Spooners on the Lake Tahoe highway in Douglas, Ormsby, and Washoe counties; $30,000 has been authorized so far.

Grading of a 3.40-mile section between the California-Nevada state line and a connection with Federal Aid highway No. 3 on the Topaz Lake highway in Douglas county. Estimated cost $22,700.

National Park Projects

Under an agreement with the National Park Service of the Department of the Interior, the Bureau since 1926 has been surveying and supervising construction on specific major projects on the National Park Highway system as requested by the Service. The program for next year is still under consideration. It is expected that somewhat over $1,000,000 will be apportioned for major road work in the National Parks embraced in District No. 2, namely: Grand Canyon in Arizona, and Lassen Volcanic, General Grant, Sequoia, and Yosemite, in California.

During December, 1929, contracts were let on the following projects:

Grand Canyon National Park—Surfacing of 25.85 miles of the entire Bright Angel Point-Cape Royal route, including the spur to Point Imperial on the north rim of the Grand Canyon. The surfacing is to consist of a 3 to 4-in. crushed base course over selected portions and a 3 to 4-in. oil-processed crushed rock top course throughout. Estimated cost $285,000.

Grading of 9.2 miles of the Bright Angel Springs-North Entrance Route. Estimated cost $90,000.

Yosemite National Park—Grading of 2.19 miles of the Grouse Creek-Turtleback Dome section of the Wawona road. Estimated cost $113,000.

Besides the above there are several uncompleted projects which will be carried over to next year. The list follows:

Grand Canyon National Park—Improvement and betterment on 35.17 miles of the South Approach road, south of the south boundary of the park. Estimated cost $85,000.

Lassen Volcanic National Park—Grading of 4.58 miles of the East of Summit section of the Loop route. Estimated cost $89,000.

Yosemite National Park—Grading of 6.59 miles of the Eleven mile-Grouse Creek section of the Wawona road. Estimated cost $233,000.

Personnel—C. H. Sweetser, district engineer, is in administrative charge of Federal Aid and Forest and Park roads in California, Arizona, and Nevada. The Federal Aid work is directed by Chas. C. Morris, senior highway engineer, and the Forest and Park roads are under Levant Brown, senior highway engineer. Morris' assistant is F. R. Bonnickson, associate highway engineer, and Brown's assistant is F. B. Lessman, associate highway engineer. George D. Whittle, senior highway bridge engineer, handles the bridge work and Roderick Pierson, highway bridge engineer, is his assistant. C. W. Dennison, assistant highway

engineer, is in charge of designs, specifications, and drafting. Inspection and supervision of projects is under the following sectional engineers: Nevada—E. C. Brown, senior highway engineer; California—John D. Shaw, senior highway engineer; California and Nevada—Geo. C. White, highway engineer, and D. L. MacBeath, highway engineer. The district maintains a branch office for work in Arizona under G. L. McLane, highway engineer.

THE 1930 PROGRAM FOR DISTRICT NO. 3, BUREAU OF PUBLIC ROADS (COLORADO, NEW MEXICO, AND WYOMING)

National Park Jobs

The following work is programmed:

Mesa Verde Park—North entrance of the North and South highway—Grading 12.4 miles—$150,000.

Rocky Mountain Park—Fall River Pass Road (one contract)—Grading 10.8 miles—$500,000.

Yellowstone Park-Artist Point—Grade and surface 1.6 miles—$91,000.

Norris Junction-Madison Junction—Grade 9.1 miles—$186,000.

National Forest Highways

The program is divided by states, as follows:

Colorado

Willow Creek Pass Project—Grade 6 miles—$72,000.
Dolores-Rico Project—Betterment work on 9 miles—$18,000.
Tennessee Pass Project—Surface 11 miles—$75,000.
Berthoud Pass Project—Surface 7.5 miles—$61,000.
Black Mesa Project—Grade 2.25 miles—$46,000.

New Mexico

Nothing has been programmed, but Forest Highway funds will permit at least two good grading contracts and one surfacing contract.

Wyoming

Wind River and Johnson-Park Highways—Contract portions of two routes, total length 6 miles—$91,000.

Cody-Yellowstone Project—Grade 1.1 miles, including a bridge over the Shoshone river—$70,000.

Hoback Canyon Project—Grade 4.2 miles—$56,000. Opens up Jackson Hole country and makes Teton Park more accessible.

Dayton-Kane Project—Grade and surface with base course, 1.65 miles—$40,000.

Personnel—A. E. Palen is acting district engineer of District 3. The Federal Aid work is under A. V. Williamson, Forest and Park roads are under Clyde E. Learned, and Lyman Copeland is the bridge engineer.

THE 1930 PROGRAM FOR DISTRICT NO. 11, BUREAU OF PUBLIC ROADS (ALASKA)

Forest Highway construction will include the grading and surfacing of 7 or 8 routes. The Bureau has available $650,000, which includes some carryover from previous years.

M. D. Williamson is district engineer, with headquarters at Juneau.

THE 1930 PROGRAM FOR DISTRICT NO. 12 (IDAHO AND UTAH)

By B. J. FINCH
District Engineer, Ogden, Utah

Forest Highways—The approximate amounts available for Forest Highway construction and maintenance in 1930 is: $162,000 for Utah, and $306,000 for Idaho. The projects upon which this money will be spent have not yet been programmed.

Park Jobs—In Zion National Park about $55,000 will be expended for surfacing and guard rail on 3.6 miles of road. The type of surface has not been decided on, although an oil mix will probably be used.

Federal Aid—The Federal Aid apportionment for Utah is $850,752, and for Idaho is $932,594.

Personnel—The assistants to Finch are: B. W. Matteson, Federal Aid; R. R. Mitchell, Forest and Park roads; and L. M. Huggins, bridges.

ARIZONA STATE HIGHWAY PROGRAM FOR 1930

By W. W. LANE*
State Highway Engineer, Arizona Highway Department, Phoenix

The Arizona Highway Department works on the fiscal year basis, July 1-June 30. The total budget for 1929-1930 is $8,126,652. Of this amount, $3,059,900 was forwarded from the previous budget.

Division of Work—The 1929-1930 budget provided for:

Grading, draining, and gravel surfacing	197 miles
Oil surfacing	278 miles

The approximate cost of this work is $2,970,000. A summary of this work for the calendar year 1930 is given on page 15.

Construction during 1929, the last calendar year, included:

Grading and draining	152 miles
Gravel surfacing	101 miles
Oil surfacing	66 miles

Personnel—Administrative assistants at Phoenix are: C. C. Small, deputy state engineer; W. R. Hutchins, office engineer; E. M. Whitworth, vehicle superintendent; M. H. Hasler, equipment engineer; R. A. Hoffman, bridge engineer; J. W. Powers, engineer of materials; E. V. Miller, engineer of plans; J. S. Mills, engineer of estimates; Ira W. Wagnon, right-of-way agent; J. P. Dillon, purchasing agent; R. L. Jones, chief accountant; A. H. Lend, superintendent of stores; H. C. Hatcher, statistical engineer. The field engineers of the two districts are: R. C. Perkins, construction engineer, northern district and F. B. Grant, maintenance engineer, northern district; T. S. O'Connell, construction engineer, southern district; and Percy Jones, maintenance engineer, southern district; Geo. B. Shaffer, paving engineer.

CALIFORNIA STATE HIGHWAY PROGRAM FOR 1930

By C. H. PURCELL†
State Highway Engineer, California Division of Highways, Sacramento

With the closing of the 1929 construction season, California is looking forward to another strenuous year of highway activity. The main source of revenue to carry on the work will be the gasoline tax and motor vehicle fees, but this will be supplemented, to a certain extent, by other funds, the principal one of which is Federal Aid.

*Member, American Society of Civil Engineers.

†Associate Member, American Society of Civil Engineers.

State and County Programs—The program for 1930 on contract work and maintenance totals $38,030,000. The county expenditures will total $50,000,000, of which $16,000,000 will be obtained from the state gas tax and motor vehicle fees.

The $38,030,000 for state work includes the following:

543 miles of various types of highways to be contracted	$17,800,000
Maintenance of existing highways	5,640,000
Required to complete projects now under way or advertised	14,590,000
Total	$38,030,000

None of the above figures include any overhead charges and the first two items do not include any Federal Aid or money to be obtained from other outside sources.

Force Account Work—Eight convict camps, composed of about 700 prisoners, will continue the grading work carried on during 1929 in Shasta, Trinity, Butte, Plumas, Colusa, Lake, Fresno, and Monterey counties.

C. H. PURCELL
State Highway Engineer, California

The entire highway organization is at present making preparations to meet this extensive 1930 program, and it is expected that work will be well under way by April or May.

Personnel—The headquarters' staff at Sacramento under C. H. Purcell, state highway engineer, is composed of: G. T. McCoy, administrative assistant; L. V. Campbell, office engineer; T. E. Stanton, materials and research engineer; Fred J. Grumm, engineer of surveys and plans; C. S. Pope, construction engineer; T. H. Dennis, maintenance engineer; Chas. E. Andrew, bridge engineer; R. H. Stalnaker, equipment engineer; and E. R. Higgens, chief accountant. The ten district engineers are: F. W. Hazelwood, district 1, Eureka; H. S. Comly, district 2, Redding; C. H. Whitmore, district 3, Sacramento; J. H. Skeggs, district 4, San Francisco; L. H. Gibson, district 5, San Luis Obispo; E. E. Wallace, district 6, Fresno; S. V. Cortelyou, district 7, Los Angeles; E. Q. Sullivan, district 8, San Bernardino; F. G. Somner, district 9, Bishop; and R. E. Pierce, district 10, Sacramento.

COLORADO STATE HIGHWAY PROGRAM FOR 1930

By L. D. BLAUVELT*
State Highway Engineer, Colorado Highway Department, Denver

The state will spend $9,000,000 on roads during 1930. The budget for Federal Aid is $3,362,000 as against $2,810,000 for 1929, Federal participation being $1,681,202.

Estimated Receipts

The estimated receipts for 1930 are $5,900,000, or $750,000 greater than the 1929 estimate. Of this amount, it is expected that $3,900,000 will come from the gasoline tax fund, $1,700,000 from Federal Aid, and the remaining $300,000 from four smaller sources. In addition, there will be about $250,000 available from the special fund established by the Act of 1929, which consists of 3% of the gasoline tax. Also, there is carried over from previous budgets about $1,600,000 from the highway fund and $2,000,000 from the Federal Aid fund to finish projects for which money has already been appropriated.

The gasoline tax is 4¢ per gallon, and is allotted as follows:

70% to the state highway fund.
27% to the counties for use on public roads.
3% for construction and improvement of city streets which form connecting links in the state highway system.

The 3% special fund is allocated for improvements in the various counties in proportion to the motor vehicle registration in these counties. Receipts from the 1929 gas tax were $2,930,000.

Federal Aid Projects Recommended for 1930

North and South Route, Colorado Springs to Pueblo—The last unpaved ling of this road is now graded and ready for paving, 26 miles of work to start early in the season. This is the largest project in the year's program and will cost $650,000.

From the New Mexico State Line Northerly—Oil surfacing—$100,000.

Between Pueblo and Walsenburg—Improvements.

North of Fort Collins—Paving—$80,000.

East and West Routes—Special attention will be given to improving U.S. Highway 40, an east and west transcontinental route. The projects follow:

Kit Carson County—Graveling and oiling 10 miles west of Burlington.

Denver to Limon—Oil surfacing 15 miles.

Idaho Springs—Paving through the town—$50,000.

Grand County—Project near Granby on which no construction has yet been done, will be carried over from 1929.

Muddy Pass—Improvements—$80,000.

From Hayden West—$100,000.

Moffat County—West of Lay—About $100,000.

DeBeque to Mouth of Plateau Creek (towards Grand Junction)—Continuation of work—$200,000.

Eagle County—Improving Eagle Valley road east of Wolcott—$200,000.

Eagle County—Graveling west of Minturn.

North of Cortez—A small project to complete a high standard road through the Ute Indian Reservation to New Mexico line where it joins a similar road in New Mexico leading to Gallup. Forms junction with U.S. Highway 66.

East Side of Wolf Creek Pass—$90,000 project.

East of Pueblo to State Line—Oil surfacing at needed points beyond end of paving—$200,000.

East of Gridley—Paving—$175,000.

Sterling to Julesburg—A 42-mile grading project now under construction. For additional work—$100,000.

North of Eaton—Additional oiling on the present gravel-surfaced road.

*Member, American Society of Civil Engineers.

Fort Collins Towards Laramie—Additional improvements.

State Projects

San Luis Valley—Cochetopa pass and San Luis—Stonewall projects.

Loveland Pass—Additional improvements—extending road down the west slope—$20,000.

Custer County—Reestablishing road in North Hardscrabble Canon pending time when survey can be made to determine advisability of reconstructing entire road—$10,000.

Colorado Springs to Limon—Bridge at Simla—$15,000.

Colorado Springs—Widening pavement on s. Nevada ave. adjacent to city.

Jackson County—Surface road through Muddy Pass connecting with U.S. Highway 40—$18,000.

Routt County—Oak Creek-Sidney—Improvements.

Washington County—From Akron west, improvements—$20,000.

Weld County—Additional work on road between Wiggins and Roggin.

Expenditures Other Than for Construction

Maintenance—About $500,000 for usual maintenance plus $200,000 to regravel Federal Aid roads which have deteriorated beyond a point where regular maintenance is sufficient.

Administration—$180,000 as compared with $125,000 in 1929.

Contingent Fund—$100,000.

Small Items—For surveys ($25,000), road signs and traffic census ($20,000), property and equipment ($30,000), compensation insurance ($20,000)—$95,000.

Personnel—L. D. Blauvelt is the state highway engineer of Colorado. Assistants at the general office, Denver, are: O. T. Reedy, senior assistant engineer; J. E. Maloney, assistant engineer; Robert H. Higgins, superintendent of maintenance; Paul Bailey, bridge engineer; Roy Randall, office engineer; John Marshall, chief draftsman; Edwin Mitchell, auditor; and Roy F. Smith, chief clerk. There are seven division engineers, as follows: E. E. Montgomery, division 1, Denver; J. J. Vandermoer, division 2, Grand Junction; J. R. Cheney, division 3, Durango; James D. Bell, division 4, Pueblo; Ernest Montgomery, division 5, Colorado Springs; H. L. Jenness, division 6, Glenwood Springs; and A. B. Collins, division 7, Greeley.

IDAHO STATE HIGHWAY PROGRAM FOR 1930

By J. D. WOOD

Commissioner of Public Works, Boise

The Idaho state highway program has not yet been definitely programmed but will total approximately $4,000,000 for all purposes, including maintenance and

J. D. WOOD
Commissioner of Public Works, Idaho

reconstruction. About $2,750,000 will be spent for new construction.

Projects—Based on the present Federal Aid appropriation ($932,594 for the fiscal year 1931, with $485,570 holdover available as of October 31, 1929), the tentative estimates include 150 miles of crushed rock and gravel surfacing and 300 miles of mixed type oiling. Under a proposed additional appropriation, the construction program would be materially increased.

Personnel—The Department of Public Works supervises state highways, aeronautics, public building construction, state capitol maintenance, and Heyburn Park. R. H. Shoemaker is office engineer, Chas. A. Kyle is bridge engineer, and Perry E. Oxley is maintenance engineer for the department.

MONTANA STATE HIGHWAY PROGRAM FOR 1930

By R. D. RADER*

State Highway Engineer, Montana Highway Commission, Helena

The construction program for Montana in 1930 is somewhat tentative at the present time. The income of the State for highway purposes depends almost entirely upon a 5-cent gasoline tax, from which 75% of the gross collections go to the highway fund. The remaining 25% of the gross collection is placed in a drawback fund, used for the payment of refunds from the gasoline tax paid for gasoline used in agricultural and other machinery not operating on the highways. At the present time (December 19, 1929), it appears

R. D. RADER
State Highway Engineer, Montana

that the refunds may possibly exceed the 25% drawback fund, in which case the state highway fund will be drawn upon to pay any additional gasoline tax refunds. It is anticipated, however, that the net revenue to the state highway fund will be approximately $3,000,000. There is an unobligated balance of about $3,000,000 in Federal Aid available to Montana at the present time.

Highway Construction—Construction under the supervision of the State Highway Commission will probably total $4,500,000, including State and Federal funds. P. G. Poore, construction engineer, has charge of all highway construction. It is anticipated that 450 miles of new road will be graded during 1930, and that possibly 300 miles will be surfaced with crushed gravel. The standard practice in Montana is to surface with gravel crushed so that the top course all passes a screen with ¾-in. round holes.

*Member, American Society of Civil Engineers.

Bridge Construction—About $1,000,000 of the estimated $4,500,000 to be spent for construction will be used for new bridges. A few of the larger bridges which have been placed on the 1930 program are:

One bridge over the Missouri river near Hardy.

One, or possibly two, over the Yellowstone.

One over the Big Horn river near its mouth.

Many smaller bridges will be constructed in connection with highway grading projects, varying from 20 ft. to 150 ft. in length. M. S. Hopkins is bridge engineer.

Maintenance—About $1,000,000 will be spent for maintenance and betterments during the year 1930. This work is under the supervision of R. P. Newland, maintenance engineer. It is also planned to oil between 200 and 300 miles of previously completed gravel road. Part of this work will be done by state forces, and part of it will be contracted. Much partly worn out gravel road will be resurfaced during 1930. The State is operating three crushers in the replacement of stock piles and light resurfacing of old projects. Where a complete resurfacing is needed, the work is put under contract.

General—The proposed work for 1930 will be scattered generally all over the State. This is required by the existing law which divides the State into 12 districts and fixes the percentage of state highway funds which must be spent in each district. This percentage is the ratio of the uncompleted mileage of the Federal Aid system in the district to the total uncompleted mileage of the 7% system in the State, as it existed at the time the bill was passed. The purpose of this bill was to insure uniform progress of state highway construction over all the State. It is probable that the next Legislature will consider amending the present law so as to allow the re-computing of the percentage in each district each year.

NEVADA STATE HIGHWAY PROGRAM FOR 1930

By S. C. DURKEE

State Highway Engineer, Nevada Department of Highways, Carson City

Federal Aid Program—On the 7% Federal Aid system the probable 1930 construction in Nevada includes:

Reconstructing and oiling—153.17 miles
Reconstruction, with possible oiling—12.46 miles
Oiling—17.56 miles
New construction—40.09 miles
Grade separations—2.

The location and approximate cost of these projects are given in Table V.

County Work—The Department of Highways will construct for Lynn county a 25-mile section of low-type road between Fernley and Towle's ranch, estimated cost $75,000. For road improvement, bridge construction, and maintenance, the various counties will expend $500,000.

City Improvements—Proposed city improvements, not under the jurisdiction of the Department of Highways, will total $275,000 throughout the state. The major portion of this expenditure will be $134,000 for street improvements in Las Vegas. Reno will spend about $45,000 for street improvements and the re-

TABLE V

F.A.P.	County Route and Section	Description	Length	Approximate Cost
		Reconditioning and Oiling		
66-A, 34	Lyon 2A-1 and Churchill 2A-2, Churchill 2A-1	3 miles east of Fernley to Leeteville	17.65	$105,900
F.F. 807, 96	Lander 2C-2, Lander 2D-1	10 miles west of Austin to and through Austin	10.00	60,000
1, 19	Pershing 1-C, Pershing 1-D	Woolsey to 2 miles west of Humboldt House	22.60	190,180
18	Elko 1-B	Elko to Halleck	20.49	122,940
74	Elko 1-C	Halleck to Deeth	11.76	70,560
54-A1, 54-A2	Elko 1-D	Deeth to Wells	19.46	116,760
17, 33	Lyon 3B-1, Lyon 3B	Yerington to Wilson canyon	12.76	76,560
43R	Clark 6-F	Crystal to west slope Mormon mesa	20.72	124,320
65B	Washoe 1B-4	Sparks to Vista	2.54	47,740
14	Douglas 3C-1	Minden to 3½ miles north	3.44	44,130
31, 78-A	Eureka 2B-2, Eureka 2B-1	Hay Ranch to and through Eureka	11.75	70,500
		Reconstruction and oiling—Sub-total	153.17	$1,029,590
		Reconstruction		
6	White Pine 2C-1	Robinson Summit to Keystone	12.46	74,760
		Oiling		
109-A	White Pine 2E	McGill to Magnusson's	17.56	31,608
		New Construction		
101-C	Clark 6A	California-Nevada state line to Jean, at $8300	13.09	108,650
110-B	Elko 13C-2	3 miles north of Wells to 30 miles north, at $8000	27.00	216,000
		New construction—Sub-total	40.09	$324,650
		Grade Separations		
1	Pershing 1-C	S. P. grade separation near Woolsey		37,420
109-E	Elko 24-B	W. P. grade separation near Wendover		34,820
		Grade separation—Sub-total		$72,240
		TOTAL	223.28	$1,532,848

mainder will be distributed among the smaller cities of the state.

State Maintenance—For maintenance during 1930, the Department of Highways has estimated the total

S. C. DURKEE
State Highway Engineer, Nevada

expenditure at $475,000, bringing the entire highway program for the year to $2,893,530.

Personnel—Administrative assistants at Carson City include: W. A. Young, assistant state highway engineer; H. D. Mills, office engineer; and E. C. Pohl, chief accountant.

NEW MEXICO STATE HIGHWAY PROGRAM FOR 1930

By W. C. DAVIDSON*
State Highway Engineer, New Mexico Highway Department, Santa Fe

The year 1930 promises to be a banner one for the department from the standpoint of program and accomplishments.

The Program—Providing authorized highway debentures in the amount of $2,600,000 are sold, the estimated program will be in the neighborhood of $8,000,000, or larger by over a million dollars than any previous year. This does not take into account any proposed increase in Federal Aid.

The estimated program for the calendar year of 1930 is given in Table VI.

TABLE VI

Federal Aid (new) 225 miles	$3,000,000
Federal Aid (carry over)	350,000
State construction (new)	1,145,000
State construction (carry over)	500,000
Maintenance (5300 miles)	1,300,000
Resurfacing and oil processing of 250 miles	1,100,000
Administration and engineering	275,000
Surveys	50,000
Signs	25,000
Emergency	100,000
Equipment	150,000
Total	$7,995,000

Personnel—The administrative assistants under W. C. Davidson are: D. W. Thornburg, assistant state highway engineer; F. L. Haralson, office assistant and auditor; E. B. Bail, construction engineer (Albuquerque); E. B. Van De Greyn, bridge engineer; B. R. Thomas, chief draftsman; R. W. Bennett, office engineer; C. O. Faulk, assistant office engineer; G. C. Lassetter, engineer of surveys; E. H. McGill (Chama) and R. P. Nelson (Wagon Mound), location engineers; L. C. Campbell, materials engineer (Las Cruces); Ladd Haystead, service bureau. There are four districts, as follows: district 1—Deming, district 2—Roswell, district 3—Albuquerque, and district 4—Springer. In district 1, Sam P. Fulton is district engineer, C. G. Willhoite and G. D. Hardaway are assistant district engineers, and W. Crowder is maintenance engineer. B. F. Kelly is district engineer of district 2 and H. H. Robins and L. J. Vauchelet are assistant district engineers. Frank Kimball is district engineer of district 3, A. E. St. Morris is district maintenance engineer, and J. S. Taylor is assistant district engineer. In district 4, P. M. Bowen is district engineer, R. M. Howard is assistant district engineer, and J. R. Galey is district construction and maintenance superintendent. J. S. Taylor is superintendent of the highway training school at Encino.

*Member, American Society of Civil Engineers.

OREGON STATE HIGHWAY PROGRAM FOR 1930—ALSO A REVIEW OF THE 1929 SEASON

By ROY A. KLEIN†
State Highway Engineer, Oregon Highway Commission, Salem

General Program

Federal Aid—The State Highway Commission is assured of approximately $7,000,000 for highway construction and betterments in 1930. This sum includes the Federal Aid allotment.

Forest Roads—There will also be spent about

ROY A. KLEIN
State Highway Engineer, Oregon

$580,000 of Government funds and additional amounts from the state and counties on a forest highway program, totaling $1,000,000.

Maintenance—The maintenance program, including oiling, will require an expenditure of $3,000,000. If additional Federal Aid appropriations are made, the State Highway Commission has ample authority under the law to match any Government funds which may be available.

Oiling and Bituminous Macadam—The 1930 oiling and bituminous macadam program is:

Oiling	267 miles
Re-oiling	265 miles
Bituminous macadam	264 miles
Non-skid surface treatment for bituminous pavement	182 miles

†Member, American Society of Civil Engineers.

Major Construction and Early Contracts

Roosevelt Coast Highway Grading—Major construction for the season will be grading and macadam surfacing, with a few miles of pavement. It is probable that the largest grading projects will be on the Roosevelt coast highway, where 12 miles of heavy grading have already been programmed for early letting.

Rogue River Bridge—The Highway Commission will receive bids on January 16 for a reinforced concrete bridge on the Roosevelt coast highway at the mouth of the Rogue river. This bridge will consist of seven 230-ft. arch spans and 328 ft. of viaduct. The estimated cost exceeds $600,000.

Ochoco Highway Grading—Grading of the remaining 12-mile unit of the Ochoco highway has been authorized, bids to be received in January. This project will complete the first east and west cross-state road through Central Oregon, connecting the Snake river valley at Ontario with the Willamette valley at Eugene and greatly shortening the distance by routes now existing.

Review of the 1929 Season

The following statistics (as of December 20, 1929) show the progress made in extending and improving the Oregon road system during the last calendar year:

Work Completed and Under Contract

a. New Construction:

TABLE VII

	Miles Completed During 1929
Paving	3.8
Bituminous macadam wearing surface	50.2
Oiled macadam	232.6
Rock surfacing	51.0
Grading	113.3

b. Betterments:

Repaving	4.4
Resurfacing macadam	68.7
Re-oiling macadam	546.0
Regrading and widening	48.8

Improvements on State Highway System at End of 1929:

	Miles
Pavement	899.2
Bituminous macadam	161.8
Oiled macadam	1,302.6
Rock surfacing (not oiled)	1,190.1
Graded (not surfaced)	307.0
Unimproved	507.6
Total	4,368.3

Amounts Expended Under Supervision of State Highway Commission During 1929:*

New construction or betterment	$ 3,630,000
Maintenance	3,200,000
Co-operation on Forest Road projects	82,000
Principal on bonds	1,825,000
Interest on bonds	1,503,578
Operation of ferries and draw bridges	70,000
Enforcement of traffic laws	75,000
Equipment	425,000
Right-of-way, quarries, parks, etc.	135,000
Administration and general supervision	260,000
Surveys	70,000
Miscellaneous	30,000
Total	$11,305,578

Income from Different Sources During 1929:*

a. State Funds:

Motor vehicle license fees	$5,422,144	
Gasoline tax	5,000,000	
Motor transportation fees	126,109	
Interest on bank balances	50,000	
Fines for traffic law violations	25,000	
Sub-total		$10,623,253

b. Other Funds:

Federal aid	$ 650,000	
County cooperation	500,000	
Cooperation from railways and others	10,000	
Sub-total		1,160,000
Total income during year		$11,783,253
Plus balance on hand at beginning of year		769,268
Total		$12,552,521

Personnel—Administrative assistants at Salem are: S. H. Probert, office engineer; L. E. Parsons, assistant office engineer; H. B. Glaisyer, chief clerk; E. A. Skelley, chief draftsman; C. B. McCullough, bridge engineer; G. S. Paxson, assistant bridge engineer; R. H. Baldock, maintenance engineer; N. M. Finkbiner, testing engineer; L. P. Campbell, equipment engineer; J. H. Schott, market road engineer; E. A. Collier, assistant market road engineer. The five division engineers are: W. D. Clarke, Salem, and J. S. Sawyer, Salem; H. G. Smith, La Grande; Wm. E. Chandler, Grants Pass; and C. W. Wanzer, Bend.

WASHINGTON STATE HIGHWAY PROGRAM FOR 1930—ALSO A REVIEW OF THE 1929 CONSTRUCTION SEASON

By SAMUEL J. HUMES
Director of Highways, Olympia

Review of the 1929 Season—The 1929 construction season in Washington was extremely favorable for highway work and resulted in a much larger expenditure of funds than would ordinarily be experienced in a normal construction season. The rainy season usually sets in during the early part of September. Construction is ordinarily much retarded from that time on, and little is accomplished after the first of October. In 1929, however, construction proceeded at full blast during September, October, and November, advancing the normal season two months.

SAMUEL J. HUMES
Director of Highways, Washington

A general review of the 1929 program shows that in addition to ordinary maintenance, 114 contracts were awarded during the calendar year, involving:

- 50 miles of concrete paving
- 56 miles of grading
- 58 miles of grading and surfacing
- 107 miles of new crushed rock or gravel surfacing
- 442 miles of resurfacing of existing roads
- 33 bridges over 20 ft. long
- 707 miles of oiling.

*Amounts given are estimated. Exact amounts are not yet available.

Carryover to 1930—Of the above construction contracted during 1929, there will be carried over into this season 34 uncompleted contracts, involving:

34 miles of grading
43 miles of grading and surfacing
57 miles of new surfacing
89 miles of resurfacing
16 bridges over 20 ft. long.

In addition to that portion of the work completed during 1929, about $2,700,000 was carried over from the 1928 construction season and completed during 1929.

1930 Program Outlined

The 1930 program for new construction, maintenance, betterment, and reconstruction will require $10,000,000, in addition to expenditures to complete existing contracts now under way.

Reviewing the tentative program for 1930 and the estimated revenues to be derived during this year, it is apparent that it will not be possible to contract all of the work for which appropriations have been made, as only 80% of the revenues for the biennium will be available up to December 1, 1930. Further, the appropriations for the biennium exceed the estimated revenues for the corresponding period by some $2,200,000. However, all of the work for which appropriations have been made will be placed under contract as soon as funds become available to meet current obligations under such contracts.

Construction to be undertaken early during the coming season involves:

43.4 miles of concrete paving
10.7 miles of grading
31.4 miles of grading and surfacing
107.0 miles of new surfacing
315.0 miles of heavy oiling
9.0 separate bridge contracts.

This work is divided as follows:

State Road No. 1

Construction of bridge over Lake Union, Seattle, in co operation with city and county.
Paving 2.3 miles of waterfront road in Skagit county.
Paving 1.6 miles in city of Bellingham, in cooperation with city.
Paving 17.5 miles between Seattle and Tacoma in King county.
Paving 4.1 miles between Fort Lewis and Nisqually in Pierce county.
Grading and surfacing 2 miles at the summit on the Austin Pass road.
Grading and surfacing about 2.5 miles, Everett city limits-Broadway south.

State Road No. 2

Paving 3.3 miles between Redmond and Fall City.
Heavy oiling 80 miles between North Bend and Wenatchee.
Heavy oiling 76 miles between Orondo and Wilbur.

State Road No. 3

Grading 7.7 miles from Swauk Creek to Ellensburg city wells, between Cle Elum and Ellensburg.
Constructing 660-ft. concrete arch bridge over Yakima river at Prosser.
Grading and surfacing 1.9 miles between Colfax and Pullman.
Paving 8 miles from Freedom to North Pine, between Spokane and Colfax.
Heavy oiling 32 miles between Prosser and Walla Walla.
Heavy oiling 30 miles between Pomeroy and Clarkston.
Heavy oiling 30 miles between Central Ferry and North Pine.
Heavy oiling 22 miles between Chewelah and Colville.

Inland Empire Highway—Eastern Route

Constructing 82-ft. concrete bridge at Pullman in cooperation with city and county.
Surfacing 13.8 miles, Pullman to Colton.

State Road No. 4

Bridges, and surfacing 15 miles between Columbia river and Cache creek in Ferry county.

State Road No. 5

Paving ½ mile, King county line south, between Auburn and Sumner.
Paving 1.7 miles between Sumner and Puyallup.
Surfacing 5.2 miles between Elbe and Carlson.

State Road No. 6

Grading and surfacing 3.4 miles between Spokane county line and Diamond lake.
Purchase of Metaline Falls bridge.

State Road No. 8

Grading 8.3 miles from Maryhill west.
Grading and surfacing 8.5 miles between Goldendale and Toppenish.
Surfacing 10 miles between Goldendale and Toppenish.
Surfacing 7 miles between Wing creek and Wind river.

State Road No. 9

Surfacing 12.7 miles between Kalalock creek and Cedar creek.
Constructing 138-ft. concrete T-beam bridge over Kalalock creek.
Constructing 360-ft. steel bridge and approaches over Hoh river.
Paving 6 miles of Port Townsend-Ludlow road.
Bridge at Bear creek crossing.

State Road No. 10

Grading and surfacing 1 mile, Methow river bridge approach at Pateros.
Grading and surfacing 3 miles between Orondo and Chelan Falls.
Heavy oiling 45 miles between Wenatchee and Okanogan.

State Road No. 12

Paving ¾ mile, Raymond city limits.
Surfacing 1.8 miles, Raymond east.
Grading and surfacing 1 mile at Fort Columbia.
Surfacing 13.9 miles, Stella to Cathlamet.
Reconstructing Naselle bridge.

State Road No. 13

Surfacing 16.8 miles between Raymond and Aberdeen.

State Road No. 21

Grading and surfacing 2 miles between Silverdale and Keyport.

Miscellaneous

Reconstruction of portions of Lake Samish road between Mt. Vernon and Bellingham.
Construction of bridge, Queets river-Harlow crossing.

Major Projects for 1930—There are two outstanding projects in the 1930 program, namely: paving State Road No. 1 between Seattle and Tacoma, and construction of the Lake Union bridge. The paving between Seattle and Tacoma will complete the construction of a double-track pavement, that is: two 20-ft. strips, or 4 traffic lanes, between these points. This highway will then have one of the highest class pavements in the west. The Lake Union bridge will be 3200 ft. long, including approaches. The main span will be 800 ft. long, consisting of two 325-ft. cantilever arms with a 150-ft. suspended span. On the north side will be a 350-ft. anchor arm and on the south side a 300-ft. anchor arm. The remainder of the bridge will consist of approach spans composed of trusses, plate girders, and concrete.

Maintenance—The maintenance program for 1930 covers 3400 miles of state highways and will involve an expenditure of $1,500,000. This road mileage is divided as follows:

Cement concrete paving—763 miles
Asphaltic concrete paving—68 miles
Brick paving—10 miles
Crushed rock or gravel surfaced roads—1694 miles
Heavy oil surfaced roads—726 miles
Dirt roads—140 miles.

Personnel—The administrative staff at Olympia includes: Samuel J. Humes, director of highways; T. G. McCrory, chief engineer; H. G. Porak, construction engineer; L. R. Turnbull, office engineer; R. A. Patten, equipment engineer; J. W. Hamilton, maintenance engineer; J. D. MacVicar, right-of-way engineer; O. R. Elwell, bridge engineer; and A. W. Peck, department auditor. The district engineers of the six districts are: Geo. H. Shearer, district 1, Seattle; John Duff, district 2, Wenatchee; O. R. Dinsmore, district 3, Olympia; W. A. Schwarz, district 4, Vancouver; E. C. Simpson, district 5, Yakima; and L. V. Murrow, district 6, Spokane.

UTAH STATE HIGHWAY PROGRAM FOR 1930

By H. S. KERR†
Chief Engineer, Utah Road Commission, Salt Lake City

Federal Aid Projects—The construction program for 1930, based on Federal Aid, totals $1,258,000, and is divided as shown in Table VIII.

†Member, American Society of Civil Engineers.

TABLE VIII

Location	U. S. Route No.	State Route No.	Miles	Estimated Cost	County
Red Narrows-Thistle	U.S. 50		5.8	$ 120,000	Utah
Ford Creek Bridge	U.S. 50			20,000	Carbon
Woodside-Green River	U.S. 50		14.0	145,000	Emery
Green River-East	U.S. 50		20.±	100,000	Grand
Grading Death Curve Revision	U.S. 91		0.75	29,000	Weber
Kanab-Arizona Line	U.S. 89		4.0	35,000	Kane
Manti-Gunnison	U.S. 89		7.9	80,000	Sanpete
Three Lakes Canyon	U.S. 89		3.0	75,000	Kane
Boxelder County	U.S. 30-S		12.8	160,000	Boxelder
Morgan-Summit County Line	U.S. 30-S		7.7	130,000	Morgan
Morgan County Line-Henefer Flat	U.S. 30-S		0.6	12,000	Summit
Wasatch-Wyoming State Line	U.S. 30-S		5.9	70,000	Summit
Chalk Creek Bridge	U.S. 530			10,000	Summit
Lambs Canyon-Summit	U.S. 40		3.0	70,000	Salt Lake
Salt Creek Canyon	U.S. 189		7.0	85,000	Juab
Tooele Overhead		S.R. 36	1.5	42,000	Tooele
Toguerville-LaVerkin		S.R. 15	3.0	75,000	Washington
				Total—$1,258,000	

Tentative State Expenditures, non-Federal Aid add $1,850,000 to the foregoing estimate. Of this, $500,000 is provided for oiling 130 miles of road, $350,000 for miscellaneous construction, and $1,000,000 for maintenance.

Present Construction—The status of present construction, as of December 14, 1929, with corrections to December 21, 1929, is given in Table IX.

H. S. KERR
Chief Engineer, Utah State Road Commission

During 1929, notable progress was made in the improvement of U. S. Routes 30-S and 40, including reductions in mileage. With the improvements outlined for 1930, U. S. Route 30-S will be surfaced throughout. U. S. Route 40 is surfaced from Salt Lake to Wendover and from Salt Lake east to Vernal, with the ex-

TABLE IX

Project No.	Name	County	Type	Length	Estimated Cost	Initial Date	Contract Days	% Comp.
7-C	Peter's Wash and Hudson Cr. Bridges	San Juan	Wood truss	208 ft.	$ 16,434	9- 9-29	125	58*
42-A and 65-D	Heber City	Wasatch	Concrete	0.764 mi.	29,615		60	Suspended
62-E	Mt. Green-Peterson	Morgan	Gravel	3.062 mi.	32,482	9-14-29	70	72*
62-E	Cottonwood Creek Bridge	Morgan	I-beam	48 ft.	6,715		90	No report
75-A	Bridge near Green River	Emery	Wood truss	83 ft.	5,190	9- 9-29	125	11
95-C	Nolan-Beaver Creek	Carbon and Utah	Graded	6.147 mi.	221,903	8-31-29	250	32*
S.P. 219	Curlew Valley Jct.-Snowville	Boxelder	Graveling	17.06 mi.	37,725	8-15-29	133	100
S.P. 225	Timpie-Dolomite	Tooele	Gravel	3.96 mi.	31,000	10- 8-29	70	100
S.P. 226	Spring City-Pigeon Hollow	Sanpete	Gravel	5.63 mi.	18,144	10-14-29	60	100
S.P. 228	Tooele-Mills Junction	Tooele	Gravel	5.287 mi.	19,858	10-21-29	70	100
S.P. 229	Death Curve-24th St.	Weber	Graded	4.118 mi.	14,146	10-26-29	60	100
S.P. 230	Recapture Wash Bridge	San Juan	I-beam	115 ft.	7,470		75	
S.P. 231	Farmington-Weber Canyon	Davis	Graded	3.395 mi.	17,675	12- 9-29	75	35
S.P. 232	Price River Bridge and Approaches	Carbon	Gravel	0.46 mi.	18,911		90	0
S.P. 234	Ogden-Hooper Resurfacing	Weber	Gravel	9.1 mi.	11,976		75	0

*Not reported as of December 21.
Projects 7-C to 95-C, inclusive, are Federal Aid and those marked S. P. are state projects.

ception of the 16 miles between Heber and Fruitland. One highway, U. S. 91, is now surfaced throughout, and 40% of this route is paved.

County Road Programs—Construction and maintenance of county roads during 1930 will probably amount to $1,200,000.

Cities—A considerable amount of paving appears to be programmed for Salt Lake City and Provo. The latter city is outlining an unusually large paving program.

WYOMING STATE HIGHWAY PROGRAM FOR 1930, ALSO A REVIEW OF THE 1929 CONSTRUCTION SEASON

By Z. E. SEVISON*
State Highway Engineer, Wyoming Highway Department, Cheyenne

Construction—Funds for construction and maintenance of the State Highway System for 1930 are approximately the same as were available in 1929 and 1928, thus the program that may be carried out will be similar to those of the two preceding years. The amount of Federal Aid available from the congressional appropriation of $75,000,000 is $942,000. State funds to match this sum will be available in the amount of $640,000, and additional state funds for state

Z. E. SEVISON
State Highway Engineer, Wyoming

projects will approximate $110,000, so that the 1930 construction program will total $1,700,000.

Divisions—The different classes of work to be undertaken will include:

Grading and draining—120 miles
Gravel and crushed stone surfacing—190 miles
Asphaltic oil treatment—140 miles
Regrading and resurfacing—50 miles.

Maintenance—Funds available for regular maintenance will total $780,000, and this amount will be expended in maintaining 2950 miles of the state highway system. Expenditures for administration and engineering, property and equipment, will approximate $280,000, so that the total estimated expenditures of the State Highway Department for 1930 will be $2,750,000.

Other Agencies—No definite data are available as to the proposed expenditures by counties, cities and towns, but judging by past experience this amount will be about $950,000.

*Member, American Society of Civil Engineers.

1929 Highway Improvement in Wyoming

Financing—The Wyoming Highway Department, since 1927, has been financed on the basis of a 10-year program for the completion of the entire state highway system to a uniform gravel-surfaced standard. Funds for maintenance, construction and matching Federal Aid were made available by the 1927 Legislature. All of the 3-cent gasoline tax was provided for maintenance and asphaltic treatment; and motor vehicle license fees, together with the part of the federal oil royalties accruing to the state, were made available for state construction and for matching Federal Aid. Such a financial program provides about $1,900,000 per year for construction and $1,000,000 for maintenance, resurfacing and asphaltic oil treatment.

Status of the Road System—Over one-half of the state highway system has been brought to a standard uniform surface and at the end of the 1929 season there remained 863 miles to grade and drain and 1313 miles to surface. Asphaltic oil treatment is being applied to completed work as rapidly as possible, a total of 192 miles of such treatment has been made and the surface is proving highly satisfactory both to the traveling public and to the Department officials.

1929 Construction—During 1929, 140 miles were graded and drained ready for surfacing, 160 miles were surfaced, 99 miles were regraded and resurfaced, and asphaltic oil treatment was applied to 105 miles. The work was largely of a routine nature, required for filling in gaps between completed projects. Rapid progress is being made in closing these gaps, so that long sections of continuous and surfaced highways are now available on the important trunk lines.

Winter Maintenance and Snow Removal—Probably the most important feature of the department's work during the past season has been to provide for winter maintenance and snow removal on about 2000 miles of the more important highways. This mileage covers the heavily traveled roads outside of the strictly mountain areas. Some snow removal work has been done in previous years in certain sections of the state, but this covered only a limited mileage. The increased travel and demand for satisfactory highways throughout the year made it necessary for the highway commission to authorize the purchase of a considerable amount of new equipment in the fall of 1929, which would be suitable for snow removal work and would make possible the accomplishment of winter maintenance on an efficient basis.

Asphaltic oil treatment has been successfully developed by the Wyoming Highway Department, the first work of this kind being undertaken in 1924. The results obtained from the first two years of treatment were not satisfactory, due to the unsuitable grade of oil which was used. The oil industry became sufficiently interested to bring about the production of a road oil from the asphaltic base crudes obtainable in Wyoming, so that in the past three years it has been possible to use an oil which is comparable with that obtainable anywhere. Wyoming now has about 1200 miles of surfaced roads to which this treatment is adapted, and the department plans to proceed with

this class of work as rapidly as funds can be made available. The program is limited at the present time to 100 to 150 miles per year, but additional finances are in prospect through the state bond issue to be voted on by the people in November, 1930. This bond issue, if adopted, will permit of a much greater mileage of asphaltic oil treatment in the subsequent years.

Personnel—The assistants handling the different divisions of the department's work are: C. C. Warrington, office engineer; C. F. Siefried, engineer of design; W. H. Fisher, engineer of bridges; J. E. Pierson, engineer of equipment; W. E. Davis, secretary and accountant. The district engineers are: R. J. Templeton at Rock Springs; C. H. Bowman at Casper; Talcott Moore at Sheridan; J. G. Smith at Basin; G. D. Corwine at Newcastle; and G. W. Marks at Rawlins.

DETAILS OF THE ARIZONA PROGRAM

Probable 1930 Construction

U.S. Route 80—From Yuma to Phoenix—Complete the unpaved sections on this route to an oil surface standard; 116 miles.

From Phoenix to the Florence-Superior Jct.—To complete the unpaved sections to an oil surface standard; 21 miles.

From Tuscon to Benson—21 miles of oil surface—the remainder of the work to consist of reconstruction, straightening the alignment and widening.

Benson to Tombstone—15 miles reconstruction and oil surfacing.

Douglas to New Mexico state line—54 miles of reconstruction and oil surfacing.

Completion of the Agua Fria bridge.

Completion of the Tempe bridge.

U.S. Route 180—Oil surfacing Florence-Superior Jct. to Miami—36 miles.

Oil surfacing from Globe east—54 miles.

Reconstruction of 20 miles between Bylas and the end of the paving west of Safford.

Reconstruction from Duncan to the New Mexico state line—7 miles.

U.S. Route 66—Reconstruction by oil surfacing between Holbrook and New Mexico state line—approximately 40 miles.

Holbrook to Winslow—reconstruction and oil surfacing—32 miles.

Winslow to 24 miles east of Flagstaff—35 miles oil surfacing.

From Flagstaff to Ash Fork—relocation.

Ash Fork west 7 miles—reconstruction.

Seligman 6 miles west—reconstruction.

In the vicinity of Peach Springs—18 miles reconstruction.

Between Kingman and Topock—10 miles oil surfacing.

U.S. Route 70—Springerville to New Mexico state line constructed to gravel surface standard—16 miles.

U.S. Route 91—Northwestern corner of the state—19 miles of new construction and oil surfacing.

U. S. Route 89—Connect paving into town of Nogales—1 mile.

Additional reconstruction Nogales north—17 miles.

Pima county line towards Tucson—12.5 miles reconstruction, with approximately 25 miles of oil surfacing additional for this highway between Tucson and Nogales.

U.S. Route 89—Phoenix to Prescott—30 miles of oil surfacing.

From Flagstaff north—80 miles of construction, Cameron to Grand Canyon bridge.

Construction from Fredonia to Utah state line—6 miles.

Between Tucson and Phoenix, by way of Picacho, Coolidge, and Chandler—55 miles of construction and reconstruction; 30 miles of additional surfacing; and approximately 85 miles of oil surfacing.

To complete the construction now in progress between Casa Grande and Gila Bend—58 miles.

Some work will in all probability be started on the new route between Globe and Springerville. Also, some additional work will probably be done on the Wickenburg-Ehrenburg route; and some between Jerome and Flagstaff on the Oak Creek canyon section. The amount of work to be done upon these projects is problematic at this time.

(For additional information and personnel see page 6.)

Pacific Coast Building Construction for 1930

In a special bulletin, the National Monthly Building Survey of S. W. Straus & Co. reports an estimated 1930 expenditure of over $400,000,000 for new buildings on the Pacific coast. Present conditions indicate that building activity in practically every city within the area will be appreciably greater during 1930 than in 1929. By speeding up the program of public building construction, normally amounting to 8 to 10% of the total annual program, this estimated total would be materially increased.

An analysis of 100 Pacific coast cities made by S. W. Straus & Co. shows the following yearly totals for new building permits:

Year	Total	Remarks
1925	$546,610,000	Post-war peak.
1926	500,620,000	
1927	452,750.000	
1928	410,690,000	
1929	370,000,000	Estimated.

As the major portion of money expended for new building construction is borrowed money, building activity is largely dependent on the availability of funds which might be borrowed at interest rates justified by the projected enterprises. Recent cessation of popular participation in the stock market is said to again make available the funds necessary for building construction.

Los Angeles Metropolitan Sewer Project

The Los Angeles County Sanitation Districts have obtained a permit from the California State Board of Health for construction of the White Point outfall sewer. This sewer is required to provide adequate capacity for Long Beach. Condemnation proceedings to secure the remaining rights-of-way from the Palos Verdes estates to the ocean, 2 miles, have been started. A right-of-way through 4 miles of line on the Los Angeles city shoestring strip has already been obtained. A bond election for the outfall probably will be held during March.

The outfall will be laid beside an existing sewer crossing the city's shoestring strip, then through Los Angeles county territory to the Palos Verde hills. The outfall will consist of a concrete pipe, inside diameter 6 to 8 ft., laid in a tunnel 5000 ft. long. (See previous issues for progress from 1926 to date.)

A. K. Warren is chief engineer and A. M. Rawn is assistant chief engineer of the Los Angeles County Sanitation Districts.

Federal Building Program

On December 16, 1929, the House of Representatives passed the Elliott bill, authorizing the expenditure of $230,000,000 for construction of federal buildings in the United States.

CALIFORNIA POWER PROJECTS

By E. W. KRAMER*
District Engineer, Federal Power Commission, San Francisco

The use of electric power in California shows an 11% increase during the year 1929. The electrical power output during the year reached a total of 8,900,000,000 kw.hr., of which 72% was generated by hydro and 28% by steam plants.

California still greatly exceeds any state in output of hydro, and is second only to New York in total output of electrical power. The total electrical power generated in the United States for the year was 97,000,000,000 kw.hr., of which 35,000,000,000 was hydro and 62,000,000,000 steam. California's percentage of this was 18 for hydro and 4 for steam.

Due to the enormous amount of generating capacity placed in operation during 1928, the amount of new installation brought to completion in California in 1929 was relatively small; the total being 70,000 kw., of which 35,000 kw. was hydro and 35,000 kw. steam. This installation included an additional 35,000 kw. unit in the Big Creek No. 8 hydro plant of the Southern California Edison Co., and a 35,000-kw. unit in the San Francisco steam plant of the Great Western Power Co. The additional unit was added to the Big Creek No. 8 plant to utilize the water made available through the development of the Shaver lake reservoir, completed in 1928 with 138,000 ac.-ft. capacity.

With the 1929-additions, the total generating capacity in California is 3,619,000 hp., distributed as follows:

	Horsepower
So. Calif. Edison Co.	1,131,000
Pacific G.&E. Co.	922,000
Gr. West. Pr. Co.	334,000
Los Angeles Gas & Elec. Co.	230,600
San Joaquin L.&P. Corp.	230,000
City of Los Angeles	178,000
San Diego G.&E. Co.	122,000
City of San Francisco	111,000
So. Sierras Pr. Co.	109,000
†Calif. Oregon Pr. Co.	78,300
Turlock-Modesto Irr. Dist.	53,200
City of Pasadena	51,000
Merced Irr. Dist.	41,800
Snow Mtn. W.&P. Co.	12,000
Coast Counties G.&E. Co.	3,000
Utica Power Co.	2,900
†Sierra Pacific Pr. Co.	2,000
Escondido Dist.	800
U. S. Government	6,000
	3,619,000

The Pardee dam (Lancha Plana dam) of the East Bay Municipal Utility District, on the Mokelumne river below the developments of the Pacific Gas & Electric Co., was completed during the year. It impounds 230,000 ac.-ft. of water for municipal purposes. A power plant is being constructed immediately below the dam with an installation of 15,000 kw., which will go into operation early in 1930.

The principal hydro project under construction is the Salt Springs reservoir of the Pacific Gas & Electric Co., which with a storage capacity of 120,000 ac.-ft., will materially increase the annual output of the Electra power house on the Mokelumne river below, make economical its enlargement, and the construction of the Tiger creek power plant also on the Mokelumne river. It is expected that the Salt Springs dam will be completed in 1931. The Tiger creek project, consisting of a 20-mile concrete canal and a powerhouse with a proposed installation of 43,000 kw., was begun during the year.

The Pacific Gas & Electric Co. also began and is rushing work on remodeling its Station A steam plant in San Francisco. The capacity will be raised from 85,000 to 300,000 hp., consisting of four giant units, two of which will be installed at once. It is expected that the station will be completed in five years.

Construction on the Lyons dam of the Pacific Gas & Electric Co., which will impound 5800 ac.-ft. of water, started in 1929 and will be completed in 1930. It will enable the company to meet its water commitments for domestic and irrigation use in Tuolumne county, and allow more water to be diverted from the south fork of the Stanislaus river to the Spring Gap and Stanislaus plants.

The Utica Mining Co. began active construction on its Spicers meadows reservoir on Highland creek, a tributary of the north fork of the Stanislaus river, in 1929. It will be completed in 1930 to a capacity of 9000 ac.-ft. The ultimate capacity is 60,000 ac.-ft. This reservoir will furnish additional water at the Murphys and Angels Camp powerhouses.

The construction of a second unit in the Long Beach steam plant No. 3 of the Southern California Edison Co. is proceeding in accordance with the company's program to have this unit of 100,000-kw. in operation by March, 1930.

The San Joaquin Light & Power Corp. (Great Western Power Co.) plans to enlarge its Merced Falls plant on the Merced river by installing a 4000 kva. unit. The present capacity is 500 kw. This corporation is also designing a 35,000 kw. steam plant to be located at Buttonwillow and completed in 1931.

The increase in steam generated kilowatt hours was from 10% of the total in 1928 to 28% in 1929.

Preparation for, and actual application of use, of natural gas for the generation of electrical power in California was of the utmost importance during the year. This is evidenced by the gas pipe-lines constructed into the San Francisco bay region and the changing of the constructed steam plants of the Pacific Gas & Electric Co. from the use of oil to natural gas. Up to November 30, last year, 14,070,912,300 cu.ft. of gas had been used at the Long Beach steam plant of the Southern California Edison Co. This is equivalent to 2,735,000 bbl. of fuel oil. During the same period only 21,749 bbl. of actual fuel oil was burned. For the total year of 1930 it is expected that the Southern California Edison Co. will make use of 15,600,000,000 cu.ft. of natural gas.

†California plants only.
*Member, American Society of Civil Engineers.

Missouri River Bridge, Montana

State Highway Commission Constructing Steel Bridge, 1060 ft. Long, 6 Miles Below Wolf Point

By M. S. HOPKINS

Bridge Engineer, Montana State Highway Commission

As part of its 7% Federal Aid system, the Montana State Highway Commission is building a bridge over the Missouri river six miles below Wolf Point. The bridge proper consists of two 275-ft. and one 400-ft. through riveted steel truss spans, with a 50-ft. steel I-beam approach span at the north end and a 60-ft. steel I-beam approach span at the south end. The bridge will have a reinforced concrete deck, 20 ft. wide between concrete curbs.

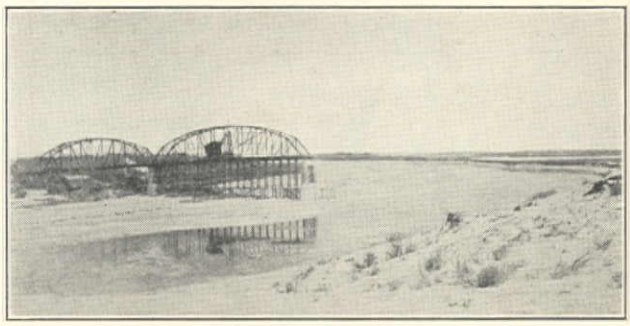
Bridge Site—The north bank of the Missouri river at the bridge site is the low or bar side—a built-up river formation—and is on the inside of a bow. This throws the current against the bluffs on the south side, which are mainly a stiff gumbo and sandstone formation overlying a thick bed of Bearpaw shale. The shale is characteristic of the riverbed in that locality.

Although the main channel is on the south side, the bar on the north side is subject to overflow by high water and ice. Therefore, the bar must be spanned to provide an adequate discharge area.

Design—The bridge is designed for Class 'A' loading H-15, Montana State Highway Commission standard specifications, which is identical with the specifications of the American Association of State Highway Officials.

The pier heights and span cambers are arranged so as to place the entire bridge deck on a vertical curve, with the 400-ft. span level except for a permanent camber of 1 ft. The main channel span provides a vertical clearance of 38 ft. from low steel to maximum high water.

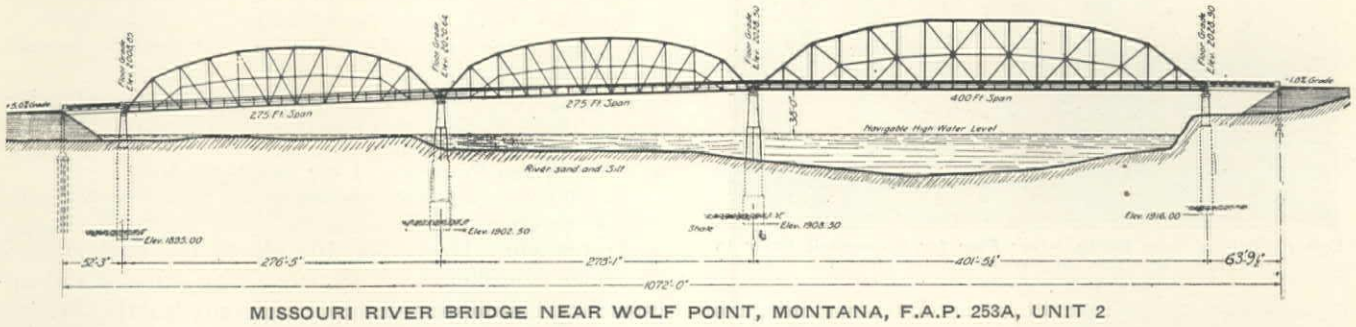
There are two river piers—No. 2 and 3, two shore piers—no. 1 and 4, and two open reinforced concrete pedestal bents—'A' and 'B'—at extreme ends of the approach spans. Bent 'A' at the north end is founded on timber piling in the sand and silt formation overlying the Bearpaw shale. Bent 'B' rests on tough clay overlying the sandstone and shale in the bluff on the south bank. Piers 1 and 4 each consist of twin cylindrical steel caissons, 9 ft. diam., filled with concrete and surmounted with concrete columns and tie beams. Piers 2 and 3 rest on plain concrete caisson blocks, respectively 58 by 17-ft. and 60 by 17-ft. These caisson blocks penetrate 8 ft. into the shale and extend to 66.5 and 60.5 ft. below low water. The caissons are stepped and sloped into the top of the icebreak which supports the columns and top beams. The piers are all of reinforced concrete.



Missouri River Bridge, Looking Downstream from Bluff on South Side, December 13, 1929

Contract and Quantities—The contract was let in January, 1929, to the Missouri Valley Bridge & Iron Co., Leavenworth, Kansas (the only bidder), for $427,644. The quantities and unit prices follow:

Structural steel—2,300,450 lb. at $0.085
Cast steel—29,400 lb. at $0.15
Reinforcing steel—167,600 lb. at $0.06



MISSOURI RIVER BRIDGE NEAR WOLF POINT, MONTANA, F.A.P. 253A, UNIT 2

Class 'A' concrete (1:2:4 mix)—1371 cu.yd. at $40
Class 'B' concrete (1:2½:5 mix)—4129 cu.yd. at $30
Class 'D' concrete (1:2:3 mix)—596 cu.yd. at $28
Unclassified excavation—300 cu.yd. at $5
Caisson excavation—6730 cu.yd. at $8
Concrete curb and rail—238 lin.ft. at $4
Cast-iron floor drains—76 at $6.50
Foundation piling—2100 lin.ft. at $1.50
Hand-placed riprap—1000 cu.yd. at $10

The contract completion date is July 1, 1930.

Construction Methods and Equipment—The contractor built a 5-mile spur from the Great Northern

railway to the north end of the bridge site. All supply cars were switched direct to the job with the aid of a tractor. A locomotive crane handled the steel on the ground and was used for much general work, including pile driving. In addition to the erection hoist, four stationary hoists were employed.

Air for the pneumatic caisson work was supplied by two diesel-operated compressors and for the tools by a gas-operated compressor unit. A double-acting steam pump supplied water for the jets. Electric light was furnished from a generator, direct-connected to a vertical steam engine.

A temporary tramway was built across the river to one side of the piers and back to the concrete mixing plant. This plant was built of timber, with aggregate bins and batch boxes. An inclined track carried the cement skip from the cement shed to a hopper over the mixer. A small gas locomotive was used to pull flat cars, on which dump buckets were set. Three buckets were used, each carrying one 30-cu.ft. batch

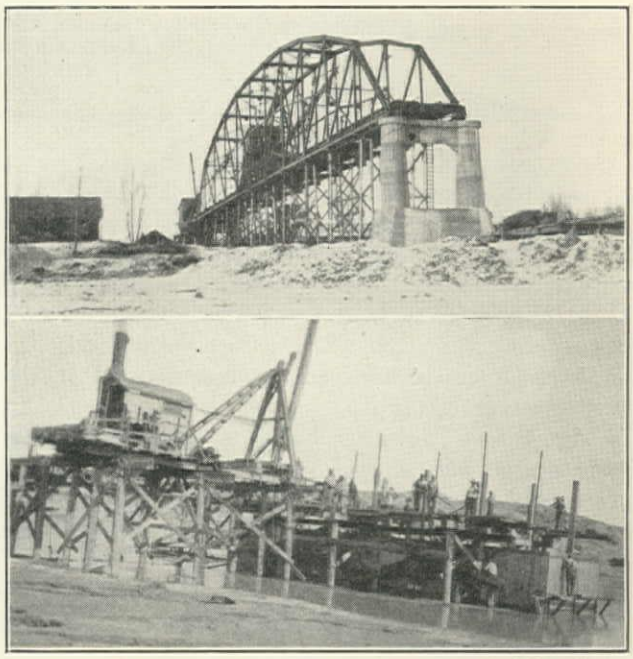
Driving Piling from North River Pier for Falsework Prior to Steel Erection on Missouri River Bridge

of concrete. While the third skip was being dumped, two were returned for another set of batches. A hopper below the mixer received the first batch mixed, so that two batches were always in readiness for the dinkey.

The caissons for all piers were sunk under air. All of the tubular caissons were inclined to get friction bound and at times the larger caissons would hang up. Some loading was used on the tubular caissons. A deep layer of coarse gravel was encountered at piers 1 and 2 and a thick layer of snags at pier 3, which considerably slowed up the work, as a large amount had to be taken out through the shafts.

The equipment list includes:

Two 10-ton, 35-hp. American hoists
One 10-ton, 22-hp. Mundy hoist
One 10-ton, 35 hp. American locomotive crane
One type 2, Model AL, Plymouth gasoline locomotive
One Ford truck
One 20-35 Allis-Chalmers tractor



(Upper) North Span and Pier No. 2 on November 21, 1929. (Lower) Cutting Edge of Caisson for Pier No. 3 About 2.5 ft. Under Water. Crew Caulking Up Preparatory to Sinking Caisson

One 2-cylinder, 6½ by 6-in. high-pressure (120-lb. capacity) Chicago Pneumatic portable air compressor
Two feather valve, 40-lb. Worthington air compressors
Two 90-hp. 2-cycle, solid injection, 7¼ by 10-in. Worthington diesel engines
Two 35-hp. vertical boilers for the steam pumps and electric light plant
One duplex 10 by 6 by 10-in. Gardner steam pump for handling water
One Scranton auxiliary steam pump for handling water
Two 4-in. Emerson steam pumps on the cofferdam
Two No. 80 and one No. 90 Boyer riveting hammers
Three No. 90 Thor riveting hammers
Two Cleveland pneumatic holder-ons (air jams for bucking rivets)
One Boyer and one Ingersoll-Rand high-pressure air spades
Two Ingersoll-Rand jackhamers
Two Ingersoll-Rand pneumatic drift bolt drivers
Two Chicago Pneumatic 'Little Giant' air drills
One 30-ft. T. L. Smith concrete mixer, with Waukesha gas engine drive.

At present (December 16) all of the substructure has been completed. The two 275-ft. trusses and approaches have been erected, but only partly riveted. The remainder of the steel will be erected shortly, but the concrete deck will not be placed or the steel painted until the weather moderates next spring.

The Missouri Valley Bridge & Iron Co. is performing all the work with its own forces and is doing the steel fabrication in its shop at Leavenworth, Kansas.

Personnel—Plans were prepared by the bridge department of the Montana State Highway Commission, R. D. Rader, state highway engineer, and M. S. Hopkins, state bridge engineer. P. M. Hegdal is resident engineer for the state, and John Frazer is the contractor's superintendent.

Monterey County Water Works, California

Synopsis of Paper Read by Chas. S. Olmsted, Superintendent, at the Tenth Annual Convention of California Section, American Water Works Association, at Del Monte, California, October 23 to 26

The Monterey County Water Works had its beginning in rather a peculiar way in 1880 when the original Hotel Del Monte was constructed. Several wells were drilled—one to a depth of 1500 ft.—and other sources of supply in the immediate vicinity of the hotel were investigated, but found insufficient for a project as large as the Hotel Del Monte development. The Carmel river, which empties into the Pacific Ocean south of Carmel 6 miles from the hotel, was finally selected as the most adequate and dependable source of supply.

Diversion Dam—A masonry diversion dam 30 ft. high, equipped with the regulation gate wells, screens, etc., was constructed across the Carmel river at a point 21 miles southeast of Monterey.

The first pipe-line was constructed of pipe of various types and diameters. The first seven miles from the dam is 18-in. diam. riveted iron pipe of 12 gauge. The sheets were fabricated in England, and were rolled, punched, and made up on the job. The pipe was dipped in a tar coating according to the Schussler formula. The next seven miles is 14½ and 15-in. lap-weld pipe; and the remainder is cast-iron pipe (manufactured by R. D. Wood Co.) with lead joints.

Pacific Grove Reservoir—Just back of Pacific Grove and three miles west of Del Monte, at elev. 245 ft. above sea-level, a storage reservoir of 15,000,000 gal. capacity (now known as Pacific Grove reservoir), was built in a draw, with one embankment, the formation under the reservoir being decomposed granite. The outlet from this reservoir is an 8-in. cast-iron pipe-line extending to Del Monte.

Territory Supplied—As soon as the main pipe-line from the Carmel river was completed, the citizens of Monterey demanded water, and thus the Monterey County Water Works came into being. The system now serves water to the cities of Del Monte, Monterey, Pacific Grove, Carmel-by-the-Sea, and intervening territory known as Pebble Beach and the Monterey Peninsula Country Club subdivisions. These are all residential areas with the exception of Monterey, which has an industrial district including several sardine canneries.

The original distribution system in and about Monterey consisted of small screw pipe together with some riveted mains; all of which have been replaced.

Clay Pits—The consumption gradually increased until 1892 when additional storage was necessary, and the Clay Pits reservoir was constructed. The reservoir has a capacity of 140,000,000 gal., is 35 ft. deep, and 285 ft. (top of embankment) above sea-level. It was built in a hog back, the two side embankments being made from material excavated from the reservoir. These fills have a clay puddle core, and are remarkably water tight.

Additional Pipe-Lines—An additional pipe-line was also laid from this reservoir to Del Monte, consisting of two miles of 12-in. and three miles of 16-in. sheet iron pipe; with riveted shop joints and field joints of iron bands caulked with lead.

In 1906 an additional pipe-line was laid to bring more water from the Carmel river. This line begins at the lower end of the first seven miles of 18-in. main and extends fourteen miles to the Clay Pits reservoir; and consists of 22 in. diam., No. 7 and 8 gauge steel pipe with both shop and field joints riveted, and coated inside and out with a hot asphaltic dip. This pipe was manufactured by the Montague Pipe & Steel Co., of San Francisco.

San Clemente Dam and Reservoir—In 1920 it was necessary again to increase the storage, and the San Clemente dam (see front cover illustration) was constructed across the Carmel river about 2000 ft. upstream from the original diversion dam. This dam is a single concrete arch of the Jorgensen constant angle arch type, 107 ft. high above bedrock, 320 ft. long on crest, 34 ft. thick at the base and 4 ft. thick just under the spillway lip. The dam (completed in June, 1921) contains 70,000 cu.yd. of concrete, and the storage capacity of the reservoir formed is 700,000,000 gal. The spillway has 24 openings, each 5½ ft. wide by 11 ft. high. There are iron I-beams on the top along the upstream face for raising the water level 12 ft. with wooden gates or flashboards, after the winter floods have passed; thus increasing the storage capacity 60%. This dam was designed by A. J. Wilcox and built by Chadwick & Sykes, contractors.

Fish Ladder—This dam is equipped with a fish ladder for the steelhead salmon which swim up the Carmel river during spring freshets. The ladder was designed by W. T. Moore, of the Monterey County Water Works, and is unique in design. Except for the first few pools at the top and at bottom, which are cast monolithic in the bedrock, the ladder consists of a series of concrete boxes placed end to end, on loose formation. If one or more of these boxes are washed out, they can be replaced quickly. The steelhead have a 30-in. jump between boxes and a total climb of 70 ft. By the use of flashboards, the amount of water flowing down the ladder may be regulated and the velocity through the opening in the dam to the lake may be kept down, so that the fish can negotiate the ladder without too much effort.

The watershed above the San Clemente dam is 155 sq.mi. in area; the greater portion being within the boundaries of the Santa Barbara National Forest. The

*1930 President, California Section, American Water Works Association.

terrain is mountainous and covered with heavy brush and large oak and other trees, and is sparsely inhabited.

Booster Pump—After the completion of this dam and in order to get additional water through the main pipe-line, a 24-in. pipe was laid connecting the outlet pipes of the dam with the 18-in. pipe-line at Clay Pits reservoir. But, during the past year the use of water increased so rapidly that it was necessary to install a booster pump about three miles below the dam; which is operated during the summer months peak draft period.

New 30-in. Pipe-Line—About four years ago the Pacific Grove reservoir was 'cut-in' on the main distribution system with a check valve, and thus used as a kick-in reservoir; its function being to supply water to the system when the draft on the two pipe-lines from the Clay Pits reservoir reduced the head. This worked well for a while, but last year it became necessary to lay a 30-in. welded steel pipe-line from the Clay Pits reservoir to the center of the distribution system in Pacific Grove; this line being completed in June, 1929. This 30-in. pipe was manufactured by the Western Pipe & Steel Co., of California, and has a shell thickness of ¼ in.; with shop joints electrically welded by machine, then dipped and soil proofed. The laying and field welding was done by our own forces. Dresser couplings were installed at 1000-ft. intervals, and a 30-in. Bailey flow meter at the outlet end into Clay Pits reservoir. When this line was filled and tested there was not a leak.

Booster Pumps—Although the greater part of the territory is served by gravity, there are ten booster pumping plants, and in two places the water is lifted twice; the highest elevation served being 800 ft. above sea-level. These booster plants range in size from 20 to 600 g.p.m., and are all automatically controlled; only one man being necessary to service them each once a day and change the charts.

Chlorination—All water is chlorinated before going into the distributing reservoirs, by a Wallace & Tiernan chlorinator at the outlet of San Clemente reservoir.

Distribution System—There is 192 miles of pipe in the entire system, varying in size from 1 to 30 in. diam. All pipe in the distribution system 4 in. and over in diameter is cast-iron. There are 7170 services, from ½ to 8 in., of which 6500 are metered—3000 Tridents and the remainder Empires. The population served numbers 20,000, which is materially increased during the summer season. The per capita consumption is 112 gal. daily.

The water bills are made out in triplicate; the three copies and the ledger leaf being made in one operation on Underwood billing machines. One copy is mailed to the consumer, the other two copies being sent to the collection offices in the different communities. When the bill is paid, the consumer receives one copy as a receipt, the other going to the accounting department for posting.

American Society of Civil Engineers—The National Annual Spring Meeting will be held in Sacramento, California, April 23 to 26. Make your plans to attend and help the Sacramento Section make this a memorable meeting.

SOUTHERN CALIFORNIA EDISON 1930 PROGRAM TOTALS $24,000,000

The 1930 program of the Southern California Edison Co. for new construction in the ten counties in Southern California served by the company, totals $23,601,000, or $5,500,000 more than expended during 1929.

The 1930 expenditure is the beginning of a definite 5-year program of intensive development. The 1930 improvements will benefit 360 cities and towns in a territory of 55,000 sq.mi. An increase of 35,000 new consumers and a load of 365,000 hp. is anticipated; 15% more than its present load of 1,131,000 hp.

The major single item is $2,000,000 for completion of the second unit of 133,000 hp. at the Long Beach steam plant; to be put into service in March, 1930. The construction of a third unit will be started this year.

Over $10,000,000 has been allocated for extensions and betterments in the Los Angeles metropolitan area; including $773,000 for completion of the La Fresa substation, between Torrance and Redondo, and $550,000 for additional equipment for the Laguna Bell substation, between Montebello and Compton. About $7,000,000 will be used for additional distribution lines and $3,000,000 for transmission lines and extensions.

Another major item is $3,575,000 for the completion of the new Edison bdg. at 5th st. and Grand ave., Los Angeles, which will be 175 ft.sq. and 13 stories high.

Store and garage buildings at Long Beach and Vernon will cost $135,000; and extensions to the company's telephone system to cover the 31 geographic districts, $153,265.

Great Western and San Joaquin Light & Power Co. 1930 Program

The detailed program for 1930 of the Great Western Power Co. and the San Joaquin Light and Power Co. has not been announced, but at least $24,000,000 will be spent for construction and operation; of which at least $13,000,000 will be for new construction. Additional generating capacity is needed, especially in the San Joaquin valley, and if this major project is under taken, a much greater amount will be expended.

Royal Gorge Bridge Dedicated

The highest suspension bridge in the world, 1053 ft. above the Arkansas river at the Royal Gorge, was dedicated December 8, 1929. This bridge, near Canon City, Colorado, has a span of 1260 ft. Its construction saves a 20-mile drive previously required between the north and south approaches.

The Portland (Oregon) Electric Power Co. will spend $4,300,000 on new construction during 1930 or more than twice the 1929 expenditure. One 46,000-hp. steam turbine will be added to the e. Lincoln st. plant and one 40,000-hp. water wheel to the Oak Grove hydroelectric plant. Expenditures on these two units will total $2,602,000.

St. Johns Bridge at Portland, Oregon

By MELVILLE E. REED*
Bridge Engineer, Multnomah County, Portland

Bridge Dimensions—The St. Johns bridge across the Willamette river† will connect the suburb of St. Johns on the east side with St. Helens road on the west. It is of the suspension type with a main span of 1207 ft. and anchor spans of 430 ft. 3 in. each. The center of the main span is 205 ft. above low water.

The east side approach consists of 1284 ft. of steel viaduct and a concrete approach 227 ft. long. The west side approach has 257 ft. of steel viaduct and sidehill graded approaches to the north and south, connecting with St. Helens road.

The total length of bridge and approaches is 8935 ft.

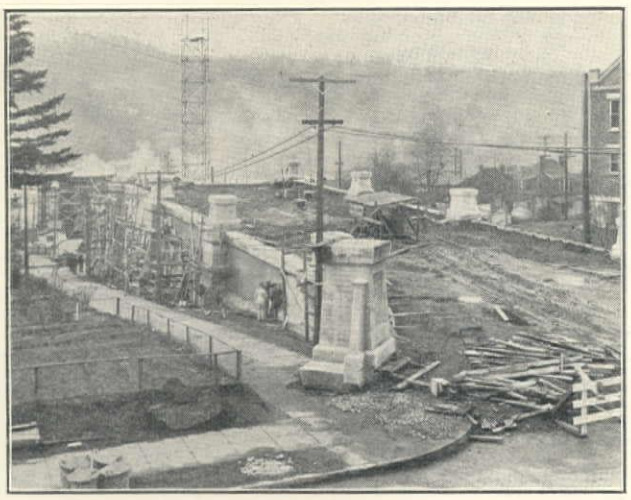
Contracts were let in seven divisions and progress in each division is as follows:

Division A—Substructure (Awarded to Gilpin Construction Co., Portland, Oregon, for $1,029,897).

Due to exceptionally favorable weather, most excellent progress has been made. The east concrete approach and abutment is complete except for railing, sidewalks, and paving, which come under Division F.

Footings for piers 2-7 inclusive are in place. Pier No. 2 is complete and forms for Piers 3 and 4 well under way.

Excavation for the east anchorage is complete and MacArthur concrete foundation piles are being driven



East Approach to St. Johns Bridge, Portland

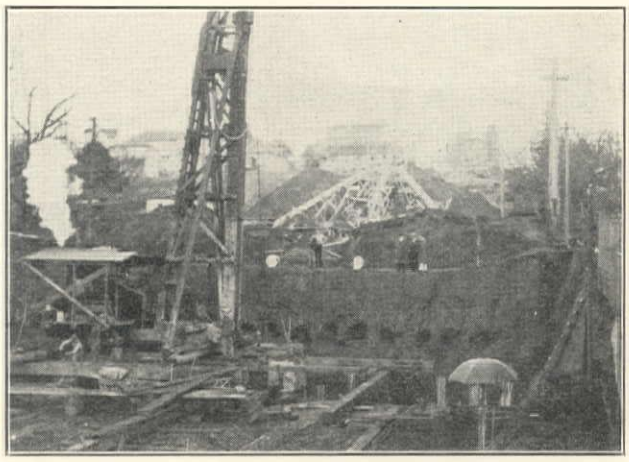
(1052 will be required). These piles are in place of timber piles called for by the specifications.

Footings for Piers 9 and 10 are complete and an Archer Tubular Tower, 215 ft. high, is in place, ready to deliver concrete in the piers. Both these piers rest on timber piles cut off near low water level. The piles are spaced at 3 ft. centers.

Pier 13 on the west side has the footings placed and forms are being set for concrete.

Piers 11 and 12, main cable towers: These piers are just outside the harbor lines. A sub-contract has been let to the Pacific Bridge Co. for the two piers.

Pier 11 will rest on timber piles with cutoff at El. –50 ft. The contractor is using the open cut method. The material has been dredged to the elevation of the bottom of the pier with natural slopes, which proved



Driving MacArthur Concrete Piles for Pier 9, East Anchorage

to be quite flat and require the removal of a large excess of material.

Piles are being driven to cutoff by means of a McKiernan-Terry subaqueous hammer and a specially designed pile driver with leads extending down to cutoff. This method, the same as used at the Burnside bridge, has proved satisfactory, it being necessary for a diver to cut off only a few piles. This pier will require 1068 piles, of which about 900 are now driven.

The timber crib for this pier is complete, ready to be floated into position and sunk as soon as pile driving is completed.

Pier 12—West tower pier: This pier will rest on solid rock at an elevation of about –25 ft. Subaqueous drilling and blasting is completed and rock is being dredged out ready for the timber crib.

Piers 14 and 15 and west cable anchorage: Preliminary rock excavation is under way, preparatory to excavation of the anchor tunnels which will be in solid basaltic rock. These tunnels will be about 80 ft. long.

Division B—Bridge Steel (Awarded to Wallace Bridge & Structural Steel Co., Seattle, Washington, for $986,446).

A subcontract for part of the steel has been let to the Bethlehem Steel Co.

Shop plans are being submitted for approval and standard shapes are being assembled at Seattle for fabrication.

*Member, American Society of Civil Engineers.
†A short description of the bridge, by Melville E. Reed, was given in the July 25th, 1929, issue, p. 377.

Division C—Cables (Awarded to John A. Roebling's Sons Co., Trenton, N. J., for $472,200).

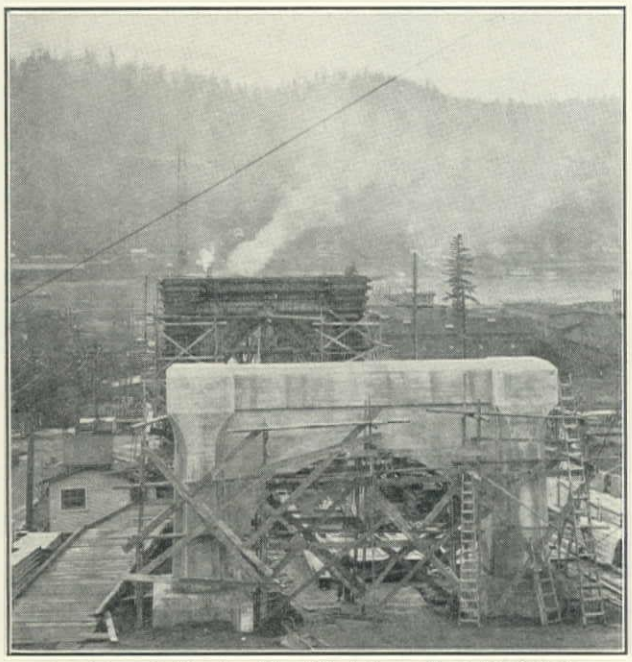
Twisted-strand cables are specified in place of parallel wire cables, and are now being fabricated.

Division D—West Approach (Awarded to La Pointe Construction Co., Portland, Oregon, for $267,603).

The contractor has two shovels at work on the south approach; and a crew constructing retaining walls at the foot of slopes. The progress is satisfactory and the specified completion date is May 1, 1931.

Division E—Viaduct Steel (Awarded to U.S. Steel Products Co., Portland, Oregon, for $290,000).

This contract covers seven steel spans, total length 1541 ft. A contract for fabricating these spans has been let to Poole & McGonigle, Portland, Oregon,



St. Johns Bridge Looking West from East Abutment, Piers 2 and 3 in Foreground

who also have a subcontract for the structural steel included in the Gilpin Construction Co. contract. This work awaits final approval of shop plans.

Division F—Concrete Deck (Awarded to Lindstrom & Feigenson, Portland, Oregon, for $146,000).

No work as yet.

Division G—Electrical Work (Awarded to National Electric Co., Portland, Oregon, for $33,000).

No work as yet.

Concrete and Reinforcing—All concrete is being furnished by the Swigert, Hart & Yett Co., who are delivering 'Transit Mixed' concrete from their St. Johns plant.

Up to January 1, 1930, about 8000 cu.yd. has been placed, the best 8-hour run being 487 cu.yd. The estimated total for the job is 64,000 cu.yd.

Reinforcing steel is being furnished by the Pacific Coast Steel Co., Seattle, Washington.

American River Hydroelectric Co. Project in California, is to be constructed in conjunction with the coordinated plan for development of the water resources of the state; and will cost $46,000.000.

LARGE WESTERN PROJECTS

These data, compiled by our **Daily News Service**, record the large number of projects in preparation in the Far Western territory for 1930. They illustrate the record-breaking program for the West for the current year, and answer President Hoover's plea for increased construction to offset recent financial depression:

Street and Road Work

1930 State Highway Program, Arizona	$8,000,000
1930 State Highway Program, California	38,000,000
1930 State Highway Program, Colorado	9,000,000
1930 State Highway Program, Idaho	4,000,000
1930 State Highway Program, Montana	5,500,000
1930 State Highway Program, Nevada	3,000,000
1930 State Highway Program, New Mexico	8,000,000
1930 State Highway Program, Oregon	7,000,000
1930 State Highway Program, Utah	3,000,000
1930 State Highway Program, Washington	10,000,000
1930 State Highway Program, Wyoming	3,000,000
National Park Roads, 1930 Program, 11 Western States	4,000,000
National Forest Roads, 1930 Program, 11 Western States	6,500,000
Forest Development, 1930 Roads and Trails, 11 Western States	3,000,000
County Highways, 1930 Program, California	50,000,000
County Highways, 1930 Program, Nevada	575,000
Multnomah County Highways, 1930 Program, Oregon	4,000,000
County Highways, 1930 Program, Utah	1,200,000
County Highways, 1930 Program, Wyoming	950,000
Ocean Shore Blvd., San Francisco-Santa Clara, California	7,000,000
Toll Road into Yosemite Valley, California	2,000,000

Bridges, Tunnels, Tubes

San Rafael-Richmond Bridge, California	15,000,000
High St. Bridge, Alameda County, California	250,000
Fourth St. Viaduct, Los Angeles, California	1,500,000
Owyhee Reclamation Project Tunnels, 10 miles, Oregon	
Highway Tunnel for Contra Costa County, California	1,500,000
Breed Highway Toll Tunnel, Oakland, California	1,500,000
Hetch Hetchy 25-mi. Water Supply Tunnel for San Francisco, Calif.	24,000,000
San Diego Bay Tube, California	6,000,000
Subways, Tucson, Arizona	850,000

Sewage, Trade Waste, Refuse Disposal

Los Angeles Outfall Sewer, California	20,000,000
Richmond Sewers, California	1,000,000
San Francisco Sewer, California	3,500,000
Reno Sewer System, Nevada	500,000
Tacoma Sewers, Washington	2,500,000

Water Supply

Phoenix Water System Improvements, Arizona	2,526,000
Colorado River Aqueduct, Los Angeles, California	175,000,000
San Francisco Hetch Hetchy Pipe-line, California	12,000,000
Pasadena Dam and Conduit, California	10,000,000
Orange County, Carpenter Water Co. Dam., etc., California	750,000
Riverside County Water District Pipe-lines, California	700,000
Whittier Water Improvements, California	300,000
Los Angeles, Reservoir in Chatsworth District, California	4,500,000
San Diego Chollas Heights Reservoir, California	500,000
Great Falls Improvements, Montana	1,000,000
Helena Water Improvements, Montana	500,000
Astoria Pipe-line and Dam, Oregon	375,000
Salt Lake City Water Improvements, Utah	5,000,000
Anacortes Water System, Washington	800,000
Seattle Pipe-lines, Washington	3,000,000
Tacoma Water Improvements, Washington	600,000

Irrigation and Reclamation

All-American Canal, Boulder Project, Arizona	38,500,000
Arizona Water Conservation District, Irrigation System	3,500,000
Santa Clara County Water Conservation, California	5,000,000
Water Conservation Program, State of California	200,000,000
San Gabriel Dam, Los Angeles County, Calif. (Plans being revised)	25,000,000
Imperial Irrigation District, California, (also for power)	3,500,000
El Dorado Irrigation District, California	2,000,000
Madera Irrigation District, California	24,000,000
Orange, Riverside and San Bernardino Water Conservation, Calif.	30,000,000
Middle Rio Grande Water Conservation, New Mexico	10,000,000
Boulder Dam and Reservoir, Arizona-Nevada	70,000,000

Rivers and Harbors

Long Beach, Pier for Neptune Pier Co., California	2,000,000
Los Angeles, Wharves, etc., California	1,500,000
Islais Creek Development, San Francisco, California	1,500,000
Stockton Deep Water Channel, California	5,000,000
Ventura County Harbor Improvements, California	2,000,000
Seattle Sea Wall, Washington	1,200,000

Power Development

Steam Power Plant, Central Arizona L. & P. Co., Arizona	2,500,000
Pacific Gas & Electric Co., Extensions and Improvements, Calif.	5,000,000
Pacific Gas & Electric Co., Gas Transmission, California	12,000,000
Pacific Gas & Electric Co., Other Works, California	23,000,000
Southern California Edison Co., Extension Work, California	25,000,000
Boulder Power Development, Arizona-Nevada	38,200,000
Hood River Power Plant, Oregon	750,000
Portland Electric Power Co., Oregon	4,300,000
Skagit River Power Project, Seattle, Washington	13,500,000

Railroads

Boulder Railroad, Arizona-Nevada	2,600,000
Northern Pacific, Brockway, Montana-Lewiston, Idaho	6,000,000
O.W.R.& N., Crane-Crescent Lake, Oregon	9,000,000
Santa Fe Improvements, 11 Western States	100,000,000
Southern Pacific Yards, San Jose, California	5,000,000
Western Pacific, California	16,000,000

Buildings

Los Angeles, County Court House, California	8,000,000
(Total Pacific Coast Building Program) Estimated at	400,000,000
Total	$1,568,926,000

P. G. & E. to Spend $40,000,000 in 1930

The Pacific Gas & Electric Co., serving northern and central California, will spend $35,000,000 during 1930 on construction of new gas and electric projects, and normal extensions and improvements throughout the system will bring the year's building budget up to $40,000,000.

The bulk of this sum will be expended in California. All possible purchases of equipment, materials, and supplies will be made in the state. The wages that the company will pay out in 1930 will exceed the total for 1929, which was $18,394,008 for all purposes.

Natural and Artificial Gas Program—Twelve million dollars of the budget will be used to complete the natural gas system. The first unit from Buttonwillow to San Francisco, 286 miles long, cost $13,000,000. Construction crews are already working on a second network of pipe-lines from the Kettleman hills that will serve the communities of the San Joaquin and Sacramento valleys and the Redwood empire. This network will be completed early in the spring and will be linked up with the system that now serves Fresno, Salinas, Monterey, San Jose, and San Mateo county, and industries in San Francisco and Oakland. The company then will have more than 750 miles of natural gas pipe-lines, representing a total investment of $27,500,000 and serving 471,000 of its 485,000 consumers. San Francisco and the East Bay cities will be furnished with straight natural gas when the new pipe-line is completed. With two pipe-lines, there will be a double source of supply and no danger of interruption of service.

Cost estimates on the natural gas lines are given in Table I:

TABLE I

Natural Gas Project

Cost Estimates

G.M.		
35,300	Pipe-line from Buttonwillow to Milpitas, including telephone line ($200,000), Milpitas meter station and patrol stations	$5,948,229
35,900	Pipe-line from Milpitas to Oakland city limits	813,635
35,611	Pipe-line from Oakland city limits to Gas Station 'B'	372,960
37,151	Pipe-line from Oakland to Richmond	609,390
36,244	Oakland gas holder (8,000,000 cu.ft.)	650,000
35,350	Pipe-line from Milpitas to San Francisco	1,262,078
36,708	San Francisco gas holder (10,000,000 cu.ft.)	650,000
36,998	Salinas-Monterey pipe-line	558,535
36,400	Kettleman hills compressor plant	990,000
	Changes at San Francisco plant to handle natural gas	373,000
	Changes at Oakland plant to handle natural gas	230,000
	Changes at San Jose plant to handle natural gas	78,000
38,100	Pipe-line from Vernalis to Stockton and Sacramento (80 mile unit of the second line)	1,815,106

Apart from the natural gas project, the company will spend $3,000,000 on additions to its present gas system—on new holders, on 200 or more miles of new mains, and on new equipment for its various plants.

Hydroelectric Construction—One hydroelectric job—the Mokelumne river development—will require $16,000,000 during the year to carry out the schedule that calls for its completion in 1931. The generating units of the project—there will be four powerhouses—will add 228,000 hp. to the electricity available. This capacity is divided as in Table II:

TABLE II

Mokelumne River Project

Power Generation

	Generator kva.	hp.
Salt Springs Initial	11,000	14,500
Added for Bear river	25,000	33,500
Tiger creek	60,000	80,000
West point	15,000	20,000
New Electra	60,000	80,000
	171,000	228,000
Present Electra to be removed	20,000	26,800
	151,000	201,200

Salt Springs dam, the keystone of the development, will be brought close to completion by an expenditure of $4,000,000. About $4,500,000 already has been spent on the structure and $500,000 more will be needed for the finishing touches in 1931.

Tiger creek powerhouse, one of the generating units, will require $3,500,000 during the year. Its final cost, including the forebay, will be $4,520,000 and its capacity will be 80,000 hp. A 20-mile concrete lined canal from the dam to this plant will cost $4,460,000, of which $3,500,000 will be spent in 1930.

The year's work on the construction of the Mokelumne-Newark transmission line, a $4,260,000 job, will take $3,000,000, and an additional sum of $1,786,000 will be spent enlarging the Newark substation to handle the additional load. Telephone lines connecting the various units of the Mokelumne development will cost $50,000.

Steam Plant Enlargements—About $4,000,000 will be expended on the reconstruction of Station 'A', the steam electric generating plant in San Francisco. This item is only part of a 5-year program of rebuilding the station and raising its capacity to 300,000 hp. by the intsallation of four large turbines. One of the units will be ready for service during the coming fall and the second after an additional 6 months. The entire cost of reconstruction will be $11,000,000.

Canal Enlargement—The task of enlarging the Bear river and Wise canals, in Placer county, to increase the generating capacity of Halsey and Wise powerhouses, near Auburn, will take more than $600,000 and constructing or reconstructing dams at various parts of the system will require several hundred thousand dollars more.

Buildings—Beside these major projects, there will be

many building jobs in all parts of the company's territory—new substations, new transmission and distribution lines, additions to plants and re-equipment of others, all of which will run into several million dollars.

The outstanding item on the budget for new buildings is the San Francisco service group, which will cost $1,000,000. The buildings will occupy the block bounded by Folsom, Shotwell, 18th, and 19th sts., and will include a 300-car garage, shops and warehouses. The list also includes new offices at San Rafael and reconstruction of the offices at Sacramento, Chico, and Martinez, and new service groups at Santa Rosa and Placerville.

BUILDING CODE FOR DAMS

THE EDITOR: Los Angeles, December 30, 1929.

Reference is taken to your letter of December 24, in which you ask me for comments on the paper by Allen Hazen, on 'Safety in Dam Construction', read at the recent World Engineering Congress in Tokio.

Hazen gives a very clear exposition of many vital points in connection with the safety of dams of various types. He enumerates some of the probable reasons for the many failures of dams that have occurred in the past, and comes to the conclusion that "the record is not creditable to the engineering profesSon which has been responsible".

Referring to straight gravity dams, Hazen states that "with a dam of a section that the line of thrust is at the limit of the middle third . . . the indications are that a large dam of this section, without considering either upward pressure or sliding, is very near the limit of its resistance. The real factor of safety instead of being 2.0 is really, on the best evidence, but little more than 1.0".

Of further interest is the statement regarding shear: "Shear is measured by the force required to break the material at the bottom, either rock or masonry, and to start movement; and friction is measured by the force required to move the dam forward after the contact is broken. Shear comes first, is generally greater, and it is shear that really holds many or most dams in position".

Hazen is in favor of providing large gravity dams with interior drainage channels in order to diminish uplift. In this connection it is of interest to note that A. J. Wiley, in his paper 'Past Experience with High Dams and Outlook for the Future', Proceedings, Am. Soc. C.E., November, 1929, page 2324, stated as follows:

"The utility and desirability of the vertical drains usually placed close to the upstream face of concrete dams are questionable . . . It would seem desirable to prevent the seepage of water through a dam by increasing the density of the concrete and the distance which the seeping water has to travel, and to avoid the use of any device which offers a short travel for the escape of water either through the body of the concrete or through its seams and joints."

With regard to arch dams Hazen states that these dams "are especially adapted to narrow canyons with hard rock walls". Further, that there have been no recorded failures of important arch dams, although a large number have been built in recent years.

With regard to buttressed dams, Hazen calls attention to the necessity for making the slope of the deck flat enough in order to produce the required frictional resistance. Buttressed dams "are well protected from uplift because usually the whole space under the dam is open, making accumulation of uplift pressure impossible".

Referring to earth dams, Hazen stresses the importance of making such structures watertight either by a core, of clay material or concrete, or by providing a watertight upstream face slab. Special attention is called to the danger of failure of this type of dam either by overtopping, or by slips during construction, especially for dams of the hydraulic fill type.

Writing of the factor of safety of dams, Hazen suggests the following quite pertinent requirement: "If a real factor of safety of two is desired, it would seem well to make the calculation for twice the actual horizontal water pressure, a procedure which probably has not been often followed."

FRED A. NOETZLI,
Consulting Hydraulic Engineer.

San Francisco Boulevard and Sewer Projects for 1930

The city of San Francisco will spend $10,000,000 for highways, boulevards, and sewers for 1930, if the program of necessary development is carried out. The following list includes 21 projects, costing $13,655,000.

Not all of the projects will be started this year; some of them carry over from last year.

Project	Cost	Remarks
Islais creek development	$1,620,000	Includes 1900 ft. of seawall, 50 ft. high, and dredging channel and shoals.
Alemany sewer	475,000	Under construction.
Broadway tunnel	1,500,000	Bonds have previously been voted down.
Alemany blvd.	650,000	To connect Mission district and Junipero Serra blvd.
San Jose ave.	300,000	Widen, grade, and pave from county line to Daly City. Nearly completed.
Bernal cut	50,000	To be completed about February 1.
Sunset blvd.	1,000,000	Includes bridge at Ulloa st. and underpass for Sloat blvd.
Army st.	1,000,000	Widening Third st. to foot of Twin Peaks, then a new route to Sunset district.
Illinois st.	.....	To be developed after 1930 as an industrial artery.
Van Ness ave.	500,000	Extension of Mission to Howard st.
Junipero Serra blvd.	500,000	Development.

Other proposed projects are: further development of Mills Field municipal airport; extending Golden Gate Park panhandle; and several sewer jobs.

M. M. O'Shaughnessy is city engineer of San Francisco and Clyde Healy is chief assistant engineer on city projects.

PERSONAL MENTION

E. P. Wilsey has been named city manager of San Mateo, California, and will direct a 1930 program of $200,000 projected city improvements.

George Otis Smith, director of the United States Geological Survey, has returned to the United States from the World Engineering Congress at Tokyo, Japan.

Raymond Harsch, materials engineer for the Idaho Department of Public Works,, Boise, Idaho, has resigned to become office engineer for an oil company in San Francisco.

Nat Neff, county superintendent of highways, Orange county, California, was elected 1930 president of the Orange County Engineers' society at a recent meeting in Fullerton, and A. A. Beard, of Santa Ana, was elected secretary.

Eduardo Aguirre, chief engineer, hydraulic department, Bureau of Water Works, Santiago, Chile, has been in California for some time getting all data available on hydroelectric, water supply, and sanitary engineering projects, and especially tunnel construction.

Ray F. Goudey, since 1920 engineer in charge of the Los Angeles office of the Bureau of Sanitary Engineering, State Board of Health of California, has resigned to accept, on February 1, the position of special sanitary engineer with the Los Angeles Bureau of Water Works and Supply, under H. A. Van Norman, chief engineer, to investigate and prepare plans for the reclamation of the sewage of the city for replenishment of the underground water supply and for industrial and other uses.

Haki Osman El-Selemi, civil engineer, road department, city of Cairo, Egypt, was a recent visitor at the San Francisco office of the Bureau of Public Roads. Selemi, a graduate of the Egyptian Engineering University 4-year course in 1927, is spending one year studying the construction and maintenance of low-cost roads in the United States (California, Texas, Ohio, Pennsylvania, New Jersey, and New York). He will later spend three months in Europe, principally in Holland and France. A short article by Selemi on the highway situation in Egypt, construction methods, and proposed developments, will be published in an early issue of **Western Construction News.**

Jack Mulholland, holder of the Walter and Eliza Hall Engineering Fellowship, University of Queensland, Australia, has recently been in California studying and investigating water and sewage works. Mulholland graduated from the University of Queensland in 1925, and then spent three years with the Queensland Water Supply Commission. In 1928 he was granted a three-year leave of absence to accept the fellowship, which provides two years of travel around the world, followed by one year of lecturing at the University. He has been in the United States since March, 1929, during which time he secured a post graduate degree in sanitary engineering at Harvard University.

J. J. Jessup, of Los Angeles, has been appointed city engineer of Los Angeles to succeed **John C. Shaw.** Jessup, after graduating from Penn College, Iowa, in 1892, served with the United States Geological Survey; then came to Newberg, Oregon, as head of the Pacific College for five years. He then became the first president of Whittier College, near Los Angeles; and later city engineer of Whittier, during which time he built the water works. Following this, he became a graduate student and teaching fellow in the engineering school at the University of California. Jessup was appointed deputy city engineer of Berkeley and later city engineer, serving until the United States entered the World War, when he went to France as superintendent of construction for the Y.M.C.A.; having charge of the disposal of all equipment to the government of France at the conclusion of the war. Upon Jessup's return to the United States he was appointed consulting engineer for Imperial county, California, on plans for the county highway system. He was then appointed special engineer under the late W. F. McClure, state engineer, on investigation of the water resources of the state, during which time he made the first studies of the proposed salt water barrier across Carquinez strait, San Francisco bay. For some years Jessup has been in partnership with Clyde C. Kennedy (likewise formerly deputy and city engineer of Berkeley) as consulting engineer specializing in municipal work; Jessup having charge of the Los Angeles office of the firm. He is a member of the American Society of Civil Engineers.

ASSOCIATIONS

American Society of Civil Engineers Spring Meeting—Sacramento Section will be host to the spring meeting of the national society on April 23-26. A committee of the San Francisco Section was appointed on December 17 to assist the Sacramento Section.

Spokane Chapter, Associated General Contractors—Members of the Chapter will discuss plans whereby they may assist President Hoover in a program for continued business prosperity and stabilized improvement. This program was endorsed at a directors meeting of the Northwest Branch at Portland, attended by Dan Hannah, secretary of the Spokane Chapter, O. J. Amberg, president of the Northwest Branch, H. Collins, and T. A. Huetter, treasurer. At the annual meeting, to be held in Portland during February, the subject will be further discussed.

United States Civil Service Commission announces examination No. 10 (unassembled), for senior agricultural engineer (extension specialist) in the Bureau of Public Roads for duty in Washington or in the field; salary $4600-5200 a year. Applications on Form 2600 must be on file with the Commission at Washington not later than January 14, 1930.

The duties are: to aid state extension agents in methods of organizing and developing extension work in agricultural engineering and to act as liaison officer between the state extension forces in matters relating to extension work in agricultural engineering.

Candidates will be rated as to education, training, and experience (70) and writings—thesis or publications, to be filed —(30). Applicants must have been graduated with a degree in engineering, preferably in agricultural engineering, or must have completed 118 hours of such a course. They must also have had at least 6 years of experience in agricultural engineering, including at least 3 years of responsible work in agricultural engineering extension. The thesis submitted must contain 5000 words.

C. S. W. A.

1929 Journal To Be Distributed January 15—Location and Date of Spring Conference Undecided

The 1929 Journal of the California Sewage Works Association will be printed and ready for distribution to the 230 members about January 15. It will contain 250 pages, or 100 pages more than the first or 1928 Journal; and will include all the papers presented at the First Spring Conference at Fresno and at the Second Annual Meeting in Oakland, together with synopses of the papers read at the Sanitary Section of the Short Course School of Citizenship and Public Administration, University of Southern California, June, 1929; and some other papers and data.

The 1929 Journal is again being underwritten and published by **Western Construction News,** and 22 manufacturers and engineers have contributed support in the form of advertising.

Membership in the California Sewage Works Association costs but $2.00 per year, $1.00 of which goes to the National Federation of Sewage Works Associations, and includes a subscription to the National Journal, issued quarterly. E. A. Reinke, 102 Civil Engineering Bdg., Berkeley, is secretary-treasurer.

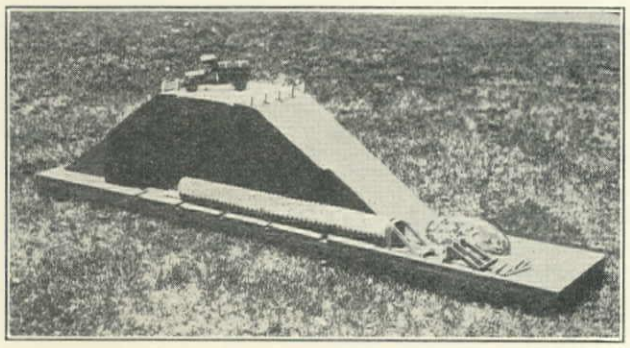
Municipal Traffic League of California—The fourth annual convention of the league was held at the El Cortez hotel, San Diego, December 16 and 17.

New Equipment and Trade Notes

ARMCO EXHIBIT APPEALS TO CONTRACTORS

Drainage products and methods of special interest to highway and public works contractors are exhibited in this year's Road Show by the Armco Culvert Mfrs. Association, Middletown, Ohio. Actual specimens of pipe combined with explanatory films and charts give a complete picture of the uses, advantages and methods of installation of Armco corrugated iron pipe in highway work. Armco paved invert pipe and the Armco jacking method are especially featured.

Because the Armco jacking method of culvert placement has been adopted as standard practice by a number of railways



Model of Armco Jacking Method of Culvert Placement

and highway departments, a special effort has been made in this exhibit to explain its many advantages. Those who are interested in culvert placement methods, either from the standpoint of the public official or that of the contractor, will find a visit to the Armco exhibit, in space 103, Anton S. Rosing, publicity manager, in charge, to be time well spent. Other Armco representatives in attendance are H. E. Cotton, A. J. Gloyd, J. B. Morrison, Mont C. Noble, Howard See, and W. H. Spindler.

SPEEDER MACHINERY CORP.

The Speeder Machinery Corp., Cedar Rapids, Iowa, pioneer manufacturers of full revolving, fully convertible gasoline and electric ½-yd. shovels, plans an unannounced exhibit at the Road Show that promises to attract wide attention in the power shovel field, as well as the exhibit of their B-3 model ½-yd. shovel with several improvements.

The Speeder Corp. hotel headquarters will be at the Knickerbocker hotel and the exhibit will be located on the main floor of the Auditorium, Booth 312, which is directly in front of the stage. Those in attendance will be T. M. Deal, sales manager; H. W. Parsons, assistant sales manager; Edgar McNall, advertising manager; L. A. Bartlett, B. W. Olin, and W. H. Boyd, district sales managers; H. J. Parcell, factory erector.

STERLING MOTOR TRUCK CO. OF CALIFORNIA

W. B. Hambly, vice-president and general manager of Sterling Motor Truck Co. of California, announces the following changes in the personnel of his Pacific Coast branches. R. T. Stafford, with the Los Angeles branch for some time, has been made manager of the Seattle branch, replacing G. O. Griffin. Griffin has been promoted to sales manager of the Los Angeles branch. G. A. Pickel, formerly connected with Sterling and Fageol at San Francisco, has been made branch manager at Portland and Loy Leffingwell, former Portland manager, has been transferred to San Francisco. Harry O. Roosen, former sales manager of the Los Angeles branch, has been promoted to branch manager at Los Angeles.

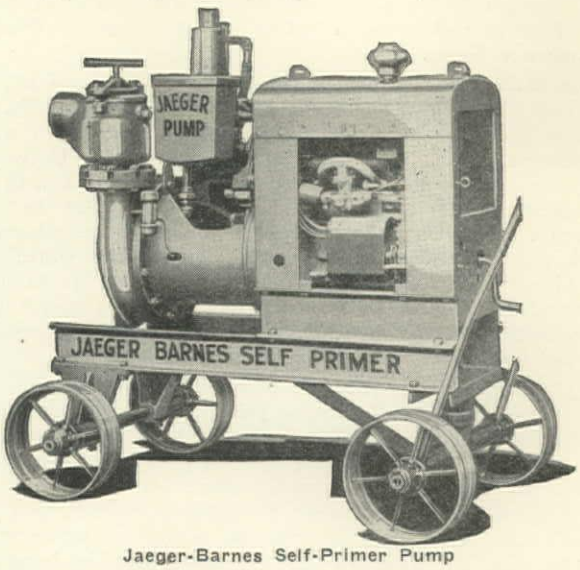
Sterling sales on the Pacific coast for 1929 exceed any previous year.

JAEGER MACHINE CO.

Because of their advanced design, many items which The Jaeger Machine Co., Columbus, Ohio, will exhibit at the Atlantic City Road Show will be of unusual interest to the industry.

With the 1930 line of Jaeger-Barnes pumps will be shown the self-priming centrifugal type in which the self-priming device actually increases the pump capacity, particularly at high lifts. The positive action within this design keeps the otherwise standard centrifugal 'always ready to pump' when water is to be moved. Other dewatering pumps, in all types, will include a display of standard diaphragms, convertible diaphragm, lift and force pumps, plunger trench pumps and centrifugals. Road builders, interested in positive water supply, will find the Jaeger-Barnes triplex road pump completely self-oiling, with patented positive rotary oiling pump, Hyatt bearings on all shafts, drop-forged crankshaft and 2-piece plungers, and cylinder body. The special clutch is of particular value for constant service. This pump has already performed on a thousand road jobs, being developed by the pioneers in road pump construction.

Jaeger Timken-equipped tilting mixers will be represented by the 3½S trailer, model 3½CT. Disc wheels with wide cushion tires, and the spring-mounted axle used on all Jaeger tilters, equip it for rough roads and high speed trailing. Jaeger's 'one man control' combination of a hoist and mixer will be exhibited in the 7H-4 model, one bagger. Featuring the display of non-tilters will be the 'Speed King', a full one-bag trailer on dual tires and springs. Many 1930 improvements are presented in this mixer, including standard type Jaeger single adjustment clutch with power chain drive to the top shaft. Bridge builders and others whose specification work is likely to demand rigid control of concrete, will center attention on Jaeger's 10S non-tilt mixer in combination with a detached skip scale. This device, built by Winslow, permits quick weighing of cement, sand and stone in



Jaeger-Barnes Self-Primer Pump

the loader. Used in combination with Jaeger's accurate-measure water tank it insures water ratio law enforcement.

Timken roller thrust hoists, capacities 10 to 50 hp., with up-to-the-minute features of construction and design, will be exhibited. Positive screw-thrust control both ways is provided, eliminating springs. Friction clutch and brake are on opposite sides of drums. Optional electric starters are also provided.

The latest addition to the Jaeger line is the trail or truck mixer, produced after two years' study, engineering development, and tests. Complete with power plant, it can be quickly mounted on any make or model of truck—old or new, or on a trailer, and used to haul, mix and discharge concrete, and to haul and deliver pre-mixed or dry bulk materials.

MACARTHUR CONCRETE PILE CORP.

The MacArthur Concrete Pile Corp. has established a branch in San Francisco in the Holbrook bdg. under the direction of S. Burke Smith. The MacArthur pile has a long record of successful performance in all parts of the United States. It is a 'cast-in-place' pile, formed and placed by the MacArthur system, and consists essentially in the use of a highly compressed, dry mix, concrete with a considerable percentage of fairly large aggregates. A widely used type of the MacArthur pile is that which is known as the 'pedestal' pile; this has a bulb or pedestal formed on the base of the pile which adds materially to its supporting power when considered solely as a column. The method of forming the pile results also in a rough skin which adds greatly to the supporting power derived purely from its friction with the earth.

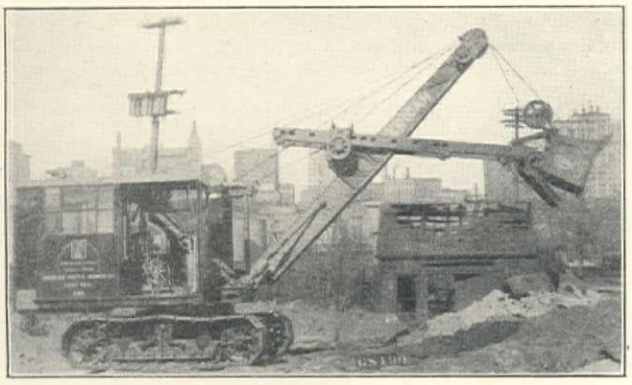
Among recent successful completions by the corporation in the east are the piles for the Milwaukee court house, the new buildings for the National Tube Co., and the support for the large dirigible hangar at Akron. The east anchorage of the St. Johns bridge, Portland, Oregon, is one of the jobs on the west coast where MacArthur piles are being used (see p. 21, this issue).

In San Francisco, the Fireman's Fund bdg. and the old United States Sub-Treasury bdg., now a part of the Stock Exchange bdg., are supported on MacArthur piles. The corporation also drives composite piles of wood and concrete sections, as well as a straight shaft all-concrete pile; and a composite pile of concrete and pipe sections.

AMERICAN HOIST & DERRICK CO.

The American Hoist & Derrick Co., St. Paul, Minnesota, will exhibit an 'American Gopher' gasoline operated 1-yd. combination shovel-crane or dragline. The exhibit will be so arranged as to permit operation of all motions except the swing, and that alone is not arranged for power demonstration on account of lack of space.

The American Hoist & Derrick Co. does not advocate yearly models but continues to improve its products whenever



American Gopher 1-yd. Gas Shovel-Crane

and as often as the occasion presents itself. The simplicity and correctness of design, the ease and silence of operation and the excellent reputation which the 'American Gopher' has established for itself in this country and abroad has aroused wide-spread interest among non-owners and has brought the highest satisfaction to owners. The company's exhibit will be in space 209, Atlantic City Convention Hall. Members of the organization with a coast to coast acquaintanceship among contractors and industrial men will be there to welcome their friends.

HOTEL SIR FRANCIS DRAKE

Frank W. Cummings, Jr., formerly manager of the El Cortez hotel, San Diego, has been appointed assistant to the president of the Huckins-Newcomb Hotel Co., operating Hotel Sir Francis Drake in San Francisco. Cummings has had a wide experience in the hotel business on the Pacific coast.

THE OSGOOD CO. ANNOUNCES NEW NORTHERN CALIFORNIA DISTRIBUTOR

Charles A. Neville, well known in construction machinery circles, has recently organized the Osgood California Co., and will take the exclusive distribution of the Osgood Co., Marion, Ohio, line of gasoline, electric, diesel and steam shovels, cranes and draglines in Northern California and Western Nevada. Neville has been closely associated with the shovel industry for some time past, and in order to better serve the users of Osgood machines, will have his repair parts and service, also stocks, at 1830 W. 9th St., Oakland. In addition, he will have offices in San Francisco and Sacramento.

The Osgood Co. is the pioneer manufacturer of shovels and the present line includes the ¾, 1, 1¼, and 1½-yd. sizes. Complete units for immediate shipment will be carried at the Oakland warehouse.

LINK-BELT CO.

Forest protection has been, is now, and always will be the keystone of forest conservation. Conservation and good forest management are meaningless terms so long as the plague of flames sweeps off in a week more than the constructive forester can accomplish in 10 years. Until fire is eliminated, conservation of forests can make no real headway.

The Commonwealth of Pennsylvania, through its Department of Forests and Waters, is carrying on a systematic program for the protection of state-owned forests, comprising 1,280,000 acres of forest.

The building of forest roads and forest trails into remote regions, to make them more accessible for the fire fighting organization, is no small part of Pennsylvania's program for protecting its forests from ravage by fire, often started by the careless hunter or camper. Over 2200 miles of forest roads and 2800 miles of trails have been built up to the present time. This sort of road building makes tough digging—probably too tough for some shovels, but not for the Link-Belt heavy-duty gasoline crawler shovel, with 1-yd. all-manganese-steel rock dipper. These roads lead from main highways into the forests, following the contour of the mountains on a 10% grade, to the remote peaks. Clearing crews go ahead of the shovels, cutting down the timber and clearing the brush to prepare the right-of-way. The shovel follows the clearing crew, cutting a bench in the side of the mountain—sufficiently wide to carry the shovel safely—casting the material to the side to make the fill for the completed road. An average width of 18-ft. is maintained. The material handled is loose earth, stratified rock and shale, and often, what the average contractor would consider solid rock, which is loosened somewhat by the mud cap or gopher hole method of blasting. Even in this tough digging, Link-Belt shovels have been able to maintain an average of 800 to 1000 cu.yd. a day.

GENERAL EXCAVATOR CO.

Spears-Wells Machinery Co. has been appointed exclusive distributor in northern California and western Nevada for the General Excavator Co., Marion, Ohio.

The General Excavator Co. manufactures on a production schedule and basis, the 'General Excavator' unit, which is a convertible shovel, clamshell, crane, dragline, skimmer, back hoe and back filler. The unit is made in one size only, a full ½-yd. The General Excavator Co. pioneered in the ½-yd. machines the rigid and substantial unit steel castings in crawlers and main frame members which before the General's time had been used only on the larger sizes such as 1-yd. and 1½-yd. machines.

The Spears-Wells Machinery Co. is well known in the territory allotted, having been a manufacturer and distributor of road construction and maintenance equipment, as well as other lines of contractors' equipment, for many years. The office and warehouse is located at 1832 W. 9th st., Oakland, and shortly the company will have complete stocks of the latest models and will also be prepared to give complete repair part service at that address.

UNIT BID SUMMARY

Note: These unit bids are extracts from our Daily Construction News Service

STREET AND ROAD WORK

SANTA CLARA, CALIF.—CITY—ASPHALT

Awards as follows by City of Santa Clara, Santa Clara County, for street work:

(A) Contract awarded to Union Paving Co., Call Bdg., San Francisco, $93,675 for improving Madison, Jefferson, University, Fremont, Benton, and Liberty Sts. Bids received on:

(1) 491,295 sq.ft. 1½-in. 'B' asphalt surface
(2) 491,295 sq.ft. 3½-in. asphalt base, including grading and 3-in. quarry waste
(3) 85,892 sq.ft. 2-in. 'A' asphalt surface
(4) 85,892 sq.ft. 4-in. asphalt base, including grading and 3-in. quarry waste
(5) 26,465 sq.ft. concrete sidewalk
(6) 6,171 ft. concrete curb
(7) 9,406 sq.ft. concrete gutter
(8) 3,240 sq.ft. conc. driveway approach
(9) 2,834 ft. 4-in. vitrified sewer
(10) 2,059 ft. 6-in. vitrified sewer
(11) 3 brick manholes
(12) 37 4 by 6-in. Y branches

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	TOTALS
Union Paving Co., S. F.	.067	.07	.0775	.08	.15	.50	.22	.22	.50	.60	30.00	.40	$ 93,675
Peninsula Pav. Co., S. F.	.038	.0975	.049	.113	.18	.40	.26	.25	.50	.55	60.00	.60	93,724
A. J. Raisch	.04	.115	.05	.125	.17	.50	.22	.22	.60	.75	60.00	2.00	105,047
Hanrahan Co., S. F.	.05	.11	.055	.12	.15	.40	.20	.20	.50	.60	60.00	.50	105,476
V. R. Dennis Con. Co.	.045	.12	.06	.13	.15	.50	.20	.20	.45	.50	75.00	.75	109,525
M. J. Bevanda	.05	.132	.06	.147	.17	.475	.22	.22	.56	.64	65.00	.75	120,535

(B) Contract awarded to Union Paving Co., Call Bdg., S. F., $28,785 for improving Lafayette St. Bids received on:

(1) 170,200 sq.ft. 2-in. asphalt surface
(2) 170,200 sq.ft. 4-in. asphalt base, including grading and 3-in. quarry waste
(3) 5,300 sq.ft. concrete sidewalk
(4) 800 ft. concrete curb
(5) 1,850 sq.ft. concrete gutter
(6) 800 sq.ft. conc. driveway approach
(7) 650 ft. 4-in. vitrified sewer
(8) 400 ft. 6-in. vitrified sewer
(9) 2 brick manholes
(10) 4 4 by 6-in. Y branches

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	TOTALS
Union Paving Co., S. F.	.075	.08	.15	.50	.22	.22	.50	.60	30.00	.40	$28,785
Peninsula Paving Co.	.049	.113	.18	.40	.26	.25	.50	.55	60.00	.60	30,194
A. J. Raisch, San Francisco	.05	.125	.17	.50	.22	.22	.60	.70	60.00	2.00	32,467
Hanrahan Co., S. F.	.06	.12	.15	.40	.20	.20	.50	.60	60.00	.50	32,968
V. R. Dennis Con. Co.	.06	.13	.15	.50	.20	.20	.45	.50	75.00	1.00	34,709
M. J. Bevanda	.06	.147	.17	.475	.22	.22	.56	.64	55.00	.75	37,848

Work is to be done under 1911-15 Acts. Geo. Sullivan is City Engineer.

SACRAMENTO, CALIF.—STATE—LOS ANGELES COUNTY—CONCRETE

Contract awarded to Jahn & Bressi, Corporation Bdg., Los Angeles, $253,126, to California Division of Highways for 8.5 miles concrete paving LOS ANGELES COUNTY from Tunnel Stat. to Santa Clara River. Bids received on:

(1) 20,000 cu.yd. slide removal
(2) 200,000 sta.yd. overhaul
(3) 150,000 sq.yd. subgrade for paving
(4) 30,800 cu.yd. 'A' conc. (paving)
(5) 712,000 lb. reinf. steel
(6) 1,000 timber guide posts
(7) 450 stations finishing roadway

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	TOTALS
Jahn & Bressi Const. Co., Los Angeles	.20	.0075	.08	6.65	.038	1.50	5.00	$253,126
Will F. Peck, Los Angeles	.25	.01	.09	7.20	.0425	2.50	5.00	277,270
Basich Bros. Const. Co., Los Angeles	.10	.005	.10	7.60	.035	2.50	3.50	280,975
Wells & Bressler, Santa Ana	.30	.01	.10	7.33	.04	3.00	4.00	282,044
J. F. Knapp, Oakland	.30	.01	.09	7.50	.0425	3.00	4.00	287,560
McCray Co., Los Angeles	.30	.008	.10	7.50	.043	1.00	7.00	288,366
Griffith Co., Los Angeles	.30	.01	.10	7.77	.035	3.00	8.00	293,836
Fredrickson & Watson and Fredrickson Bros.	.25	.01	.09	8.65	.045	3.00	5.50	324,435
O. A. Lindberg, Newhall	.35	.01	.10	8.58	.05	3.75	5.00	329,864
Average bid	.26	.009	.094	7.65	.041	2.58	5.22	291,000

SACRAMENTO, CALIF.—STATE—IMPERIAL COUNTY—ASPHALT PAVING

R. E. Hazard Contracting Co., 2528 Kettner Blvd., San Diego, $110,426, low bid to California Division of Highways, for 5 miles grading and paving with asphalt from Dixieland to Seeley, IMPERIAL COUNTY. Bids from:

(1) R. E. Hazard Contr. Co., San Diego $110,426
(2) Basich Bros. Constr. Co., L. A. 113,522
(3) Ben Pearce Constr. Co., San Diego 129,910
(4) V. R. Dennis Const. Co., San Diego $135,922
(5) Gibbons & Reed Co., Burbank 140,818
(6) Average Bid 126,000

	(1)	(2)	(3)	(4)	(5)	(6)
32,600 cu.yd. roadway excavation	.30	.40	.50	.28	.33	.36
457,100 sta.yd. overhaul	.01	.015	.01	.01	.01	.011
1,430 cu.yd. structure excavation	.60	.60	.75	1.00	1.50	.89
10,500 sq.yd. preparing subgrade	.09	.13	.09	.10	.09	.10
37,000 sq.yd. asphalt paint binder	.03	.01	.04	.03	.03	.028
17,500 tons asphalt concrete	4.95	4.75	5.55	6.14	6.35	5.53
150 cu.yd. 'A' cem. concrete (struc.)	15.00	20.00	17.00	25.00	25.00	20.40
1,900 lb. reinforcing steel (struc.)	.05	.06	.05	.10	.05	.062
960 ft. 12-in. corr. metal pipe	.20	.30	.40	.50	.35	.35
622 ft. 18-in. corr. metal pipe	.20	.40	.40	.60	.50	.42
374 ft. 24-in. corr. metal pipe	.25	.75	.50	.75	.70	.59
458 ft. 36-in. corr. metal pipe	.30	.80	.90	1.00	1.25	.85
1,172 ft. 4-in. drain tile	.20	.25	.15	1.00	.25	.37
132 tons gravel blanket (siphons)	2.80	2.00	2.25	3.10	2.50	2.53
170 cu.yd. untr. crushed gravel and stone surfacing	4.00	3.00	3.10	5.25	4.00	3.87
288 ft. timber guard rail	.75	1.00	1.00	1.00	1.00	.95
280 cu.yd. remove concrete	3.00	3.00	2.50	3.00	3.20	2.94
2.3 mi. move and reset property fences	150.00	250.00	175.00	300.00	250.00	225.00
260 sta. finishing roadway	3.50	3.00	8.00	5.00	6.60	5.22
20 monuments (each)	2.50	3.00	3.50	3.00	3.00	3.00

SANTA CLARA, CALIF—CITY—CONCRETE PAVING

Thompson Bros., Santa Cruz and Fresno, who bid $130,544, low bid to City for improving Sherman, Lexington, Fremont, Alviso, Liberty, Lafayette and Benton Sts. Bids on:

(1) 390,016 sq.ft. 5-in. concrete paving
(2) 283,463 sq.ft. 6-in. concrete paving
(3) 6,375 lin.ft. concrete curb
(4) 10,497 sq.ft. concrete gutter
(5) 20,480 sq.ft. concrete sidewalk
(6) 5,765 sq.ft. concrete driveway
(7) 3,789 ft. 4-in. vitrified sewer
(8) 4,164 ft. 6-in. vitrified sewer
(9) 13 brick manholes
(10) 81 4x6-in. Y branches

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	TOTALS
Thompson Bros.	.1625	.187	.43	.20	.144	.20	.55	.60	50.00	.30	$130,544
Hanrahan Co., San Francisco	.1675	.19	.45	.23	.16	.225	.60	.75	60.00	1.00	135,255
A. J. Raisch	.17	.19	.50	.22	.17	.22	.60	.70	60.00	2.00	136,493
J. V. Galbraith	.169	.199	.44	.22	.16	.22	.40	.60	75.00	2.00	137,088
Union Paving Co., San Francisco	.167	.195	.50	.22	.15	.22	.50	.60	30.00	.40	
M. J. Bevanda, Stockton	.174	.194	.475	.22	.17	.22	.56	.64	65.00	.75	138,590
Peninsula Paving Co., San Francisco	.172	.20	.40	.26	.18	.25	.50	.55	60.00	.60	139,145
W. A. Dontanville	.177	.199	.35	.21	.16	.21	.50	.58	67.00	.90	139,576
Granite Const. Co.	.174	.20	.40	.24	.17	.24	.55	.70	65.00	.50	140,326
G. W. Wood, Stockton	.18	.205	.40	.21	.15	.20	.50	.60	70.00	1.50	142,676
N. M. Ball, Berkeley	.19	.215	.45	.22	.175	.30	.60	.70	70.00	1.25	150,177
V. R. Dennis Const. Co.	.195	.22	.50	.20	.15	.20	.45	.50	75.00	.75	152,000

Work under 1911-15 Acts. Bids rejected, specifications will be changed to asphalt paving and work readvertised. Geo. Sullivan is City Engineer.

LOS ANGELES, CALIF.—CITY—CONCRETE, ASPHALT AND WARRENITE BIT. PAVING

Bids received as follows by City of Los Angeles for street projects:

(A) Hall-Johnson Co., 905 Westminster St., Alhambra, $587,023 low for improving Alhambra Ave. and Valley Blvd. Impr. Dist. Bids on the following main items:

(1) Grading, lump sum
(2) 1,229,931 sq.ft. 2-in. Warrenite Bit. surf.
(3) 44,520 tons asphalt concrete base
(4) 17,017 ft. heavy conc. curb
(5) 36,918 sq.ft. conc. gutter
(6) Storm drain system
(7) Sanitary sewer system
(8) Water system complete
(9) 425 water service connections

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	TOTALS
Hall-Johnson Co.	$35,000	.11	3.65	.50	.26	$72,500	$26,000	$6900	21.00	$587,023
M. Simunovich, L. A.	25,600	.12	3.70	.43	.24	77,486	19,585	7800	19.00	592,376
Griffith Co., L. A.	35,000	.12	4.00	.50	.28	75,000	26,000	6600	19.00	624,883
Western Roads Co.	40,000	.125	4.10	.50	.28	72,000	25,000	7000	20.00	659,548
L. A. Paving Co., L. A.	40,000	.118	4.25	.54	.28	65,000	25,000	6500	19.00	630,173
Geo. R. Curtis, L. A.	45,000	.1125	4.00	.50	.26	80,000	25,000	6750	20.00	632,615
Bruan, Bryant & Austin	44,000	.115	4.15	.55	.30	78,000	29,000	6800	20.00	644,527
P. J. Akmadzich, L. A.	50,000	.14	3.75	.50	.30	76,250	22,900	7450	22.00	657,697

(B) J. L. McClain, 3052 W. Slauson Ave., Los Angeles, who bid $266,250, submitted low bid for the improvement of various streets in the Dickens St. and Kester Ave. Improvement District. Bids received on the following main items for the construction of this project:

(1) Grading, lump sum
(2) 1,091,590 sq.ft. 6-in. concrete paving
(3) Sanitary sewer system, complete
(4) 27,400 ft. house sewers
(5) Water system, complete
(6) 475 water services
(7) Lighting system, complete

	(7)	(2)	(3)	(4)	(5)	(6)	(7)	TOTALS
J. L. McClain, Los Angeles	$18,000	.125	$27,000	.70	$7,750	19.30	$46,000	$266.250
Tryon & Brain, Los Angeles	13,000	.128	35,350	.80	8,000	20.00	46.800	276,625
W. F. Peck Co., Los Angeles	9,700	.136	29,600	.75	8,100	20.00	49,500	278.177
Basich Bros. Construction Co., Los Angeles	10,800	.139	32,000	.77	8,000	18.00	50.000	284,550
W. F. Crawford	12,000	.146	30,000	.80	8,600	19.00	45,000	288.351
Dalmatin & Nikcevich. Los Angeles	11,010	.142	36.100	.87	9,000	19.25	48,890	295,587
Geo. H. Oswald, Los Angeles	22,000	.14	35,850	.80	7,940	19.80	45,950	298,230
Campbell-Reichert Co.	10,500	.153	28,500	1.00	8.400	21.00	52,500	308.075
Bruan, Bryant & Austin	17,000	.15	35,000	.86	8,300	20.70	50,255	310,858
M. Simunovich. Los Angeles	16,700	.16	32.662	1.00	8,000	19.00	58,000	329,959
P. J. Akmadzich, Los Angeles	12,000	.15	41,169	.85	8,300	20.70	50,000	

(C) Marrter & Bock, 1007 S. Harvard St., Los Angeles, who bid $259 886, submitted low bid for improvement Monterey Road from Pullman St. to Huntington Drive. Bids received on the following items for the construction of this project:

(1) Grading, lump sum
(2) 316,390 sq.ft. 8-in. concrete paving
(3) 38,316 sq.ft. 6-in. concrete paving
(4) 11,359 ft. heavy concrete curb
(5) 2,170 ft. special concrete curb
(6) 19,982 sq.ft. concrete sidewalk
(7) Storm drain system
(8) Sanitary sewer system
(9) Water system, complete
(10) Concrete retaining walls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	TOTALS
Marrter & Bock, Los Angeles	$40,000	.195	.18	.55	.45	.14	$3,000	$7,000	$6,000	$115,000	$259,886
P. J. Akmadzich, Los Angeles	42,500	.20	.16	.50	.60	.14	2.650	10.000	6,000	115,000	268,092

SANTA FE, NEW MEXICO—STATE—GRADING AND SURFACING

Bids received as follows by New Mexico State Highway Commission for highway projects: (A) E. J. Maloney, Gallup, N. M., $180,772, low for 12 miles grading and oil process surfacing from Arizona-New Mexico State line to 9 miles west of Gallup. Three lowest bids from:

(1) E. J. Maloney, Gallup $180,772
(2) T. J. Tobin, Albuquerque $186,154
(3) Geo. W. Orr, El Paso $194,678

	(1)	(2)	(3)
29,895 cu.yd. common excavation	.19	.19	.25
38.021 cu.yd. rock excavation	1.25	1.25	1.41
136.922 cu.yd. borrow	.18	.18	.18
117,451 sta.yd. overhaul	.03	.03	.03
12 mi. scarify and reshape	$50	$50	$53
29.844 cu.yd. base course for oil surface	1.50	1.60	1.70
3,955 cu.yd. binder	.75	1.00	.50
155 cu.yd. 'A' concrete (culvert)	25.00	26.00	27.50
19.070 lb. reinforcing steel	.06	.07	.07
3,073 cu.yd. mortar rubble masonry	8.50	7.45	8.00
1,150 ft. 24-in. iron culvert pipe	3.00	3.25	3.40
830 ft. 30-in. iron culvert pipe	4.00	4.00	4.35
48 ft. 18-in. corrugated culvert pipe	2.00	2.00	2.10
1.160 ft. 24-in. corrugated culvert pipe	2.50	3.25	3.05
836 ft. 30-in. corrugated culvert pipe	3.25	4.00	3.75
282 ft. 36-in. corrugated culvert pipe	5.75	6.25	6.00
48 ft. 18-in. iron culvert pipe	2.50	2.00	2.30
64,778 ft. galvanized wire fence	.055	.06	.06
25.3 MBM treated timber (bridge)	$170	$160	$155

(B) Lee Moor Contracting Co., El Paso, Tex., $74.720 for 5.2 miles grading and oil processing and constructing concrete and steel overpass from Las Cruces to Cambray, DONA ANA and LUNA COUNTIES. Three lowest bids on:

(1) 107,870 cu.yd. common borrow
(2) 9,337 cu.yd. base course for oil
(3) 2,140 ft. wire guard fence
(4) 53,114 ft. galv. barbed wire fence
(5) 326 cu.yd. 'A' concrete (bridge)
(6) 66 M ft. BM timber, treated (bridge)
(7) 111.100 lb. structural steel

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	TOTALS
Lee Moor Contracting Co.	.25	1.50	1.00	.04	24.00	135.00	.05	$74.720
Dudley & Amesbury, El Paso	.20	2.25	.80	.05	22.50	140.00	.06	75,825
Rawls & Wright, El Paso	.245	2.25	.90	.05	25.00	135.00	.055	81,253

IRRIGATION AND RECLAMATION

BURLEY, IDAHO-CANAL EXCAVATION AND STRUCTURES—GOVERNMENT

Haas, Doughty & Jones, Merchants Exchange Bdg., San Francisco, $537,199, low bid on five schedules combined to Bureau of Reclamation, Burley, Idaho, for canals and structures, Stat. 2135 to 3129, Main Canal Gravity Extension Division of Minidoka Project. Following are total bids on the four schedules combined:

Haas, Doughty & Jones $537,199
Utah Const. Co. (all or Sch. 2 and 5) 546,200
John Phillips, S. F. (all Sch. or none) $558,966
Morrison-Knudsen Co. (all Sch. or none) 594,987

SCHEDULE NO. 1—Bids on following main items:
(A) 48,000 cu.yd. canal excavation, Class 1.
(B) 2,000 cu.yd. canal excavation, Class 2.
(C) 21,500 cu.yd. canal excavation, Class 3.
(D) 300 cu.yd. emb. cut-off trench excav.
(E) 650 cu.yd. dry rock paving.
(F) 190 cu.yd. concrete.
(G) 17,000 lb. placing reinf. steel.
(H) 10,000 lb. install. and paint gates, etc.

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	TOTALS
Haas, Doughty & Jones	.12	.40	1.50	4.00	6.00	25.00	.03	.10	$51,443
Utah Const. Co., Ogden, Utah	.15	.35	1.35	3.00	3.50	22.00	.03	.07	46,516
John Phillips Co., San Francisco	.135	.25	1.35	3.00	2.50	28.75	.03	.05	46,207
Morrison-Knudsen Co.	.11	.40	1.60	4.00	2.00*	22.00	.03	.07	49,590

SCHEDULE NO. 2—Bids on following main items:
(A) 215,000 cu.yd. canal excavation, Class 1.
(B) 20,000 cu.yd. canal excavation, Class 2.
(C) 58,000 cu.yd. canal excavation, Class 3.
(D) 750,000 sta.yd. overhaul.
(E) 390 cu.yd. structure exca., Class 3.
(F) 500 cu.yd. exc. embankment cutoff tr. No. 3.
(G) 150 cu.yd. concrete.
(H) 47 M ft. BM erect timber bridges.
(I) 424 ft. lay 24-in. concrete pipe.
(J) 312 lin.ft. lay 36-in. concrete pipe.

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	TOTALS
Haas, Doughty & Jones	.12	.34	1.30	.03	4.00	4.00	25.00	25.00	2.00	3.00	$143,280
Utah Const. Co.	.13	.30	1.30	.04	3.00	3.00	22.00	25.00	2.25	3.40	151,211
John Phillips Co., San Francisco	.135	.25	1.35	.04	3.00	3.00	28.75	30.00	1.50	1.75	154,890
Morrison-Knudsen Co.	.11	.30	1.60	.035	3.00	4.00	22.00	30.00	1.00	2.00	159,587

SCHEDULE NO. 3—Bids on following main items:
(A) 153,000 cu.yd. canal excavation, Class 1.
(B) 18,000 cu.yd. canal excavation, Class 2.
(C) 33,000 cu.yd. canal excavation, Class 3.
(D) 65,000 sta.yd. overhaul.
(E) 530 cu.yd. struct. excavation, Class 3.
(F) 350 cu.yd. surface highway bridge appr.
(G) 240 cu.yd. concrete.
(H) 37 M ft. BM erect timber bridges.
(I) 636 ft. lay 36-in. concrete pipe.

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	TOTALS
Haas, Doughty & Jones	.13	.34	1.35	.05	4.00	4.50	25.00	25.00	2.50	$90,290
Utah Const. Co., Ogden	.13	.30	1.35	.06	3.00	3.50	22.00	25.00	2.80	88,051
John Phillips Co., San Francisco	.135	.25	1.35	.06	3.00	3.50	28.75	30.00	1.75	88,960
Morrison-Knudsen Co.	.11	.30	1.60	.04	3.00	4.00	22.00	30.00	1.00	91,252

SCHEDULE NO. 4—Bids on following main items:
(A) 150,000 cu.yd. canal excavation, Class 1.
(B) 20,000 cu.yd. canal excavation, Class 2.
(C) 56,000 cu.yd. canal excavation, Class 3.
(D) 66,000 sta.yd. overhaul.
(E) 400 cu.yd. surf. highway bridge approach.
(F) 113 cu.yd. concrete.
(G) 41 M ft. BM erect timber bridge.
(H) 752 ft. lay 24-in. concrete pipe.

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	TOTALS
Haas, Doughty & Jones	.12	.34	1.25	.04	4.00	20.00	25.00	2.00	$106,792
Utah Const. Co.	.13	.30	1.30	.04	3.50	22.00	25.00	2.25	110,476
John Phillips Co.	.135	.25	1.35	.06	3.50	28.75	30.00	1.50	113,442
Morrison-Knudsen Co.	.11	.30	1.60	.04	4.00	22.00	30.00	1.00	123,115

SCHEDULE NO. 5—Bids on following main items:
(A) 147,000 cu.yd. canal excavation, Class 1.
(B) 18,000 cu.yd. canal excavation, Class 2.
(C) 82,000 cu.yd. canal excavation, Class 3.
(D) 170 cu.yd. dry rock paving.
(E) 800 cu.yd. surface highway bridge appr.
(F) 800 cu.yd. surface state highway bridge appr.
(G) 200 cu.yd. concrete.
(H) 48 M ft. BM erect timber (treated) bridge.

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	TOTALS
Haas, Doughty & Jones	.12	.34	1.25	6.00	4.00	4.50	20.00	30.00	$145,394
Utah Const. Co., Ogden	.13	.30	1.30	3.60	3.50	3.50	22.00	35.00	148,951
John Phillips Co., San Francisco	.135	.25	1.35	2.50	3.50	4.00	28.75	35.00	155,466
Morrison-Knudsen Co.	.11	.30	1.60	3.00	4.00	4.00	22.00	40.00	171,448

SEWER CONSTRUCTION

SAN CLEMENTE, CALIF.—CITY—VITRIFIED AND CAST IRON SEWERS AND PUMPING PLANTS

Contract awarded to Robinson-Roberts Co., Rives-Strong Bdg., Los Angeles, $98,934 for intercepting and outfall sewer and pumping plants for City of San Clemente, Orange County. Bids from five lowest as follows:

(1) Robinson-Roberts Co., L. A. ..... $ 98,934
(2) V. Agnifili, Huntington Park 96,409
(3) C. H. Johnston, Los Angeles 102,858
(4) H. A. Teget $106,378
(5) Merritt-Chapman & Scott 108,103

	(1)	(2)	(3)	(4)	(5)
6,247 lin.ft. 15-in. vitrified pipe	2.00	3.00	2.13	3.00	3.50
108 lin.ft. 16-in. 'B' cast-iron pipe	3.00	4.05	4.82	5.00	5.00
936 lin.ft. 18-in. vitrified pipe	3.00	3.60	2.35	3.50	3.50
3,614 lin.ft. 21-in. vitrified pipe	3.00	4.96	3.81	4.25	4.00
24 ft. 22-in. 'B' cast-iron pipe	5.00	8.00	9.20	7.50	5.00
240 ft. 8-in. vitrified pipe	1.00	1.65	1.12	1.40	1.00
59 ft. 8-in. 'B' cast-iron pipe	2.00	1.92	2.05	3.00	2.00
200 ft. 6-in. 'B' cast-iron pipe	2.00	2.30	1.62	2.00	1.00
4,000 ft. 12-in. 'B' cast-iron pipe	12.25	7.00	12.00	10.50	11.00
70 ft. blanket conc. (12-in. pipe)	8.30	1.70	1.50	1.50	4.80
563 ft. conc. cradle for 15-in. pipe	2.00	1.70	2.50	1.50	.50
288 ft. conc. cradle for 21-in. pipe	2.00	2.00	2.50	1.75	1.00
2,710 ft. 1-in. galv. water pipe	.15	.45	.25	.25	.10
33 manholes	$100	85.00	90.00	80.00	75.00
6 drop manholes	$100	$100	90.00	$100	75.00
Sewage pumping plant No. 1	$7000	$8500	$8570	$11.000	$10,287
Sewage pumping plant No. 2	$4500	$6000	$4570	$4500	$4450
Sewage pumping plant No. 3	$4500	$6000	$4570	$4500	$4450

WATER SUPPLY SYSTEMS

SAN DIEGO, CALIF.—CITY—PIPE LINES, TUNNELS, ETC.

Bids as follows by City for Otay Reservoir-San Diego Second Main Pipe Line:

SCHEDULE 2—PROPOSAL A (using Electric Welded steel pipe) for pipe, connections, etc., from Mile 0 to Mile 16.2; Western Pipe & Steel Co., L. A. and S. F., low. Bids from:

(1) Western Pipe & Steel Co. (low bidder) $620,982
(2) Steel Tank & Pipe Co., Berkeley 644,063
(3) Consolidated Steel Co., Los Angeles 701,588
(4) Los Angeles Mfg. Co., Los Angeles $715,490
(5) V. R. Dennis Const. Co. (electric welded) 720,915
(6) V. R. Dennis Const. Co. (Toncan pipe) 799,505

		(1)	(2)	(3)	(4)	(5)	(6)
40	ft. 28-in. elect. weld. steel pipe, 3/8-in.	8.20	8.40	9.00	9.30	9.00	8.40
30,810	ft. 40-in. elect. weld. steel pipe, 3/8-in.	6.16	6.22	6.80	7.10	7.40	7.85
4,060	ft. 40-in. elect. weld. steel pipe, 1/4-in.	7.15	7.35	7.60	7.70	8.20	9.90
7,200	ft. 40-in. elect. weld. steel pipe, 1/4-in. (in tunnels)	7.80	8.00	9.95	10.25	8.20	9.90
830	ft. 40-in. elect. weld. steel pipe, 5/16-in.	8.45	9.30	9.00	9.20	9.65	12.30
21,560	ft. 36-in. elect. weld. steel pipe, 3/8-in.	5.90	5.78	6.21	6.35	6.80	7.00
13,340	ft. 36-in. elect. weld. steel pipe, 1/4-in.	6.70	6.78	7.45	7.50	7.60	9.00
4,910	ft. 36-in. elect. weld. steel pipe, 5/16-in.	7.80	8.00	8.00	8.30	8.90	11.15
3,100	ft. 36-in. elect. weld. steel pipe, 3/8-in.	9.00	9.15	9.20	10.10	10.00	13.30
250	40-in. addit. circular seams, 5/16-in. plate	14.00	16.50	20.00	15.00	8.75	8.75
50	40-in. addit. circular seams, 1/4-in. plate	14.00	16.50	20.00	15.00	8.75	8.75
25	40-in. addit. circular seams, 5/16-in. plate	15.50	16.50	20.00	16.00	10.25	10.25
150	36-in. addit. circular seams, 5/16-in. plate	14.00	16.50	20.00	15.00	8.45	8.45
90	36-in. addit. circular seams, 1/4-in. plate	14.00	16.50	20.00	15.00	8.75	8.75
50	36-in. addit. circular seams, 5/16-in. plate	15.00	16.50	20.00	16.00	9.95	9.95
25	36-in. addit. circular seams, 3/8-in. plate	15.50	16.50	20.00	16.00	10.58	10.50
60,000	lb. elect. weld. pipe, fabr. angles	.12	.13	.15	.10	.12	.105
5	40-in. x 36-in. elect. weld. steel reducers, 1/4-in.	109.00	185.00	200.00	170.00	195.00	145.00
1	40-in. x 30-in. elect. weld. steel reducer, 1/4-in.	160.00	150.00	175.00	142.00	165.00	170.00
2	40-in. x 28-in. elect. weld. steel reducers, 1/4-in.	157.00	150.00	175.00	142.00	155.00	180.00
4	36-in. x 30-in. elect. weld. steel reducers, 1/4-in.	155.00	150.00	170.00	142.00	160.00	130.00
1	36-in. x 28-in. elect. weld. steel reducer, 1/4-in.	150.00	150.00	170.00	142.00	150.00	150.00
1	elect. weld. steel tee 36-in. x 36 x 20-in., 1/4-in.	346.00	330.00	350.00	310.00	195.00	300.00
1	40-in. x 40 x 36-in. elect. steel Y, 1/4-in. plate	145.00	140.00	160.00	150.00	300.00	185.00
2	36-in. x 36-in. x 30-in. elect. weld. steel T, 1/4-in.	190.00	185.00	200.00	188.00	170.00	290.00
4	40-in. expansion joints	164.00	165.00	180.00	170.00	535.00	535.00
5	36-in. expansion joints	146.00	150.00	165.00	150.00	455.00	455.00
3	36-in. vert. geared gate valves	$1,520	$1,600	$1,460	$1,780	$1,655	$1,655
1	30-in. vert. geared gate valve	$1,010	$1,100	$ 980	$1,640	$ 930	$ 930
1	28-in. vert. geared gate valve	$ 905	$ 940	$ 920	$1,210	$1,385	$1,385
132	4-in. air valve assemblies (private street)	59.00	70.00	75.00	60.00	80.00	80.00
5	4-in. air valve assemblies (streets and roads)	82.00	90.00	75.00	75.00	105.00	105.00
35	4-in. blowoff assemblies, Crane Co., No. 481	55.00	70.00	65.50	52.00	80.00	80.00
2	4-in. blowoff assemblies, Crane Co., No. 755	65.00	70.00	65.50	52.00	75.00	75.00
24	4-in. blowoff assemblies, on pipe, Crane Co., No. 481	53.00	58.00	65.50	52.00	70.00	70.00
2	4-in. blowoff assemblies, on pipe, Crane Co., No. 755	65.00	70.00	65.50	52.00	80.00	80.00
1	6-in. blowoff assembly, Crane Co., No. 481	71.00	85.00	82.00	80.00	93.00	93.00
1	6-in. blowoff assembly, Crane Co., No. 755	90.00	100.00	93.00	90.00	112.00	112.00
6	6-in. blowoff assemblies, on pipe, Crane Co., No. 481	73.00	85.00	82.00	80.00	93.00	93.00
800	ft. 4-in. stand. wrought iron pipe	1.10	1.25	1.10	1.05	2.50	2.50
50	ft. 6-in. stand. wrought iron pipe	1.85	2.10	2.00	1.75	4.20	4.20
35	M ft. BM No. 1 Douglas Fir lumber	100.00	120.00	150.00	110.00	165.00	165.00
250	cu.yd. concrete Class 1	15.00	45.00	48.00	60.00	25.00	25.00
40	cu.yd. concrete Class 2	15.00	50.00	48.00	56.00	25.00	25.00
450	bbl. cement	3.00	3.25	3.10	3.00	3.25	3.25
8,750	lb. reinforcing steel	.06	.15	.08	.10	.10	.10
6	stand. pre-cast concrete manholes	125.00	160.00	148.00	170.00	200.00	200.00
500	precast reinf. conc. saddles	3.00	6.00	7.60	9.00	2.50	2.50
1	28-in. inlet and outlet Venturi meter tube	$2,935	$3.160	$2,710	$2,850	$4,000	$4,000
200	cu.yd. unclassified excavation	2.00	4.40	4.75	5.00	1.50	1.50
900	ft. 6-in. concrete pipe	.60	.90	.68	.75	1.00	1.00

SCHEDULE 2—PROPOSAL B (Using Cast Iron Pipe) for pipe, connections, etc., from Mile 0 to Mile 16.2; R. E. Hazard Contr. Co., 2528 Kettner Blvd., San Diego, only bid. Unit bids of R. E. Hazard Contr. Co. follow:

12,640	ft. 40-in. cast iron pipe, 200-ft. head	9.88
7,200	ft. 40-in. cast iron pipe, in tunnels, 200-ft. hd.	10.46
18,650	ft. 40-in. cast iron pipe, 250-ft. head	10.98
3,160	ft. 40-in. cast iron pipe, 300-ft. head	12.17
850	ft. 40-in. cast iron pipe, 350-ft. head	13.27
520	ft. 40-in. cast iron pipe, 400-ft. head	14.73
170	ft. 36-in. cast iron pipe, 200-ft. head	8.67
17,530	ft. 36-in. cast iron pipe, 250-ft. head	10.98
10,270	ft. 36-in. cast iron pipe, 300-ft. head	10.59
6,100	ft. 36-in. cast iron pipe, 350-ft. head	11.46
3,900	ft. 36-in. cast iron pipe, 400-ft. head	12.54
1,780	ft. 36-in. cast iron pipe, 450-ft. head	13.44
1,060	ft. 36-in. cast iron pipe, 500-ft. head	14.15
1,740	ft. 36-in. cast iron pipe, 525-ft. head	15.03
40	ft. 28-in. cast iron pipe, 300-ft. head	10.60
3	40-in. Class "C" manhole tees	225.00
2	40-in. Class "D" manhole tees	240.00
4	36-in. Class "C" manhole tees	175.00
3	36-in. Class D manhole tees	200.00
2	36-in. Class "E" manhole tees	225.00
243,850	lb. tees, and fittings, etc.	.07
90,250	lb. tees, and fittings, etc.	.07
4	40-in. expansion joints	135.00
5	36-in. expansion joints	130.00
3	36-in. vert. gear. hub end gate valves	$1,150
1	30-in. vert. gear. hub end gate valve	750.00
1	28-in. vert. gear. hub end gate valve	720.00
11	4-in. air valve assemblies, Crane No. 480	42.50
62	2-in. pres. air valve, assemblies, Crane No. 472	54.00
35	4-in. blowoff assemblies, Crane No. 481	32.00
2	4-in. blowoff assemblies, Crane No. 755	50.00
24	4-in. blowoff assemblies on pipe, Crane No. 481	34.00
2	4-in. blowoff assemblies on pipe, Crane No. 755	50.00
1	6-in. blowoff assemblies trestle, Crane No. 481	48.00
1	6-in. blowoff assemblies trestle, Crane No. 755	100.00
4	6-in. blowoff assemblies pipe, Crane No. 481	46.00
800	ft. 4-in. wrought iron pipe	1.20
50	ft. 6-in. wrought iron pipe	2.25
38.000	lb. structural steel	.07
450	cu.yd. Class 1 concrete	18.00
80	cu.yd. Class 2 concrete	18.00
725	bbl. cement	2.75
10,000	lb. reinf. steel	.055
610	precast reinf. conc. saddles	3.70
1	28-in. Venturi meter tube	$2,500
200	cu.yd. excavation	1.50
900	ft. 6-in. conc. drain pipe	.55

(Continued next page)

SAN DIEGO, CALIF.—CITY—PIPE LINES, TUNNELS, ETC. (continued)

SCHEDULE 4—PROPOSAL A (Using Cast Iron Pipe) for excavation, pipe, connections, etc., from Mile 16.2 to Mile 19.2, R. E. Hazard Contracting Co., 2528 Kettner Blvd., San Diego, low. Bids from:

(1) R. E. Hazard Contracting Co., San Diego (low bidder) $179,148
(2) Miracle Const. Co., San Diego 220,728
(3) Miracle Const. Co. $218.811
(4) Geo. Mitchell Co., Huntington Park 288,882
(5) M. N. Guho (excavation only) 58,733

	(1)	(2)	(3)	(4)	(5)
25,000 cu.yd. trench excavation	.89	.95	.95	3.00	1.88
32,000 sq.ft. paving, remove and replace	.30	.35	.35	.50	.35
50 cu.yd. excavation (pipe line)	1.40	2.00	2.00	4.00	2.25
14,580 lin.ft. 36-in. cast iron pipe, 250 ft. head	8.90	11.35	11.30	12.00	
1,080 ft. 36-in. cast iron pipe, 300 ft. head	10.10	12.00	10.90	12.90	
85 ft. 30-in. elect. welded steel pipe, ¼-in.	5.30	8.00	8.00	10.00	
3 36-in. "C" manhole tees	175.00	180.00	180.00	200.00	
3 36x36x6-in. "C" cast iron blowoffs	150.00	140.00	140.00	200.00	
1 36x36x30-in. cast iron tee, Class C	175.00	260.00	260.00	200.00	
1 36-in.x30-in. cast iron reducer, Class C	112.00	140.00	140.00	200.00	
1 30-in. "C" 90 degree ell	215.00	170.00	170.00	200.00	
28,000 lb. "C" cast iron angle fittings	.0675	.07	.07	.10	
2 30-in. gate valves	825.00	900.00	900.00	1,000.00	
3 6-in. gate valves	46.00	26.00	26.00	40.00	
60 ft. 6-in. "C" flanged C.I. pipe	1.60	1.50	1.50	1.00	
6 2-in. pressure air valve assemblies	60.00	110.00	110.00	80.00	
1 4-in. air valve assembly	42.00	100.00	100.00	50.00	
3 pre-cast concrete manholes	110.00	55.00	55.00	100.00	100.00
10 cu.yd. Class 2 concrete	10.00	15.00	15.00	30.00	10.00
10 bbl. cement	2.50	2.20	2.20	3.00	2.10

SCHEDULE 4—PROPOSAL B (using Electric Welded pipe) for excavation, pipe, connections, etc. from Mile 16.2 to Mile 19.2, Western Pipe & Steel Co., S. F. and L. A., low. Bids from:

(1) Western Pipe & Steel Co., S. F. and L. A. (low) $137,364
(2) Steel Tank & Pipe Co., Berkeley 164,952
(3) Consolidated Steel Corp., Los Angeles 178,933
(4) Los Angeles Mfg. Co., Los Angeles 189,411
(5) V. R. Dennis Const. Co. (Electric weld. pipe) $167,497
(6) V. R. Dennis Const. Co. (Toncan pipe) 187,790
(7) M. N. Guho, L. A. (excavation only) 58,733

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
25,000 cu.yd. trench excavat.	.68	1.60	1.80	2.00	1.00	1.00	1.88
32,000 sq.ft. pav. remove and replace	.27	.35	.31	.42	.50	.50	.35
50 cu.yd. excav. pipe line appur.	1.00	4.40	4.70	5.00	1.85	1.85	2.25
15,650 ft. 36-in. el. weld. pipe, ¼-in.	6.70	6.75	7.42	7.50	7.55	8.85	
85 ft. 30-in. el. weld. pipe, ¼-in.	6.05	6.20	6.22	6.45	6.80	7.75	
1 36-in.x36-in.x30-in. steel tee, ¼-in.	121.00	135.00	130.00	110.00	270.00	270.00	
1 30-in.x90 degree steel ell	250.00	240.00	238.00	220.00	169.00	170.00	
1 36-in.x30-in. steel reducer, ¼-in.	161.00	170.00	146.00	150.00	162.00	161.00	
7,000 lb. fab. elect. weld. angles	.14	.15	.12	.10	.12	.105	
20 36-in. addit. circ. seams, ¼-in.	13.00	15.00	20.00	15.00	7.35	6.00	
3 36-in. expansion joints	145.00	160.00	175.00	150.00	450.00	450.00	
2 30-in. gate valves	$1,100	$1,200	$980	$1,640	$1,025	$1,025	
6 6-in. blowoff assemblies	73.00	70.00	100.00	80.00	102.00	102.00	
5 2-in. pressure air valve assemblies	95.00	100.00	100.00	90.00	110.00	110.00	
3 4-in. air valve assemblies	67.00	80.00	72.00	60.00	110.00	110.00	
60 ft. 6-in. wrought iron pipe	1.95	2.00	2.00	1.75	4.00	4.00	
70 ft. 4-in. wrought iron pipe	1.10	.90	1.50	1.05	2.50	2.50	
3 pre-cast concrete manholes	120.00	240.00	282.00	320.00	187.50	187.50	100.00
10 cu.yd. Class 2 concrete	20.00	50.00	47.00	56.00	18.00	18.00	10.00
10 bbl. cement	3.00	3.00	3.10	3.00	3.20	3.20	2.10

SCHEDULE I—PROPOSAL A—TRENCH EXCAVATION and completion of backfill from Mile 0 to Mile 16.2 (for either cast iron or steel pipe), R. E. Hazard Contracting Co., 2528 Kettner Blvd., San Diego, low. Bids from:

(1) R. E. Hazard Contr. Co., San Diego (low) $43,370
(2) DeWaard & Sons, San Diego 44,999
(3) Western Pipe & Steel Co. 49,390
(4) Macco Const. Co., Clearwater 50,455
(5) V. R. Dennis Const. Co., San Diego 80,538
(6) Nelson & Sloan, Chula Vista ..... $ 90,757
(7) Miracle Const. Co., San Diego 85,780
(8) M. N. Guho, Los Angeles 96,455
(9) A. Dalmatin & R. N. Nikcevich, L. A. 154,288

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
81,550 yd. uncl. excavation	.46	.47	.52	.55	.90	.90	.96	1.10	1.62
1,125 sq.ft. pav. remove	.45	.33	.30	.50	.75	.50	.50	.40	.30
42,000 cu.yd. backfill	.125	.15	.10	.12	.15	.40	.165	.15	.52

SCHEDULE 3—PROPOSAL A—TUNNELS No. 1, 2, 3 and 4 (for either cast iron or steel pipe) M. N. Guho, 1037 S. Atlantic St., Bell, Los Angeles County, low. Bids from:

(1) M. N. Guho, Bell (low bidder) ..... $ 66,666
(2) Western Pipe & Steel Co., San Francisco 104,408
(3) Miracle Const. Co., San Diego 105,726
(4) R. E. Hazard Contr. Co., San Diego 112,085
(5) H. E. Warden 115,318
(6) Macco Const. Co., Clearwater $122,160
(7) Geo. Mitchell Co., Huntington Park 130,422
(8) V. R. Dennis Const. Co., San Diego 168,819
(9) Crook & Henno, Los Angeles 155,385
(10) A. Dalmatin & R. N. Nikcevich, L. A. 152,122

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
7,200 ft. tunnel excavation	5.95	9.45	9.25	10.50	10.80	11.75	12.00	13.25	13.90	16.00
200 yd. tunnel entr.	1.40	.50	2.00	1.75	2.50	2.50	4.00	2.00	2.20	4.00
6,800 ft. 1½-in. gun. lining	1.50	2.00	2.40	2.70	2.60	2.60	2.50	6.00	4.70	2.10
400 ft. lining in timb.	3.75	6.00	8.00	7.50	11.00	11.00	7.50	25.00	8.65	2.60
50 cu.yd. conc. Cl. 1, ent.	6.75	25.00	18.00	9.00	22.00	22.00	25.00	25.00	22.00	20.00
40 cu.yd. conc. Cl. 1 floor	6.75	16.00	15.00	9.00	10.00	10.00	20.00	25.00	22.00	20.00
550 cu.yd. conc. Cl. 2 floor	5.75	16.00	15.00	8.50	10.00	10.00	20.00	17.50	15.00	15.00
2,250 bbl. cement	2.20	3.00	2.60	2.75	2.50	2.50	3.00	3.25	2.80	2.90
10,500 lb. reinf. steel	.06	.08	.06	.055	.04	.04	.08	.06	.06	.08
2,850 lb. wire mesh	.09	.08	.09	.10	.082	.0825	.12	.12	.10	.15
12,000 lb. galv. 2-in. mesh	.12	.08	.16	.12	.075	.075	.12	.105	.10	.18
10 M ft. BM Doug. fir. timber	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00

CONSTRUCTION NEWS SUMMARY

NOTE: For additional information regarding projects in this summary refer to Daily Construction News Service, date appearing at end of each item.

TABULATION OF AWARDS

Awards for 1929 for construction projects in the eleven Far Western States totaled $886,676,081, of which $375,779,431 was Building Construction and balance of $510,896,650 for Engineering Construction, as follows:

Paving	$72,052,000
Grading, highways	67,696,000
Bridges	29,250,000
Sewer construction	30,574,650
Water Supply systems	24,454,000
Irrigation and Reclamation	19,760,000
Flood control work	25,073,000
Power development	105,824,000
River and Harbor work	9,484,000
Railroad construction	24,453,000
Lighting systems	10,776,000
Oil Pipe-Lines	91,500,000
	$510,896,650
Building construction	375,779,431
	$886,676,081

Awards for the month of December, 1929, for construction projects in the Far Western States total $35,688,425, of which $18,867,425 was for *Building Construction, balance of $16,821,000 for Engineering Construction, as follows:

Paving	$4,760,000
Grading, highways	3,261,000
Bridges	765,000
Sewers	1,010,000
Water supply systems	1,225,000
Power development	1,000,000
Irrigation	825,000
River and harbor work	2,100,000
Lighting systems	450,000
Railroad construction	1,425,000
	$16,821,000
Building construction	18,867,425
	$35,688,425

*Building permits compiled by S. W. Straus & Co.

LARGE WESTERN PROJECTS

(See Construction News, this issue, for details.)

WORK CONTEMPLATED

Wharves, transit shed, etc., at Berths 144, 145 and 146 for City of Los Angeles, $1,500,000.

Hotel for Pickwick Stage Corp. at Eureka, Calif., $500,000.

Apartment for Consolidated Properties on Green and Leavenworth sts., San Francisco, $700,000.

Engineering building at University of California, Berkeley, Calif., $500,000.

Auditorium for City of Long Beach, Calif., $1,400,000.

Balboa St. High School for City and County of San Francisco, $700,000.

Health Center building for San Francisco Board of Health, $650,000.

High School building for George Washington School for City of San Francisco, $600,000.

Sewers for County Sanitation Dist. No. 3, Los Angeles, $3,400,000.

Reservoir, filtration plant and water mains for City of Great Falls, Mont., $1,000,000.

Wells, and pipe lines for City of Tacoma, Wash., $550,000.

Railroad, 22 miles long, east of Winslow, Ariz., for Atchison, Topeka & Santa Fe R. R., $1,375,000.

Factory at Los Angeles for Liquid Carbonic Corp., Chicago, Ill., $600,000.

Addition to St. Catherine Home at San Francisco, $800,000.

BIDS BEING RECEIVED

Grading in Los Angeles County near La Canada, for California Division of Highways, 1½ miles, involving 460,000 cu.yd. excavation, bids to January 22.

Concrete paving 9 miles in Imperial County from Holtville to El Centro, for California Division of Highways, bids to January 22.

Concrete bridge over Salt River at Tempe for State of Arizona, bids to January 20.

Concrete bridge over Rogue River, Curry County, for State of Oregon, bids to January 16.

Hospital for King County at Seattle, Wash., bids to January 14; $2,500,000.

Concrete paving 7 miles in San Luis Obispo County from Santa Maria River to Los Berros Creek, for California Division of Highways, bids to January 29.

BIDS RECEIVED

Welded steel pipe line (Second Otay) for City of San Diego, Calif., Western Pipe & Steel Co., Los Angeles, $758,346 low.

Canals and structures on Minidoka Project for Bureau of Reclamation, Burley, Idaho, Haas, Doughty & Jones, San Francisco, $537,199 low.

CONTRACTS AWARDED

Pier for Canadian Northern R. R. Co. at Vancouver, B. C., to Northern Construction Co. and J. W. Stewart, Vancouver, B. C., $642,560.

Asphalt & Warrenite Paving streets in Alhambra and Valley Blvd. District for City of Los Angeles, to Hall-Johnson Co., Alhambra, $587,023.

STREET and ROAD WORK

WORK CONTEMPLATED

ALAMEDA, CALIF.—Plans by B. Hamilton, City Engineer, for: (1) Buena Vista Ave. from Webster St. to City limits, involving 137,400 sq.ft. grading, 73,000 sq.ft. 6-in. oil-macadam paving, vitrified sewers; and (2) Third St. from Pacific Ave. to Maple St., involving 28,000 sq.ft. 6-in. oil-macadam paving, corrugated culverts, etc. Bids after Jan. 21. 12-31

MILL VALLEY, CALIF.—Plans by City Engineer, protests Jan. 9, for improvement of Blithedale Ave., consisting of concrete sidewalk, concrete curb, 10-in. vitrified pipe culvert, etc. 1911 Act. 12-30

PACIFIC GROVE, CALIF.—Plans by E. Dames, City Engineer, for: (1) Improvement of Fountain Ave., between Lighthouse Ave. and Sinex Ave., work consisting of 4-in. asphalt concrete pavement, cement concrete gutters, 4-in. sanitary sewer laterals, etc. (2) Improvement of Gibson Ave., between Pacific Grove east city limits and Fountain Ave., work consisting of grading, 4-in. asphalt concrete pavement, concrete gutters, storm drains, 4-in. sanitary sewer laterals, etc. Bids after Jan. 2. 12-27

SAN DIEGO, CALIF.—Plans by City Engineer, protests Jan. 20, for improving Upas St., involving 39,959 sq.ft. 6-in. asphalt paving, 1846 ft. 4-in. 'B' cast-iron pipe, etc. 12-27

SAN DIEGO, CALIF.—Plans by City Engineer, H. W. Jorgensen, protests Jan. 20, for improving 54th St., involving 316,585 sq.ft. 6-in. hexagonal slab concrete paving, 43,802 cu.yd. excavation, 2157 ft. 8-in. and 12,682 ft. 6-in. vitrified sewer, 1698 ft. 8-in., 7754 ft. 6-in. and 321 ft. 4-in. cast-iron pipe, 13 hydrants, etc. 12-28

SAN FRANCISCO, CALIF.—Plans by City Engineer's Office for improving Corbett Ave. from Clayton to 24th Sts., involving 17,600 cu.yd. excavation, 125,000 sq.ft. 6-in. concrete base with 2-in. asphalt surface, vitrified sewers, etc. 12-21

SAN JOSE, CALIF.—Plans by W. L. Popp, City Engineer, for improving Waco St. from Hamline St. to Newhall St., paving with 2½-in. asphalt base with 1½-in. asphalt surface. 12-31

SAN LUIS OBISPO, CALIF.—Plans by County Surveyor, protests January 6, for: (1) County Improvement District 9, portions of various streets in and adjacent to subdivision No. 2 of Oceano Beach and No. 3 of Oceano Beach, work consisting of grading, paving with Warrenite Bitulithic with gravel subbase, gravel paving, pine header boards, constructing concrete gutters and sidewalks, wooden pile bulkheads, welded-steel pipe, valves, fire hydrants, corrugated culverts, ornamental street lighting system, etc. (2) County Improvement District No. 17, improvement of portions of Pier Ave. Blvd., Grand Pacific Blvd., First St., Strand Ave., McCarthy Ave., Juanita Ave., etc., located near the town of Oceano. Work consists of grading, paving with Warrenite Bitulithic, constructing concrete gutters, sidewalks and curbs, timber bulkheads, corrugated pipe, etc. Work under 1921 Act. 1-3

SANTA CRUZ, CALIF.—Plans by R. Fowler, City Engr., protests January 6, for improvement of Easterly Ave. by concrete pavement, curbs, sidewalks, vitrified sewer, etc. Work under 1911 Act. 12-20

BIDS BEING RECEIVED

LONG BEACH, CALIF.—Bids to 2:30 p.m., Jan. 14, by City Clerk for improving Atlantic Ave., involving 106,005 sq.ft. 7-in. concrete paving, sanitary sewer. 12-30

LOS ANGELES, CALIF.—Bids to 2 p.m., Jan. 13, by County for 2.9 miles Topango Canyon Road from summit south, involving 334,423 cu.yd. excavation, corrugated pipe, etc. 12-27

SACRAMENTO, CALIF.—Bids to 2 p.m., Jan. 22, by California Division of Highways, Sacramento, for (1) LOS ANGELES COUNTY—1.5 miles grading from 2½ to 4 miles northerly of La Canada, involving 460,000 cu.yd. roadway excavation, 3,000,000 sta.yd. overhaul, 5220 cu.yd. structure excavation, 1150 cu.yd. concrete, 170,000 lb. reinf. steel, reinf. conc. headers and stretchers, etc.; (2) KERN COUNTY —9.7 miles grading and surfacing from San Emigdio Road to Route 4, involving 72,300 cu.yd. roadway excavation, 23,900 tons gravel or stone (base course), 21,000 tons oil-treated gravel or stone surfacing, 460 bbl. fuel oil, 2700 bbl. pipe line run oil; (3) IMPERIAL COUNTY—9 miles concrete paving from El Centro to Holtville, involving 47,000 cu.yd. roadway excavation, 14,800 cu.yd. sand cushion, 20,200 cu.yd. "A" concrete (paving), 508,200 lb. reinf. steel, etc.; and (4) RIVERSIDE COUNTY—0.5 miles concrete paving at Wineville, involving 2300 cu.yd. concrete paving, 1000 cu.yd. concrete (structures, etc.); and 101,100 lb. reinf. steel. 12-26

SACRAMENTO, CALIF.—Bids up to 2 p.m., Jan. 29, by California Division of Highways for: (1) SAN LUIS OBISPO COUNTY—7.2 miles from Santa Maria River and Los Berros Creek, involving 157,250 cu.yd. roadway excavation, 17,250 cu.yd. 'A' concrete (paving), 885 cu.yd. 'A' concrete (structures), 500,000 lb. reinforcing steel; and (2) SANTA BARBARA COUNTY—4 miles from Zaca to Wigmore, involving 100,000 cu.yd. roadway excavation, 9650 cu.yd. 'A' concrete (paving), 237,500 lb. reinforcing steel, corrugated pipe, etc. 1-2

PORTLAND ORE.—Bids to 10 a.m., Jan. 16, by Oregon State Highway Commission for: JACKSON and KLAMATH COUNTIES—27.1 miles broken stone resurfacing and furnishing of broken stone for maintenance purposes, work involving 53,000 cu.yd. of broken stone. LANE COUNTY—21 miles resurfacing and furnishing of materials for maintenance purposes on Nimrod-Belknap Springs Section of McKenzie Highway, involving 41,000 cu.yd. of broken stone or crushed gravel. LINCOLN COUNTY—Construction of a ferry slip and 1 mile of embankment on Yaquina Bay-South Beach Section of the Roosevelt Coast Highway. Work involves 25,000 cu.yd. of embankment construction. WASHINGTON COUNTY—Construction of 3.9 miles of 24-ft. concrete paving on the Multnomah County Line-Beaverton Section of the Tualatin Highway. WHEELER and GRANT COUNTIES—Grading Barnhouse Ranch-Picture Gorge Section of Ochoco Highway, to be let in two units, West Unit, 6.9 miles, involving 195,000 cu.yd. excavation; and East Unit, 3.1 miles, involving 100,000 cu.yd. roadway excavation. 1-3

BIDS RECEIVED

OAKLAND, CALIF.—Low bids as follows by East Bay Municipal Utility District: (1) Tieslau Bros., 2819 Grove St., Berkeley, $4634, low for 9.63 miles grading and surfacing Upper San Leandro Road; (2) Pacific Construction Co., 2235 E. Seventh St., Oakland, $9929, low for 1.4 miles grading and surfacing Middle Bar Road; and (3) Hutchinson Co., 1450 Harrison St., Oakland, $20,000, only bid, for asphalt paving repairs in various cities. 12-28

SACRAMENTO, CALIF.—Low bids as follows by California Division of Highways: (1) LOS ANGELES COUNTY—Will F. Peck Co., 1120 N. Las Palmas St., Los Angeles, $69,953, low for 1.2 miles grading and concrete paving at Liberty Trade, 5 miles west of Calabassas; (2) KERN COUNTY—Geo. Herz Co., San Bernardino, $242,768, low for 15 miles grading and surfacing from Cinco to 7 miles north of Ricardo; and (3) TULARE COUNTY—California Construction Co., Standard Oil Bdg., San Francisco, $240,190, low for 8.6 miles grading and asphalt paving from Pixley to Tipton. 1-2

SAN FRANCISCO, CALIF.—Sibley Grading & Teaming Co., 165 Landers St., San Francisco, $7490, low for grading playfield at S. F. State Teachers College for State Architect's Office. 1-2

SANTA CLARA, CALIF.—Thompson Bros., Santa Cruz and Fresno, $130,544 low for concrete paving, etc., Sherman, Lexington, Fremont, Alviso Sts., etc., for City. Bids rejected, to be advertised on asphalt paving. (See Unit Bid Summary). 12-19

SANTA FE, N. M.—Low bids as follows by State Highway Commission: McKINLEY COUNTY—12 miles, E. J. Maloney, Gallup, N. M., $180,772.84 for grading, two small creosoted timber bridges, base course for oil-process surfacing. CURRY COUNTY—T. J. Tobin, Albuquerque, N. M., $64,508.62 for crushed material surfacing, 7.9 miles. CHAVES COUNTY—Lee Moor Contracting Co., El Paso, $63,391.79 for resurfacing with crushed selected material, 10.7 miles. DONA ANA and LUNA COUNTIES—Lee Moor Contracting Co., $74,719.46 for preparing 5.2 miles for oil surfacing. (See Unit Bid Summary.)

CONTRACTS AWARDED

CASA GRANDE, ARIZ.—To O. U. Miracle, 1604 Dale St., San Diego, $39,675 for concrete paving, lighting standards for City. 12-21

LOS ANGELES, CALIF.—To Hall-Johnson Co., 905 Westminster St., Alhambra, $587,023 for improving streets in Alhambra Ave. and Valley Blvd. District. for City, grading, paving with asphalt base with Warrenite Bitulithic surface, storm drain system, sanitary sewer and water system. (See Unit Bid Summary.) 1-2

LOS ANGELES, CALIF.—To Martter & Bock, 1007 S. Harvard Blvd., Los Angeles, who bid $259,886 to Board of Public Works for improving Monterey Road, between Pullman St. and Huntington Drive, by grading, concrete paving, curb, sidewalk, gutter, storm drain, water system, ornamental light conduit, retaining walls complete, etc. 12-30

LOS ANGELES, CALIF.—To J. L. McClain, 3052 W. Slauson Ave., Los Angeles, who bid $266,251 to Board of Public Works for improving streets in Dickens St. and Keater Ave. Improvement District by grading, 6-in. concrete paving, concrete curtain wall, storm drain, sanitary sewer, water system, ornamental lighting system, etc. 12-26

LOS ANGELES, CALIF.—To Geo. R. Curtis Paving Co., 2440 E. 26th St., Los Angeles, at $120,524 by City for improvement of Riverside Drive, between north city boundary and Los Felix Blvd., by grading, 4-in. asphalt concrete base with 2-in. asphalt concrete wearing surface, wooden guard rail, guard fence, storm drain, etc. 12-23

LOS ANGELES, CALIF.—To Griffith Co., L. A. Railway Bdg., Los Angeles, $46,035 for improving Floral Drive, etc., involving grading, concrete paving, macadam paving, etc., for County. 12-26

NEWPORT BEACH, CALIF.—To Fleming Const. Co., Box 108, Pomona, $35,859 for improvement of Seville Ave., work for City, grading, paving with 6-in. concrete with 6-in. disint. granite sub-base, vitrified sewers, cast iron water mains, gate valves, fire hydrants, lighting system, etc. 12-24

SACRAMENTO, CALIF.—To R. E. Hazard Contracting Co., 2528 Kettner Blvd., San Diego, who bid $110,426 to California Division of Highways, Sacramento, for 5 miles grading and paving with asphalt from Dixieland to Seeley, IMPERIAL COUNTY. (See Unit Bid Summary.) 1-3

SACRAMENTO, CALIF.—To Jahn & Bressi, Corporation Bdg., Los Angeles, who bid $253,126 to California Division of Highways, for 8.5 miles concrete paving LOS ANGELES COUNTY, from Tunnel Station to Santa Clara River. (See Unit Bid Summary.) 12-23

SACRAMENTO, CALIF.—To E. B. Bishop, Regis Hotel, Sacramento, who bid $59,265 to California Division of Highways, Sacramento, for 21.7 miles grading and surfacing with untreated gravel or stone from Morgan Springs to Lake Almanor, TEHAMA AND PLUMAS COUNTIES. 12-20

SACRAMENTO, CALIF.—To Lewis Construction Co., 308 S. Juanita St., Los Angeles, who bid $189,687 to California Division of Highways, Sacramento, for 6.7 miles grading in SAN BERNARDINO COUNTY, from 4½ miles west of Running Springs Park to Squirrel Inn. (See Unit Bid Summary, Dec. 25 issue.) 12-20

SACRAMENTO, CALIF.—To F. H. Neilson, Orland, who bid $22,504 to California Division of Highways, Sacramento, for six timber bridges east of Red Bluff, TEHAMA COUNTY. 12-23

SAN FRANCISCO, CALIF.—To J. F. Dowling, 251 Kearny St., San Francisco, who bid $7023 for improvement 47th Ave. from Moraga to Noriega Sts., concrete curbs, side sewers, and paving with 6-in. concrete base with 1½-in. asphalt surface. 12-24

SAN RAFAEL, CALIF.—To Pacific States Const. Co., Call Bdg., San Francisco, $1788 for asphalt tennis court at San Rafael High School. 12-26

SANTA CLARA, CALIF.—Awards as follows by City (1) To Union Paving Co., Call Bdg., San Francisco, $93,675 for improving Madison, Jefferson, University, Fremont, etc., involving asphalt paving, vitr. sewers, etc., and (2) To Union Paving Co., San Francisco, $28,785 for asphalt paving, vitr. sewers, etc., on Lafayette St. (See Unit Bid Summary.) 12-19

SANTA CRUZ, CALIF.—Awards as follows by City: (1) To W. E. Miller, Santa Cruz, $6142 for concrete paving Soquel Ave.; and (2) To Thompson Bros., Santa Cruz, $3764 for concrete paving Third St. 12-27

SANTA CRUZ, CALIF.—To W. E. Miller, Santa Cruz, $1346, low for concrete paving Rathburn Ave. for City. 12-31

SANTA ROSA, CALIF.—To J. V. Galbraith, P.O. Box B2, Petaluma, who bid 45¢ per cu.yd. for grading 10,000 lin.ft. of Armstrong Grove Road, involving 13,000 cu.yd. roadway excavation for County. 12-27

STOCKTON, CALIF.—To Pereira & Reed, Tracy, $2480 for embankment and culverts on Zuckerman Road for County. 12-26

VERNON, CALIF.—To L. A. Paving Co., 3200 E. Vernon Ave., Los Angeles, $82,359 for asphalt paving, reinf. conc. culverts, sanitary sewers, etc., on Soto St. for City. 12-21

BOISE, IDA.—To Sutherland & Burns Construction Co., Missoula, Mont., $53,770 for grading and graveling 8 miles of North and South Highway, from Chilco to Bonner County Line, for State.

BRIDGES and CULVERTS

BIDS BEING RECEIVED

PHOENIX, ARIZ.—Bids to 2 p.m., January 20, by the Arizona State Highway Commission, Phoenix, Ariz., for reinf. concrete bridge, consisting of 10 reinforced concrete arches across the Salt River at Tempe, on the Phoenix-Tempe Highway. (The work to be completed on or before July 31, 1931). Work involves: 12,000 cu.yd. excavation, 1,800,000 lb. reinforcing steel, 17,400 cu.yd. concrete. 12-20

STOCKTON, CALIF.—Bids to 11 a.m., Jan. 20, by County for: (1) Removing existing floor and reflooring the steel bridge over Middle River on the Borden Highway, about 5 miles west of Holt Station. (2) Removing existing floor and constructing new floor system on bridge over Burns Cutoff on Borden Highway about 4 miles west of Stockton, between Rough and Ready and Roberts Island. 12-27

PORTLAND, ORE.—Bids to 10 a.m., January 16, by Oregon State Highway Commission, Multnomah County Court House, Portland, for construction of seven 230-ft. concrete arch spans and 328 ft. of concrete viaduct over the Rogue river near Gold Beach, on the Roosevelt Coast Highway, in CURRY COUNTY. Work involves the following approximate quantities: 11,000 cu.yd. excavation, 42,000 lin.ft piling, 15,300 cu.yd. concrete, 1,675,000 lb. metal reinforcement, 82,000 lb. structural steel, 3892 lin.ft. concrete hand rail. 12-23

BIDS RECEIVED

SANTA FE, N. M.—Armstrong & Armstrong, $95,851, low for concrete and steel bridge at Albuquerque for State Highway Commission.

CONTRACTS AWARDED

STOCKTON, CALIF.—To L. Ubels, Ripon, $1735 for timber bridge over N. Calaveras River on Tully Road for County. 12-26

SEWER CONSTRUCTION

WORK CONTEMPLATED

CAPISTRANO BEACH, CALIF.—Burns-McDonnell-Smith Engineering Co., Western Pacific Bdg., Los Angeles, have been retained by Capistrano Beach Sanitary District to prepare plans and specifications for a sewer system and a sewage treatment plant at Capistrano Beach. 12-31

CARPINTERIA, CALIF.—Plans by Engineer, F. L. Johnston, Santa Barbara, bids soon by Carpinteria Sanitary District, for outfall sewer into the ocean, treatment plant, several pumping plants, and one-half mile of collecting sewers. Bonds have been voted, $90,000. 12-23

LOS ANGELES, CALIF.—Plans by J. E. Rockhold, County Surveyor, for sewers in Belvedere Unit No. 2, involving 24,030 ft. 8-in., 2840 ft. 15-in., and 26,100 ft. 6-in. cement sewers, etc. Bids after Jan. 20. 12-28

LOS ANGELES, CALIF.—A. K. Warren, Chief Engineer, Law Bdg., Los Angeles, has been authorized by County Sanitation District No. 3, as well as Bruce Mason, Special Counsel, to prepare proceedings for a $3,400,000 bond election for construction of trunk sewers within the district, costing $1,600,000; and this district's share in the ocean outfall, $1,800,000. 12-31

MARTINEZ, CALIF.—Plans by Engineer, Ross L. Calfee, 322 Arlington Ave., Berkeley, for outfall sewer in Stege Sanitary District for County, involving 3000 ft. 30-in. and 4000 ft. 36-in. vitrified sewer, and 2000 ft. 48-in. monolithic concrete sewer. Bids soon. 1907 Act. 1-3

SAN DIEGO, CALIF.—Plans by City Engr., H. W. Jorgensen, protests January 13 for Ravina St. storm drain, involving: 1115 ft. 51-in. centr. reinf. conc. pipe, 330 ft. 36-in. centr. reinf. conc. pipe, 1661 ft. 4-ft.x 6-ft. box section reinf. concrete storm drain, 197 ft. 57-in. centr. reinf. conc. pipe, 471 ft. 5-ft.x5-ft. box section reinf. concrete drain, 289 ft. horseshoe section reinf. conc. drain, 501 ft. 18-in. centr. reinf. conc. pipe, 210 ft. 24-in. centr. reinf. conc. pipe, 9372 cu.yd. excavation, 5889 cu.yd. embankment. 1911 Act. 12-20

LAS VEGAS, NEV.—Koebig & Koebig, Rowan Bdg., Los Angeles, has given the City an estimate of $200,000 as the probable cost of the new sewer collection system and disposal plant. 12-31

BIDS BEING RECEIVED

LOS ANGELES, CALIF.—Bids to 2 p.m., Jan. 20, by County for sewers in Belvedere Gardens Unit 3, involving 18,650 ft. 8-in. cement pipe, 6420 ft. 6-in. cement pipe, etc.; $42,250. 1-3

OJAI, CALIF.—Bids to 7:30 p.m., Jan. 27, by City Clerk, Ojai, Ventura County, for the construction of enlargements to the present sewage treatment plant, work consisting of construction of sludge tanks, sprinkling filter beds, chlorination plant and sludge-drying beds; $20,000. Black & Veatch, Ferguson Bdg., Los Angeles, are Engineers. 1-2

CONTRACTS AWARDED

LOS ANGELES, CALIF.—To A. Dalmatin and R. N. Nikcevich, 841 West 62nd St., Los Angeles, $53,891 by County Sanitation District No. 5, for constructing the Lomita Trunk Sewer from the joint disposal plant of the District west to Weston St., using vitrified pipe. 12-19

OAKLAND, CALIF.—To Fredrickson & Watson, 354 Hobart St., Oakland, at $32,061, for vitrified sewers in Wood Drive, Estates Drives, etc., for the City. 12-30

SAN CLEMENTE, CALIF.—To Robinson-Roberts Co., Rives-Strong Bdg., Los Angeles, $98,934 for vitrified and cast-iron intercepting sewer and outfall and pumping plants for City. (See Unit Bid Summary.) 12-21

WATER SUPPLY SYSTEMS

WORK CONTEMPLATED

FRESNO, CALIF.—Bond election Feb. 18 by County Water Works District No. 1, to vote $65,000 for water improvement, including deep wells and pumping plants. Chris P. Jensen is County Surveyor. 12-20

PALO ALTO, CALIF.—City is considering installing additional well for emergency water supply. 1-3

SAN FRANCISCO, CALIF.—At request and expense of City and County of San Francisco, the Spring Valley Water Company, 425 Mason St., San Francisco, will construct (probably by contracts) in the Sunset District twenty 14-in. wells about 300 ft. deep. These will be equipped (probably with deep well pumps, pumping into sump at a booster station) to be equipped with centrifugal pumps to pump into the distribution system and through three miles of 16-in. pipe (probably steel) to the Laguna Honda Reservoir. Cost, $250,000. 1-3

SAN JUAN, CALIF.—Formation election soon for Orange County Water District No. 4, involving 250,000-gal. concrete reservoir, 6-in. and 8-in. cast-iron mains, 9 hydrants and pumping plant; $30,000. W. K. Hillyard, Santa Ana, is Engineer. 1-3

GREAT FALLS, MONT.—Bond election soon by City to vote $1,000,000 for: (1) $100,000 for the construction of a 4,000,000-gal. capacity reinforced concrete reservoir at Eighth Ave. South and 34th St. (2) Enlargement of the present filtration plant, to have an ultimate capacity of 24,000,000-gal. per day; work to cost $350,000. (3) Extension of present 16-in. water mains in the business district and other improvements to the distributing system. C. P. Wells is City Engineer. 12-31

TACOMA, WASH.—City is considering water improvements to cost $550,000, as follows: (1) Installation of four new wells in South Tacoma to cost $100,000. (2) Construction of a 42-in. steel pipe-line from the wells at S. 63rd and Cedar Sts. to the junction with the Hood St. Reservoir supply line near Wilkeson St. and S. Tacoma Way, to cost $200,000. (3) Replacing 11,000 lin.ft. of the Green River pipeline from the McMillan Reservoirs to Tacoma to cost $185,000. (4) Installation of additional water mains to cost $65,000. 12-31

BIDS BEING RECEIVED

SAN FRANCISCO, CALIF.—Bids to 5 p.m., Jan. 13, by Public Works Engineering Corp., 1025 Hunter-Dulin Bdg., San Francisco, for the furnishing of all labor, material, and equipment, machinery, etc., for construction of Unit No. 1 of the Chenery Filter Plant—a rapid sand type water filtration plant of 4,000,000-gal. daily capacity. Unit No. 1, covered by this contract, consists of rough excavation for the entire plant, the construction of 2 reinforced concrete sedimentation basins and foundations, and channels for two coagulant tanks; the installation of equipment in two steel coagulant tanks, which tanks and equipment will be provided by the owner under separate contract. Work is to be completed and ready for use by April 1, 1930. The filter plant is located adjacent to the north embankment of the Chenery Reservoir and about 4500 ft. west of the paved county highway opposite Clyde, Contra Costa County California. 1-2

SANTA ANA, CALIF.—Bids to 11 a.m., Jan. 14, by County for pipe system in Villa Park, involving 5125 ft. 8-in., 2822 ft., 6-in., 19,338 ft. 2-in., and 28,400 ft. 4-in. cast-iron pipe, valves, hydrants. 1-2

BIDS RECEIVED

SAN BRUNO, CALIF.—E. W. Redman, Patterson Bdg., Fresno, $3664, low for cast-iron pipe extension in Sneath Lane for City. 12-27

SAN DIEGO, CALIF.—Low bids as follows by City for 19-mile Otay Reservoir-San Diego second main pipe-line: SCHEDULE 2, PROPOSAL A—(Electric-welded steel pipe)—Western Pipe & Steel Co., Los Angeles, $620,982, low for pipe and connections, Mile 0 to Mile 16.2; SCHEDULE 2, PROPOSAL B—(Cast-iron pipe)—R. E. Hazard Contracting Co., 2528 Kettner Blvd., San Diego, $1,008.365, low for pipe from Mile 0 to Mile 16.2; SCHEDULE 4, PROPOSAL A—(Cast-iron pipe)—R. E. Hazard Contracting Co., $179,148, low for pipe and excavation from Mile 16.2 to Mile 19.2; SCHEDULE 4, PROPOSAL B—(Electric-welded steel pipe)—Western Pipe & Steel Co., $137,364, low for excavation and pipe from Mile 16.2 to Mile 19.2; SCHEDULE 1, PROPOSAL—(Trench excavation and backfill)—R. E. Hazard Contracting Co., $43,370, low from Mile 0 to Mile 16.2; and SCHEDULE 3, PROPOSAL A—(Tunnels)—M. N. Guho, 1037 S. Atlantic St., Bell, $66,666, low. (See Unit Bid Summary.) 12-30

IRRIGATION and RECLAMATION

BIDS BEING RECEIVED

DENVER, COLO.—Bids to 3 p.m., Feb. 25, by Bureau of Reclamation for two 54-in. internal differential needle valves for Deadwood Dam, Boise Project, Idaho. 12-31

BIDS RECEIVED

BURLEY, IDA.—Haas, Doughty & Jones, Merchants Exchange Bdg., San Francisco, $537,199, low for canal excavation and structures from Station 2315 to 3129 on Main Canal, Gravity Extension Division of Minidoka Project for Bureau of Reclamation. (See Unit Bid Summary.) 12-28

RIVER AND HARBOR WORK

WORK CONTEMPLATED

HUNTINGTON BEACH, CALIF.—Bond election, Feb. 4, by City to vote $122,000 for: (1) Gunite repairs for 1400 ft. present pier, to be 25 ft. wide; $60,000. (2) 500 ft. extension to present concrete pier, to be 25 ft. wide, using centrifugal spun concrete piling, and concrete girders and beam for deck; replacing of ornamental lighting system on old pier; $62,000. Merwin Rosson is City Engineer. 12-24

LOS ANGELES, CALIF.—Plans by City Harbor Engineer for additional West Basin Terminal facilities. Work includes wharves, a steel frame transit shed, 120 by 1000 ft., track facilities, cargo masts, paved roadways, and open storage areas, to be constructed at Berths 144, 145, and 146; $1,500,000. 12-20

BIDS BEING RECEIVED

NEWPORT BEACH, CALIF.—Bids to 7:30 p.m., Jan. 13, by City Clerk for construction of two rubble mound groins, removal of existing stone pavement, dredging of entrance channel to Newport Harbor, work involving 18,100 tons stone, 400,000 cu.yd. dredging; $200,000. 12-26

BIDS RECEIVED

SACRAMENTO, CALIF.—M. A. Jenkins, 36th and Y Sts., Sacramento, $9669 for creosoted, and $7467 for redwood, low bid to State Division of Water Resources for 635 ft. bulkhead on Sacramento River near Isleton. 12-31

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SAN FRANCISCO, CALIF.—Healy-Tibbitts Construction Co., 64 Pine St., San Francisco, $1222, low for repairs to wharf at Fort Baker. 12-26

CONTRACTS AWARDED

VANCOUVER, B. C.—To Northern Construction Co., Ltd., Vancouver, B. C., and J. W. Stewart, Vancouver, $642,560 for superstructure of the new pier for the Canadian Northern RR Co., to be 220 ft. wide and 1000 ft. in length. 12-23

MACHINERY and SUPPLIES

CONTRACTS AWARDED

PHOENIX, ARIZ.—To Soule Steel Co., Los Angeles and San Francisco, $7794 for furnishing reinforced steel and fabric for State for Arizona State Prison, Florence, Ariz. 12-21

ARCADIA, CALIF.—To American Cast Iron Pipe Co., Los Angeles, $1.43 per foot, total $858, for 600 ft. 12-in. Class 150 cast-iron pipe to City. 12-21

LOS ANGELES, CALIF.—Awards as follows by Los Angeles Water and Power Bureau, Los Angeles: (1) To Pacific Pipe & Supply Co., $629 for two 30-in. gate valves. (2) To Rensselaer Valve Co., $487 for one 26-in. gate valve. (3) To Pacific Pipe & Supply Co., $1301 for one 36-in. gate valve. (4) To Rensselaer Valve Co., who bid $367 for three 24-in. gate valves. 12-23

LOS ANGELES, CALIF.—Awards as follows by Water and Power Bureau, 207 S. Broadway, Los Angeles, for furnishing and delivering cast-iron pipe under Spec. 1269: (1) Contract awarded to American Cast Iron Pipe & Foundry Co., Los Angeles, who bid 5.79 per lin.ft. for 15,480 ft. 24-in. cast-iron pipe. (2) Contract awarded to National Cast Iron Pipe Co., Los Angeles, who bid $3 per ft. for 6240 lin.ft. 16-in. cast-iron pipe. 1-2

MODESTO, CALIF.—To U. S. Pipe & Foundry Co., Monadnock Bldg., San Francisco, who bid $6612 for furnishing cast-iron pipe to City. 12-30

SACRAMENTO, CALIF.—To Crane Co., Sacramento, $3434 for furnishing galvanized and cast-iron pipe to City for Wm. Land and McKinley Parks. 12-30

SACRAMENTO, CALIF.—To Pacific Coast Engineering Co., foot of 14th St., Oakland, $14,581 for catamaran and shore pipe for U. S. Engineer's Office. 12-26

LIGHTING SYSTEMS

BIDS BEING RECEIVED

HANFORD, CALIF.—Bids to 7 p.m., Jan. 20, by City for 61 Union Metal Manufacturing Co. electroliers, and removal of 36 electroliers on Seventh, Douty, Irwin Sts., etc. A. Segel, Griffith-McKenzie Bdg., Fresno, is Engineer. 1-2

CONTRACTS AWARDED

ALAMEDA, CALIF.—To the Taper Tube Pole Co., Monadnock Bdg., San Francisco, $24,100 to City for improvement of Park St., from San Jose to Clement Aves., by installation in place of the city's poles, of wires, lamps, cast-iron bases, transformers, cast-iron brackets, lighting unit, globes, and appliances. 12-19

RAILROAD CONSTRUCTION

WORK CONTEMPLATED

WINSLOW, ARIZ.—Plans by Engineering Department, Santa Fe RR, Kerckhoff Bdg., Los Angeles, for 22-mile line east of Winslow, Ariz., involving bridge over Little Colorado River; $1,375,000. 12-31

CONCRETE WORK

BIDS BEING RECEIVED

SAN FRANCISCO, CALIF.—Bids to 2 p.m., Jan. 15, by Superintendent of Lighthouses, Custom House, San Francisco, for the following at Anasapa Island Light Station: upper and lower landings, concrete stairs, reinforced concrete retaining walls, roads, pipe system, tank foundations and two 50,000-gal. redwood tanks, etc. 12-31

BUILDING CONSTRUCTION

WORK CONTEMPLATED

BERKELEY, CALIF.—Plans by James W. Plachek, Architect, Mercantile Trust Bdg., Berkeley, for frame and concrete public library building on Kittredge and Shattuck Aves. for the City; $275,000. 12-30

BERKELEY, CALIF.—Plans by Geo. W. Kelham, Architect, 315 Montgomery St., San Francisco, for the first unit of engineering group and power plant, to consist of an administration building and machine shop, for the University of California. H. J. Brunnier, Sharon Bdg., San Francisco, is the Structural Engineer; $500,000. 12-30

HAYWARD, CALIF.—Plans by Engineering Department, Pacific Telephone & Telegraph Co., E. V. Cobby, 140 New Montgomery St., San Francisco, Architect, for steel and brick telephone exchange building on B St., Hayward, for the Pacific Telephone & Telegraph Co.; $75,000. 12-30

KELSEYVILLE, CALIF.—Plans by Wm. Herbert, Architect, Rosenberg Bdg., Santa Rosa, for concrete school building at Kelseyville, Lake County, for Kelseyville Union High School District; $35,000. 12-30

REDWOOD CITY, CALIF.—Plans by H. H. Meyers, Architect, Kohl Bdg., San Francisco, for a frame and rustic building to the City and County Health Farm, Redwood City, for the City and County of San Francisco; $125,000. 12-26

SAN FRANCISCO, CALIF.—Plans by H. C. Baumann, Architect, 251 Kearny St., San Francisco, for 23-story 'A' apartment on Green and Leavenworth Sts. for Consolidated Properties, Inc.; $700,000. 12-19

SAN FRANCISCO, CALIF.—Plans by Julia Morgan, Architect, Merchants Exchange Bdg., San Francisco, for a reinforced concrete Chinese Y.W.C.A. building on Joyce and Clay Sts., for Y.W.C.A.; $80,000. 12-23

SAN FRANCISCO, CALIF.—Plans by A. I. Coffey and Martin J. Rist, Architects, Phelan Bdg., San Francisco, for a 2 to 5-story Class A cancer and medical wing on the site of the present St. Catherine's Home, 22nd St. and Potrero Ave., San Francisco, for the City; $800,000. 12-31

SAN FRANCISCO, CALIF.—Plans by Bureau of Architecture, Mr. Sawyer, City Hall, San Francisco, for a 2-story brick and tile firehouse on 18th Ave., Sunset District, San Francisco, for City; $45,000. 12-31

SAN FRANCISCO, CALIF.—Plans by Bureau of Architecture, City Hall, San Francisco, for addition to women's wing of City and County Hospital at Potrero Ave.; $375,000. 12-30

SAN FRANCISCO, CALIF.—Plans by Bakewell & Weihe, Architects, 251 Kearny St., San Francisco, for the final unit to Balboa Senior High School group, to consist of a reinforced concrete academic building and a steel frame auditorium, on Burrows and Onondago Aves.; $700,000. 12-30

SAN FRANCISCO, CALIF.—Plans by S. Heiman, Architect, 605 Market St., San Francisco, for a 4-story 'A' Health Center building on Grove and Polk Sts., for the Board of Health Department; $650,000. 12-30

SAN FRANCISCO, CALIF.—Plans by Bureau of Architecture, City Hall, San Francisco, for Emergency Hospital on Alemany Blvd. and Ocean Ave. for City and County; $45,000. 12-30

SAN FRANCISCO, CALIF.—Plans by Miller & Pflueger, Architects, 580 Market St., San Francisco, for a group of senior high school buildings, the George Washington School, on the block bounded by Geary and 31st Aves., for the City and County, to be of reinforced concrete; $600,000. 12-27

SAN FRANCISCO, CALIF.—Plans by Julia Morgan, Architect, Merchants Exchange Bdg., San Francisco, for a concrete dormitory for Y.W.C.A., San Francisco, Inc.; $300,000. 12-27

SAN JOSE, CALIF.—Plans by W. H. Weeks, Architect, Hunter-Dulin Bdg., San Francisco, for a reinforced concrete addition to Trace Grammar School; $85,000. 12-20

BIDS BEING RECEIVED

LIVERMORE, CALIF.—Bids to 11 a.m., Jan. 18, by U. S. Veterans' Bureau, 791 Arlington Bdg., Washington, D. C., for construction of shade porches and wind break, helio deck, building No. 2, guard house, and stable and animal house at U. S. Veterans' Hospital, Livermore, Calif. 12-23

SAN FRANCISCO, CALIF.—Bids to 2:30 p.m., Jan. 22, by Board of public works, City Hall, San Francisco, for ward building F, Relief Home Tract; $155,000. 12-20

PEARL HARBOR, T. H.—Bids to 11 a.m., Feb. 26, by Bureau of Yards and Docks, Navy Department, Washington, D. C., for refrigerating plant, etc., at Naval Operating Base, Air Station, Pearl Harbor, Spec. 6005. 12-27

SEATTLE, WASH.—Bids to 10 a.m., Jan. 14, by King County Commissioners, City-County Bdg., Seattle, for construction of King County Hospital; $2,500,000. 12-23

CONTRACTS AWARDED

BERKELEY, CALIF.—To K. E. Parker, 135 South Park, San Francisco, $350,000 for 5-story reinforced concrete club building for the Women's City Club of Berkeley on Durant Ave. Julia Morgan, Merchants Exchange Bdg., San Francisco, is Architect. 12-24

OAKLAND, CALIF.—Awards as follows to Pacific Coast Engineering Co., Oakland: (1) 13 tons of structural steel for S. P. Signal Shop at Oakland; (2) 50 tons structural steel for store at San Leandro for Godchaux Estate; (3) 140 tons of structural steel for frame and 50 Bethlehem Steel Co. steel H piles to be furnished, fabricated and driven for Oakland Municipal Garage. 12-30

RICHMOND, CALIF.—To Chas. Stockholm & Sons, Russ Bdg., San Francisco, for reinforced concrete cannery building at Richmond, for Felice & Ferrelli, Gilroy. William Knowles, 1214 Webster St., Oakland, is the Architect; $200,000. 12-20

SACRAMENTO, CALIF.—To Geo. D. Hudnutt, Inc., 1915 S St., Sacramento, $250,000, for a club building on the northwest corner of Ninth and M Sts., Sacramento, for Sutter Club. Starks & Flanders, Forum Bdg., Sacramento, are the Architects. 1-3

SAN FRANCISCO, CALIF.—To MacDonald & Kahn, 405 Montgomery St., San Francisco, $100,000 for addition to Thomas Dyeing & Cleaning Works on Mission and Ninth Sts. F. W. Dakin, 625 Market St., San Francisco, is Architect. 1-3

SAN FRANCISCO, CALIF.—To Chas. S. Mabrey, First National Bank Bdg., Oakland, for reinforced concrete apartment on Jackson St., for Henry G. Hill; $520,000. Miller & Warnecke, Oakland, are the Architects. 12-27

OPPORTUNITY PAGE

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THE BUYERS' GUIDE

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Oxweld Acetylene Co.

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Gardner-Denver Co.
Garfield & Co.
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Rix Company, Inc., The
Schramm, Inc.
Sullivan Machinery Co.

Asphalt
Gilmore Oil Co.
Seaside Oil Co.
Standard Oil Co.
Union Oil Co.

Asphalt, Emulsified
American Bitumuls Co.

Asphalt Plants and Equipment
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Harron, Rickard & McCone Co.
Jenison Machinery Co.
Link-Belt Meese & Gottfried Co.
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Spears-Wells Machy. Co., Inc.
Speeder Machinery Corp.
Thew Shovel Co., The
Universal Crane Co., The
W-K-M Company, Inc.

Bars, Steel
Pacific Coast Steel Co.

Beams, Channels, and Angles
Pacific Coast Steel Co.

Bins, Storage and Hopper
Bacon Co., Edward R.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Link-Belt Meese & Gottfried Co.
Madsen Iron Works

Blacksmithing—Drop Forgings
Payne's Bolt Works

Blasting Supplies
Giant Powder Co., Cons., The
Hercules Powder Co.

Boilers
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.
Montague Pipe & Steel Co.
Peerless Mchy. & Mfg. Co.
Water Works Supply Co.

Bolts, Nuts and Rods
Claussen & Co., C. G.
Kortick Mfg. Co.
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Bonds, Surety
American Surety Co.
Associated Indemnity Corp.
Commerce Casualty Co.
Detroit Fidelity & Surety Co.
Fidelity & Casualty Co. of N. Y., The
Fidelity & Deposit Co. of Maryland
Glens Falls Indemnity Co.
Globe Indemnity Co.
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Bonds, Surety (Continued)
Maryland Casualty Co.
New Amsterdam Casualty Co.
Rolph, James Jr., Landis & Ellis

Brick, Common
Kartschoke Clay Products Co.

Bridge Plates, Bronze Expansion
Greenberg's Sons, M.
Western Iron Works, S. F.

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Bacon Co., Edward R.
Industrial Brownhoist Corp.
Jenison Machinery Co.
Lakewood Engr. Co.
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Garfield & Co.
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Jenison Machinery Co.
Lakewood Engr. Co.
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Jenison Machinery Co.
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Harron, Rickard & McCone Co.
Jenison Machinery Co.
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Greenberg's Sons, M.

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Industrial Brownhoist Corp.
Link-Belt Meese & Gottfried Co.
U. S. Cast Iron Pipe & Fdy. Co.

Castings, Street and Sewer
U. S. Cast Iron Pipe & Fdy. Co.

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Portland Cement Association

Cement Guns
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Wallace & Tiernan
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Great Western Electro-Chemical Co.

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Dorr Co., The
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Harron, Rickard & McCone Co.
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Young Machy. Co., A. L.

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Concrete Roads
Portland Cement Association

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Harron, Rickard & McCone Co.
Jenison Machinery Co.

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Bacon Co., Edward R.
Garfield & Co.
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Smith Engineering Works
W-K-M Company, Inc.
Young Machy. Co., A. L.

Culverts, Concrete
Portland Cement Association

Culverts, Metal
California Corrugated Culvert Co.
U. S. Cast Iron Pipe & Fdy. Co.
Western Pipe & Steel Co.

Culverts, Part Circle
California Corrugated Culvert Co.
Western Pipe & Steel Co.

Culverts, Vitrified
Gladding, McBean & Co.
Pacific Clay Products

Curing—Concrete
Concrete Curing Co.
McEverlast, Inc.

Dams
Ambursen Dam Co., Inc.

Derricks
Bacon Co., Edward R.
Garfield & Co.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.
Jenison Machinery Co.
Young Machy. Co., A. L.

Ditch Machinery
Bacon Co., Edward R.
Bucyrus-Erie Co.
Cleveland Trencher Co.
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Industrial Brownhoist Corp.
Jenison Machinery Co.
Link-Belt Meese & Gottfried Co.
Marion Steam Shovel Co.
Northwest Engineering Co.
Ohio Power Shovel Co., The
Orton Crane & Shovel Co.
Osgood Co., The
Thew Shovel Co., The

Draglines
Bacon Co., Edward R.
Bucyrus-Erie Co.
Garfield & Co.
General Excavator Co.
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Harron, Rickard & McCone Co.
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Osgood Co., The
Sauerman Bros., Inc.
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Universal Crane Co., The
Young Machy. Co., A. L.

Drain Tile
Gladding, McBean & Co.
Kartschoke Clay Products Co.
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Drills, Rock
Bacon Co., Edward R.
GardnerDenver Co.
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Cleveland Tractor Co., The
Garfield & Co.
General Excavator Co.
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Osgood Co., The
Owen Bucket Co.
Sauerman Bros., Inc.
Speeder Machinery Corp., The
Thew Shovel Co., The
Universal Crane Co., The

(Continued on page 64)

OPPORTUNITY PAGE

CONTINUED

HELP WANTED

As listed by the Engineering Societies' Employment Service, 57 Post Street, San Francisco. Applicants will please apply direct to them.

SALES ENGINEER, preferably between 30 and 40 years old, with good experience as a salesman to sell an established line of pumps and hydraulic equipment. Good opportunity for man with ability. Salary depends upon experience. Apply by letter. Location, Central California. R-2938-S.

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FIELD ENGINEERS AND TOPOGRAPHICAL DRAFTSMEN, for employment in Cuba, Central and South America. Starting salaries $125-$175 per mo. plus living quarters. Apply by letter; if for drafting, send samples of work. Headquarters, East. R-2931-S.

ARCHITECTURAL DRAFTSMAN, familiar with reinforced concrete and steel construction and capable of laying out and detailing drawings. Salary $200-250 mo. Location, San Francisco. R-2935-S.

JUNIOR ENGINEER, recent graduate with mechanical ability for shop and field work installing and servicing pumping machinery for dealer. Would lead to permanent position. Apply by letter. Location, Central California. R-2939-S.

THE BUYERS' GUIDE—*Continued from Page 62*

Expansion Joints
Industrial & Municipal Supply Co.
U. S. Cast Iron Pipe & Fdy. Co.
Water Works Supply Co.

Explosives
Giant Powder Co., Cons., The
Hercules Powder Co.

Equipment—Rental
Atkinson Construction Co.
Contractors Mchy. Exchange
Hackley Equipment Co., P. B.
Tieslau Bros.

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Water Works Supply Co.

Fire Hydrants
Greenberg's Sons, M.
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Water Works Supply Co.

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Wailes Dove-Hermiston Corp.

Flumes, Concrete
Portland Cement Association

Flumes, Metal
California Corrugated Culvert Co.
Montague Pipe & Steel Co.

Fluxes
Oxweld Acetylene Co.

Forms, Steel
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Lakewood Engr. Co.

Freight, Water
American-Hawaiian Steamship Co.

Frogs and Switches
Bacon Co., Edward R.
United Commercial Co.

Gas Holders
Chicago Bridge & Iron Works
Western Pipe & Steel Co.

Gates, Cast-Iron
California Corrugated Culvert Co.

Gates, Irrigation
Bishop-Jacobsen & Co.

Gates, Radial
California Corrugated Culvert Co.

Gates, Sheet Metal
California Corrugated Culvert Co.

Governors, Steam Engine
Gardner-Denver Co.
Young Machy. Co., A. L.

Governors, Turbine
Pelton Water Wheel Co., The

Gravel Plant Equipment
Bacon Co., Edward R.
Bodinson Mfg. Co.
Bucyrus-Erie Co.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Link-Belt Meese & Gottfried Co.
Smith Engineering Works
Young Mach. Co., A. L.

Gunite Lining
Cement Gun Const. Co.

Hammers, Steam Pile
Bacon Co., Edward R.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.

Hoists, Hand and Power
Bacon Co., Edward R.
Gardner-Denver Co.
Garfield & Co.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.
Ingersoll-Rand Co.
Jaeger Machine Works, The
Jenison Machinery Co.

Hoists, Hand and Power (Continued)
Link-Belt Meese & Gottfried Co.
Sullivan Machinery Co.
Willamette-Ersted Co.
Young Machy. Co., A. L.

Hoppers, Steel
Bacon Co., Edward R.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Lakewood Engr. Co.
Link-Belt Meese & Gottfried Co.
Madsen Iron Works

Hose (Steam, Air and Water)
Gardner-Denver Co.
Ingersoll-Rand Co.
Leitch & Co.
Rix Company, Inc., The

Hydro-Tite
Industrial & Municipal Supply Co.

Insurance, Casualty
Associated Indemnity Corp.
Commerce Casualty Co.
Detroit Fidelity & Surety Co.
Fidelity & Casualty Co. of N. Y., The
Fidelity & Deposit Co. of Maryland
Glens Falls Indemnity Co.
Great American Indemnity Co.
Indemnity Insurance Co. of North America
Maryland Casualty Co.
New Amsterdam Casualty Co.
Rolph, James Jr., Landis & Ellis

Jacks, Lifting
Jenison Machinery Co.

Kettles, Tar and Asphalt
Bacon Co., Edward R.
Harron, Rickard & McCone Co.
Littleford Bros. Co.
Montague Pipe & Steel Co.
Peerless Mchy. & Mfg. Co.
Spears-Wells Machy. Co.
Young Machy. Co., A. L.

Leadite
Water Works Supply Co.

Loaders, Power, Truck and Wagon
Haiss Mfgr. Co., Geo.
Industrial Brownhoist Corp.
Jaeger Machine Works, The
Jenison Machinery Co.
Link-Belt Meese & Gottfried Co.
Spears-Wells Machy. Co.
Young Machy. Co., A. L.

Locomotives (Electric, Gas and Steam)
Bacon Co., Edward R.
Garfield & Co.
Hackley Equipment Co., P. B.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Plymouth Locomotive Works
United Commercial Co.

Meters, Irrigation
Bishop-Jacobsen & Co.

Meters, Venturi
Water Works Supply Co.

Meters, Water
Industrial & Municipal Supply Co.
Neptune Meter Co.

Mixers, Chemical
Dorr Co., The

Mixers, Concrete
Bacon Co., Edward R.
Chain Belt Co.
Foote Company, Inc.
Garfield & Co.
Harron, Rickard & McCone Co.
Jaeger Machine Works, The
Jenison Machinery Co.
Lakewood Engr. Co.
Young Machy. Co., A. L.

Mixers, Plaster
Chain Belt Co.
Harron, Rickard & McCone Co.
Jaeger Machine Works, The
Jenison Machinery Co.
Young Machy. Co., A. L.

Motors, Gasoline
Continental Motors Corp.

Motors, Gasoline (Continued)
Hercules Motors Corp.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Le Roi Co.
Wisconsin Motor Co.

Paints, Acid Resisting
Wailes Dove-Hermiston Corp.

Paints, Metal Protective
General Paint Corp.
McEverlast, Inc.
Wailes Dove-Hermiston Corp.

Paints, Technical
American Bitumuls Co.
Wailes Dove-Hermiston Corp.

Paints, Waterproofing
McEverlast, Inc.
Wailes Dove-Hermiston Corp.

Pavers, Concrete
Chain Belt Co.
Foote Company, Inc.
Harron, Rickard & McCone Co.
Koehring Company
Smith Co., T. L.

Paving Breakers
Gardner-Denver Co.
Harron, Rickard & McCone Co.
Ingersoll-Rand Co.
Leitch & Co.
Rix Company, Inc., The
Schramm, Inc.
Sullivan Machinery Co.

Paving, Contractor
Warren Bros. Roads Co.

Paving Plants
Bacon Co., Edward R.
Jaeger Machine Works, The
Jenison Machinery Co.
Madsen Iron Works

Paving Tools
Bacon Co., Edward R.
Harron, Rickard & McCone Co.

Penstocks
Chicago Bridge & Iron Works
Lacy Manufacturing Co.
Pittsburgh-Des Moines Steel Co.
Water Works Supply Co.
Western Pipe & Steel Co.

Pile Drivers
Bacon Co., Edward R.
Bucyrus-Erie Co.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.
Ingersoll-Rand Co.
Jenison Machinery Co.
Northwest Engineering Co.
Orton Crane & Shovel Co.
Thew Shovel Co., The

Piles, Concrete
Raymond Concrete Pile Co.
MacArthur Concrete Pile Co.

Pipe, Cast-Iron
American Cast Iron Pipe Co.
Claussen & Co., C. G.
Industrial & Municipal Supply Co.
National Cast Iron Pipe Co.
Pacific States Cast Iron Pipe Co.
U. S. Cast Iron Pipe & Fdy. Co.
Water Works Supply Co.

Pipe, Cement Lined
American Cast Iron Pipe Co.
U. S. Cast Iron Pipe & Fdy. Co.

Pipe Clamps and Hangers
Kortick Mfg. Co.

Pipe Coatings
McEverlast, Inc.
Wailes Dove-Hermiston Corp.

Pipe, Concrete
American Concrete Pipe Co.
Lock Joint Pipe Co.
Portland Cement Association

Pipe, Culvert
American Concrete Pipe Co.
California Corrugated Culvert Co.
Gladding, McBean & Co.
Pacific Clay Products
Western Pipe & Steel Company

Pipe Fittings
American Cast Iron Pipe Co.
Claussen & Co., C. G.
Industrial & Municipal Supply Co.
National Cast Iron Pipe Co.
Pacific Pipe Co.
Pacific States Cast Iron Pipe Co.
U. S. Cast Iron Pipe & Fdy. Co.
Weissbaum & Co., G.

Pipe Line Machinery
Bacon Co., Edward R.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
W-K-M Company, Inc.

Pipe, Lock-Bar
Western Pipe & Steel Co.

Pipe, Preservative
Columbia Wood & Metal Preservative Co.

Pipe, Pressure Line
American Concrete Pipe Co.
Lacy Manufacturing Co.
Lock Joint Pipe Co.
Western Pipe & Steel Company

Pipe, Riveted Steel
Lacy Mfg. Co.
Montague Pipe & Steel Co.
Pittsburgh-Des Moines Steel Co.
Western Pipe & Steel Co.

Pipe, Sewer
American Concrete Pipe Co.
Gladding, McBean & Co.
Pacific Clay Products

Pipe, Standard
Claussen & Co., C. G.
Pacific Pipe Co.
Weissbaum & Co., G.

Pipe, Vitrified
Gladding, McBean & Co.
Kartschoke Clay Products Co.
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Pipe, Welded Steel
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Hercules Motors Corp.
Jenison Machinery Co.

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Industrial & Municipal Supply Co.
Ingersoll-Rand Co.
Jaeger Machine Works, The
Pelton Water Wheel Co., The
Rix Company, Inc., The
Woodin & Little

Pumps, Deep Well
American Well Works, The
Byron Jackson Pump Mfg. Co.
Industrial & Municipal Supply Co.
Jenison Machinery Co.
Pelton Water Wheel Co., The
Woodin & Little

(Continued on page 66)

OPPORTUNITY PAGE

CONTINUED

OFFICIAL BIDS

UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF RECLAMATION

Needle Valves

Washington, D. C., Dec. 23, 1929.

Sealed bids (Specifications No. 504) will be received at the office of the Bureau of Reclamation, Denver, Colorado, until 3 o'clock p.m., February 25, 1930, and then publicly opened, for furnishing two 54-inch internal differential needle valves for Deadwood Dam, Boise project, Idaho. The valves will be installed by the Government. For particulars, address the Bureau of Reclamation, Denver, Colorado; Boise, Idaho; or Washington, D. C.

ELWOOD MEAD,
Commissioner.

NOTICE TO CONTRACTORS

Bridge

Sealed bids will be received by the Oregon State Highway Commission at the Multnomah County Court House, Portland, Oregon, at 10 a.m., Thursday, January 16, 1930, for the construction of a bridge consisting of seven 230-foot concrete arch spans and 328 lin.ft. concrete viaduct over the Rogue River near Gold Beach, on the Roosevelt-Coast Highway in Curry County, requiring approximately:

11,000 cu.yds. of excavation
42,000 lin.ft piling
15,300 cu.yds. concrete
1,675,000 lbs. metal reinforcement
82,000 lbs. structural steel
3,892 lin.ft. concrete handrail

Proposal blanks and full information for bidders may be obtained at the office of the State Highway Commission, Capitol Building, Salem, Oregon.

Plans, specifications and forms of contract may be inspected at the same place or may be obtained upon the deposit of $5.00 for each set. A complete set of plans and specifications may be inspected at the office of the Associated General Contractors in Portland, Oregon, Seattle, Washington, Spokane, Washington and San Francisco, California.

The right is reserved to reject any or all proposals or to accept the proposal deemed best for the State of Oregon.

Prospective bidders should note that the office of the State Highway Commission is in the Capitol Building, Salem, Oregon, but that bids are to be received at Portland, Ore., as stated above. If proposals are mailed, they should be addressed to Salem and forwarded so as to reach there about twenty-four hours prior to the opening of bids.

OREGON STATE HIGHWAY COMMISSION

NOTICE TO CONTRACTORS

STATE OF CALIFORNIA, DEPARTMENT OF PUBLIC WORKS

DIVISION OF HIGHWAYS

Grading, Concrete Paving and Surfacing

Sealed proposals will be received at the office of the State Highway Engineer, Public Works Building, Sacramento, California, until 2 o'clock p.m. on January 22, 1930, at which time they will be publicly opened and read, for construction in accordance with the specifications therefor, to which special reference is made of portions of State Highway, as follows:

Kern County, between San Emigdio Road and Route Four (VI-Kern-57-C), about nine and seven-tenths (9.7) miles in length, to be graded and surfaced with oil treated crushed gravel or stone.

Los Angeles County, between two and one-half and four miles northerly from La Canada (VII-L.A.-61-A), about one and five-tenths (1.5) miles in length to be graded.

Imperial County, between El Centro and Holtville (VIII-Imp.-27-C), about nine (9.0) miles in length to be graded and paved with portland cement concrete.

Riverside County, at Wineville (VIII-Riv.-19-A), about five-tenths (0.5) mile in length, to be graded with portland cement concrete.

All bids are to be compared on the basis of the State Highway Engineer's estimate of the quantities of work to be done.

Proposal forms will be issued to only those Contractors who have furnished verified statement of experience and financial condition in accordance with the provisions of Chapter 644, Statutes 1929, and whose statements so furnished are satisfactory to the Department of Public Works. Bids will not be accepted from a Contractor to whom a proposal form has not been issued by the Department of Public Works.

Plans may be seen, and forms of proposal bonds, contract and specifications may be obtained at the said office, and they may be seen at the offices of the District Engineers at Los Angeles and San Francisco, and at the office of the District Engineer of the district in which the work is situated. The District Engineers' offices are located at Eureka, Redding, Sacramento, San Francisco, San Luis Obispo, Fresno, Los Angeles, San Bernardino and Bishop.

A representative from the district office will be available to accompany prospective bidders for an inspection of the work herein contemplated, and Contractors are urged to investigate the location, character and quantity of work to be done, with a representative of the Division of Highways. It is requested that arrangements for joint field inspection be made as far in advance as possible. Detailed information concerning the proposed work may be obtained from the district office.

No bid will be received unless it is made on a blank form furnished by the State Highway Engineer. The special attention of prospective bidders is called to the "Proposal Requirements and Conditions" annexed to the blank form of proposal, for full directions as to bidding, etc.

The Department of Public Works reserves the right to reject any or all bids or to accept the bid deemed for the best interests of the State.

DEPARTMENT OF PUBLIC WORKS,
DIVISION OF HIGHWAYS.
C. H. PURCELL, State Highway Engineer.
Dated December 24, 1929.

NOTICE TO CONTRACTORS

Cast Iron Pipe

Sealed proposals will be received at the office of the East Bay Municipal Utility District, 512 Sixteenth Street, Oakland, California, until 8:30 a.m., January 18, 1930, and will at that hour be opened, for furnishing approximately 3618 tons of cast iron pipe of diameters ranging from 4-in. to 16-in. inclusive.

Specifications may be obtained upon application to the office of the district.

JOHN H. KIMBALL, Secretary.
Oakland, California, January 4, 1930.

THE BUYERS' GUIDE—*Continued from Page 64*

Pumps, Dredging and Sand
Jenison Machinery Co.

Pumps, Hydraulic
Jenison Machinery Co.

Pumps, Power
Gardner-Denver Co.
Jaeger Machine Works, The

Pumps, Road
Bacon Co., Edward R.
Chain Belt Co.
Harron, Rickard & McCone Co.
Jaeger Machine Works, The
Jenison Machinery Co.
Woodin & Little

Pumps, Sewage
American Well Works, The
Dorr Co., The
Fairbanks, Morse & Co.
Industrial & Municipal Supply Co.

Pumps, Sewage Ejector
Industrial & Municipal Supply Co.

Pumps, Sludge
Dorr Co., The

Pumps, Water Works
Fairbanks, Morse & Co.
Industrial & Municipal Supply Co.
Jenison Machinery Co.
Pelton Water Wheel Co., The

Rails
Bacon Co., Edward R.
Claussen & Co., C. G.
United Commercial Co.

Reinforcing Bars
Pacific Coast Steel Co.
Soulé Steel Co.

Reinforcing Wire Fabric
Soulé Steel Co.

Reservoirs, Steel
Chicago Bridge & Iron Works
Western Pipe & Steel Company

Riveting Machines
Ingersoll-Rand Co.
Rix Company, Inc., The

Road Finishers
Bacon Co., Edward R.
French & Co., A. W.
Jenison Machinery Co.
Lakewood Engr. Co.

Road Forms
Bacon Co., Edward R.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Lakewood Engr. Co.

Road Graders and Scrapers
Bacon Co., Edward R.
Brown-Bevis Company
Caterpillar Tractor Co.
Galion Iron Works & Mfg. Co.
Jenison Machinery Co.
Spears-Wells Machinery Co.
West Coast Tractor Co.
Young Machinery Co.,A. L.

Road Oil
Gilmore Oil Co.
Seaside Oil Co.
Standard Oil Co.
Union Oil Co.

Road Oil, Emulsified
American Bitumuls Co.

Road Rollers
Bacon Co., Edward R.
Brown-Bevis Co., The
Galion Iron Works & Mfg. C.
Hackley Equipment Co., P. B.
Huber Manufacturing Co.
Jenison Machinery Co.
Spears-Wells Machinery Co.

Rules, Steel, Wood and Aluminum
Lufkin Rule Co., The

Saws, Portable
Harron, Rickard & McCone Co.
Ingersoll-Rand Co.
Jenison Machinery Co.
Young Machinery Co., A. L.

Scarifiers
Bacon Co., Edward R.
Jenison Machinery Co.
Le Tourneau Mfg. Co.
Spears-Wells Machinery Co.

Scrapers (Dragline, Fresno, Wheeled)
Bacon Co., Edward R.
Galion Iron Works & Mfg. C.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Killefer Manufacturing Co.
Sauerman Bros., Inc.

Screens, Sand and Gravel
Bacon Co., Edward R.
Bodinson Manufacturing Co.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Link-Belt Meese & Gottfried Co.
Smith Engineering Co.
Young Machinery Co., A. L.

Screens, Sewage
Dorr Co., The
Link-Belt Meese & Gottfried Co.

Screens, Vibrating
Harron, Rickard & McCone Co.
Link-Belt Meese & Gottfried Co.
Smith Engineering Co.

Second-Hand Equipment
Contractors Mchy. Exchange
Excavating Equipment Dealers, Inc.
Hackley Equipment Co., P. B.
Harron, Rickard & McCone Co.
Tieslau Bros.

Sewage Disposal Apparatus
Dorr Co., The
Industrial & Municipal Supply Co
Link-Belt Meese & Gottfried Co.
Wallace & Tiernan
Water Works Supply Co.

Sharpeners, Rock Drill Steel
Gardner-Denver Co.
Ingersoll-Rand Co.

Shovels (Electric, Gasoline, Steam)
Bacon Co., Edward R.
Bucyrus-Erie Co.
Garfield & Co.
General Excavator Co.
Hackley Equipment Co., P. B.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.
Jenison Machinery Co.
Link-Belt Meese & Gottfried Co.
Marion Steam Shovel Co.
Northwest Engineering Co.
Ohio Power Shovel Co.
Orton Crane & Shovel Co.
Osgood Co., The
Spears-Wells Machinery Co.
Speeder Machinery Corp., The
Thew Shovel Co., The
Young Machy. Co., A. L.

Shovels, Hand
Harron, Rickard & McCone Co.
Jenison Machinery Co.

Sluice Gates
California Corrugated Culvert Co
Water Works Supply Co.

Spreaders, Gravel and Rock and Asphalt
Bacon Co., Edward R.
Galion Iron Works & Mfg. Co.
Jenison Machinery Co.

Standpipes
Chicago Bridge & Iron Works
Montague Pipe & Steel Co.
Pittsburgh-Des Moines Steel Co.
Western Pipe & Steel Co.

Steel Bands
Pacific Coast Steel Co.

Steel, Drill
Gardner-Denver Co.
Ingersoll-Rand Co.
Leitch & Co.
Rix Company, Inc., The

Steel Plates
Pacific Coast Steel Co.

Steel Plate Construction
Chicago Bridge & Iron Works
Lacy Manufacturing Co.
Montague Pipe & Steel Co.
Pittsburgh-Des Moines Steel Co.
Western Pipe & Steel Co.

Steel, Structural
Pacific Coast Steel Co.
Western Iron Works
Western Pipe & Steel Co.

Street Sweepers, Sprinklers, Flushers
Jenison Machinery Co.

Steel Joists
Truscon Steel Co.

Steel Windows
Truscon Steel Co.

Subgraders
Bacon Co., Edward R.
Blaw-Knox Co.
Harron, Rickard & McCone Co.
Lakewood Engineering Co.

Tanks, Air Compressor
Ingersoll-Rand Co.
Lacy Manufacturing Co.
Peerless Mchy. & Mfg. Co.
Rix Company, Inc., The
Western Pipe & Steel Co.

Tanks, Corrugated
California Corrugated Culvert Co.
Western Pipe & Steel Co.

Tanks, Elevated Steel
Chicago Bridge & Iron Works
Lacy Manufacturing Co.
Montague Pipe & Steel Co.
Pittsburgh-Des Moines Steel Co.
Western Pipe & Steel Co.

Tanks, Oil Storage
Chicago Bridge & Iron Works
Lacy Manufacturing Co.
Steel Tank & Pipe Co.
Western Pipe & Steel Co.

Tapes, Measuring, Steel and Fabric
Lufkin Rule Co., The

Testing Laboratories
Hunt, R. W., Co.

Tie Plates
Pacific Coast Steel Co.

Torches (Welding and Cutting)
Oxweld Acetylene Co.

Towers, Transmission
Pacific Coast Steel Co.
Water Works Supply Co.

Tractors
Caterpillar Tractor Co.
Cleveland Tractor Co.
West Coast Tractor Co.

Tramways
American Steel & Wire Co.
Bacon Co., Edward R.
Leschen & Sons Rope Co., A.

Transmission Machinery, Power
Bodinson Mfg. Co.
Link-Belt Meese & Gottfried Co.

Transportation, Water
American-Hawaiian Steamship Co.

Trench Excavators
Cleveland Trencher Co., The
Garfield & Co.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Link-Belt Meese & Gottfried Co.
Thew Shovel Co., The

Truck Cranes
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Universal Crane Co., The

Trucks
Fageol Motors Co.
Kleiber Motor Co.

Tunnel Shovels
Bucyrus-Erie Co.
Jenison Machinery Co.
Marion Steam Shovel Co.

Turbines, Hydraulic
Pelton Water Wheel Co., The
Water Works Supply Co.

Turntables
Bacon Co., Edward R.
Harron, Rickard & McCone Co.
Jenison Machinery Co.

Unloaders, Car and Wagon
Bacon Co., Edward R.
Crear and Bates
Jenison Machinery Co.
Link-Belt Meese & Gottfried Co.

Valves
California Corrugated Culvert Co.
Claussen & Co., C. G.
Industrial & Municipal Supply Co.
Pacific Pipe Co.
Water Works Supply Co.

Valves, Gate
California Corrugated Culvert Co.
Claussen & Co., C. G.
Pelton Water Wheel Co., The
Water Works Supply Co.

Valves, Hose Gate
Greenberg's Sons, M.

Valves, Hydraulic
California Corrugated Culvert Co.
Pelton Water Wheel Co.
Water Works Supply Co.

Washers, Sand and Gravel
Jenison Machinery Co.
Smith Engineering Co.

Water Purification
Industrial & Municipal Supply Co.
Wallace & Tiernan
Water Works Supply Co.

Water Supply Installations
Industrial & Municipal Supply Co.
Wallace & Tiernan
Water Works Supply Co.

Water Transportation
American-Hawaiian Steamship Co.

Water Wheels
Pelton Water Wheel Co. The
Water Works Supply Co.

Water-Works Supplies
American Cast Iron Pipe Co.
Industrial & Municipal Supply Co.
Wallace & Tiernan
Water Works Supply Co.

Welding Apparatus (see Torches)
Oxweld Acetylene Co.

Welding Equipment
Oxweld Acetylene Co.

Welding Rods and Wire
Oxweld Acetylene Co.

Well Casing
Montague Pipe & Steel Co.

Wheelbarrows
Harron, Rickard & McCone Co.
Jenison Machinery Co.

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American Steel & Wire Co.
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