

THE MIAMI CONSERVANCY BULLETIN

August 1918



Excavating for Outlet Conduit at Englewood



FIG. 1—A STRIPPING OUTFIT

A stripping outfit, such as did that work at Taylorsville and at Englewood. It consists here of an elevator grader and six dump wagons. The elevator grader is the machine at the left. It is operated by sixteen mules, ten in front and six behind, driven by two men. It consists of a large plow fixed to a heavy beam, (shown just in front of the man on the ground) which throws the earth from the furrow onto an inclined belt conveyor. The conveyor carries it up an inclined chute and throws it into a wagon which drives alongside the grader. When one wagon is full the grader pauses, the filled wagon drives on, an empty one drives up to take its place and the grader starts up again. A cascade of dirt thus falls continuously into the wagons, one after the other. The process is very efficient and rapid. From two to four acres a day can be stripped with it.

The outfit here is not engaged in stripping, however, but in railway grading, to which it is likewise adapted. It is shown during a brief pause for adjustment.



FIG. 2—STRIPPING THE DAMSITE AT ENGLEWOOD

A stripping outfit, taken from the top of the gravel washing plant at Englewood. What look like roads are stripped portions of the dam site. The piles of earth are the stripped material, piled into a "spoil bank." They mark the upstream toe or limit of the dam. The stripping outfit is shown at a moment when it stopped for minor repairs to the "elevating grader" shown at the center of the picture. A similar machine with the wagons in operation is shown just above on this page.

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THE MIAMI CONSERVANCY BULLETIN

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FOREWORD

The **Miami Conservancy Bulletin**, of which the following pages constitute the first issue, is not to be a formal presentation of the progress of the undertaking. Its aim is rather to select those features which are most important, significant, or interesting, and present them in such a way that all may understand what is being done. The project is being carried on purely in the public interest; it is one of wide and vital public concern; and those who have it in charge feel that the public ought to be informed through a regular, responsible, official publication how the work of construction, now beginning, is being carried out. Reports have been made public from time to time, showing the nature and results of

the investigations, the general plans, and the design and relation of the various structures, connected with the undertaking. The **Bulletin** is to be considered as in the nature of a more regular, and somewhat more informal, carrying on of these reports. The reports were necessarily rather technical. The **Bulletin**, while also inevitably somewhat so, will aim at a wider audience. It will aim to be what its name implies, a news-bulletin of the progress of the work, presented with such explanations of the technical features as may make them clear to the general reader. It is hoped thus to reach all who are interested in the undertaking with a regular account of the facts.

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The Miami Conservancy Bulletin is published on the first day of every month. Matter for publication must be in the hands of the Editor by the fifteenth of the month preceding. Address Miami Conservancy Bulletin, Dayton, Ohio.

Building Up an Engineering Organization

How the Efficiency of a Permanent Industrial Organization
Was Secured for the Miami Valley Project.

The engineering organization for a great project like that of the Miami Valley Flood Control, while vastly more complex, and taking far longer to mature, is in certain ways like a football team. It is so in its temporary character. It is gotten together to do a particular job. When that job is done, it dissolves. In the one case the job is the winning of a game; in the other it is to build some great structure or connected series of structures, and in each case a considerable course of preliminary work together is necessary to the efficient performance of the task in hand.

In any engineering project, and especially in such a one as flood prevention for the Miami Valley, on account of the unusually vital interests at stake, a great amount of preliminary investigation and a careful design of the structures are necessary. This work is done by the engineering organization almost alone, at comparatively small cost. The heavy expense comes later, when the plans prepared are to be carried out in actual construction. The gain in perfecting efficient organization during the earlier stages, to be applied later, is clear. It not only lessens cost and increases speed, but betters the finished work, since the same men who made the plans will carry them out.

It seems obvious enough; yet it was not carried into effect without a certain opposition. It meant a more than ordinarily heavy force on investigation and design; heavier than to some seemed necessary. Fortunately the Directors of the District, the men who had the final decision, had had a good deal of experience in large affairs, and were able to take the broader view. They saw the point and from the beginning they gave Mr. Morgan their hearty backing in the carrying out of his idea.

The amount of work involved in building the organization is something which few even among its members have adequately conceived. The desire was to get the very best men available, and no effort was shirked in the endeavor to do so. As personality in the individual is the secret of success, so is personnel in the organization; harmonious personnel. Not only the best men must be found, but the best men who would fit; men who would co-operate. The extreme individualist has no place in such an organization. He can't subordinate himself.

And after you have found your man, there is still the problem of getting him. When great engineering works are approaching completion, the better men engaged in them are on the lookout for fresh places and it is then that they can be best secured. Thus when the work on some of the great dams in the Catskills, the sources of New York's water supply, was finishing, as far back as 1914, Mr. Morgan took the occasion to secure the services of the man who is now in charge of the work of the Englewood dam.

Similarly, and at about the same time, the services of Mr. Kimball were secured. It was clear from the beginning that when the work of channel improvement through Dayton, Hamilton and the other large river towns came to be carried out, the expensive sewer and water systems in these cities, where they cross the river, would be subject to serious dislocation. Fortunately, just at this time, the extensive sewerage improvement in the city of Louisville, Ky., a \$4,000,000 project, was being brought to an end, and the services of Mr. Kimball, who had had virtual charge of that work, became available and he was engaged. Thus it was possible to build up, in the years that have since ensued, during the study and planning for channel improvement, the same engineering organization which is now supervising the actual work. These men are mentioned simply as instances. Many more, equally pertinent, might be noted.



FIG. 3—RAILWAY EXCAVATION AT GER-MANTOWN

A Marion caterpillar dragline, temporarily transformed into a steam shovel. As soon as this railroad grade is completed the dipper will be removed and the machine will again operate as a dragline.

But more than the heads of the various departments of the work were needed. Assistants were also required; and assistants to these—a large body of men. To get them search was made in many directions and by various means. Advertisements were inserted in the engineering periodicals. Letters were written to the engineering departments of the various universities and technical schools, making inquiry as to the promising graduates who might be available. Application was made to the heads of engineering projects which were approaching completion and likely soon to release desirable men. Also, but to a less extent than any of the means already outlined, engineering employment agencies were used.

From all these sources a large number of prospective employees came to the attention of the

engineering office of the District, embracing men of many kinds. In the years between 1914-1916 over three thousand such prospects were considered. These were classified and systematically arranged. Applicants were asked to answer a systematic set of questions, designed to cover their experience and their special qualifications for the work desired. What may be called the design of the organization, and the qualifications of the men who were to become the elements of that design, received the same thorough-going attention as was given to the design of the conduits, the spillways, or the system of hydraulic fill for the various dams.

These thousands of applicants, then, were studied, sorted, and the best prospects were picked out. With these selected men personal interviews were arranged. Sometimes these took place in Dayton; sometimes elsewhere. In important cases many men were thus seen in order that only the best might be retained. On one trip, Mr. Morgan interviewed about fifty men, from whom three were ultimately selected. At this same time over two thousand applications were examined, to obtain six men. Nothing was left undone in the effort to make sure that in this, one of the most important tasks which the Chief Engineer had to perform, the surest possible foundations should be laid.

It must be emphasized that this process cannot properly be called a sifting of the wheat from the

who have enlisted for military service, approximately nine in ten have done so, and have proved to be what was hoped of them. With a few exceptions, all the engineers now in responsible positions on construction have been engaged in the research work and in the design of the structures which they now have in charge to build. And in these exceptional cases the men finally selected are such as have on other work held responsible places under either the Chief Engineer or the Assistant Chief, and are thus personally tested men.

A civil engineer, by the nature of his profession, is more or less of an Ishmaelite, a wanderer without fixed abode. It follows that when a large number of civil engineers get together, as they necessarily do on any great undertaking such as the Miami Valley Flood Control, they gather from many and distant corners of the earth. There are on the project men of many different countries, including the United States, Holland, Canada, Norway, England, Ireland, Austria, and China. They come from twenty-six states of the union. They represent forty-one different universities, colleges and technical schools. Their work has carried them into many countries other than those mentioned. One has been in South America, where he built the highest railway in the world, across the Andes Mountains. Another has worked in the East Indies. There are men who have designed and built dams and tunnels and pipe lines in Arizona deserts; and others who have built dams and tunnels among the New England hills. There is the man who assisted in designing the spillway of the great Gatun dam, on the Panama Canal. The same man had a vital part in the designing of the largest dam in the world, the Kensico dam at Valhalla, N. Y. There is a man who has designed and built drainage systems in the Philippine Islands, for the United States Government. And there is the man who designed and built the highest dam in the world, at Arrowrock, Idaho.

These things appeal to the imagination. They also appeal to the solid sense. These men were not picked out because they had gone far and wide on engineering projects, great and small, but because of their special fitness in each case for the particular job in hand. The geographical facts quoted simply help to visualize the breadth of experience which has been drawn upon, and in a degree the width and breadth of the net which has been thrown to get the desired men. The significant thing is that all these men, coming from such wide sources, and with such rich and varied experiences, have been gathered together here in Dayton, and all that wealth of education and experience and resource fused and welded into one harmoniously interlinked organization, to the end that the Miami Valley may be free for all time from any such disaster as overwhelmed it five years ago.

The Big Dayton Dragline Excavates 10,000 Cu. Yds. Per Week.

The big dragline working between Herman Avenue Bridge and the mouth of Mad River in Dayton had moved 60,000 cubic yards up to July 17. The dragline started this work on June 4. This is an average of about 10,000 cubic yards per week.



FIG. 4—THE GRAVEL WASHING PLANT AT ENGLEWOOD

A view of the cement house (at the left) and the gravel washing plant just beyond it, taken May 25 from the opposite side of the Stillwater River. What looks like the muzzle of a "Big Bertha," poking out of the base of the gravel washer, is the barrel and mouth of a concrete mixer.

chaff. Unquestionably hundreds of excellent men were among those rejected. It was rather a process of selecting the best, and among these, those who would fit; keeping in mind always three criterions of judgment, by which all men for responsible positions were to be weighed;—original power in engineering research and in the designing of engineering structures; ability to superintend the actual construction of the completed design; and finally, fitness for teamwork, the ability to sink the interest of the individual in that of the job.

The results of this foresight have been gratifying. Mistakes of course have been made. Not all the men selected have remained, but aside from those

Progress at the Dams

Much Preparatory Work Has Been Done in Clearing, Stripping, Cut-Off
Trenching, Conduit Excavation and Erecting Construction
Plant. Embankment Not Yet Started.

The first operation in the construction of a dam is the cutting of the trees and the grubbing of the stumps on the damsite, the two usually classed together as "clearing and grubbing." On the river and creek bottoms this operation is practically complete at all the dams, and in most cases the slopes of the valley are also cleared. Taken as a whole, the clearing approaches completion.

Following the clearing comes the stripping; that is, the removal of the top soil and humus from the damsite, and the piling it in "spoil banks" along the upstream and downstream edges or toes, where it will be available after the dam is completed to spread again over the surface as a top dressing to be grassed. An additional and more urgent reason for stripping the top soil is that it always contains more or less material not fit for incorporation into

dump wagons and an "elevator grader." This outfit is shown, as it appears during a pause for repairs, in figure 2. A similar outfit, used for railway excavation, appears in figure 1.

Following the stripping comes generally the digging of the "cut-off trench." This is simply a deep ditch running along the longitudinal center line of the dam. It is called a "cut-off trench" because later it will be filled with clay tamped firmly in to cut off any leakage of water through the soil under the dam. "Sheet piling"—in effect wide, flat bars of steel driven with their edges interlocked in the bottom of the cut-off trench, forming a metallic wall—will be used where necessary, to carry this protection against leakage still deeper.

At three of the dams the cut-off trench is not yet started. At Taylorsville it has been dug almost



FIG 5—THE CUT-OFF TRENCH AT TAYLORSVILLE

The same scene as in figure 6, as it appears just one month later. The cut-off trench is now completed nearly to the river. The stripping of the river bottom is finished. The left hand trestle is now across the river. The new pole line down the center brings electric power from Dayton for the operation of the big dragline and other machinery. A locomotive and train are seen on the construction track to the right.

the completed structure. The dams of the district are all earthen dams, but the earth they are made of is all to be carefully selected, and the soil on which they rest must be equally good.

On the river and creek bottoms, at all the dams, the stripping is completed except for minor trimmings. On the valley slopes, however, it still remains in most cases to be done. At Englewood it is nearing completion over the entire damsite.

In most cases this work has been done with plows and wheeled scrapers. At Englewood and Taylorsville it has been speeded up by the use of

across the valley floor. (See figure 5). The digging was done with a Bucyrus "dragline," shown at work in figure 6.

At Huffman the excavation of the cut-off trench is fairly well begun.

At the base of every dam, founded on the native rock, will be built a conduit to carry the water of the stream as it flows under ordinary conditions. This is one of the first pieces of construction to be undertaken, in order that a channel for the water may be provided, not only after the dam is built but while it is building. At Huffman it will occupy the

present river channel. In this case a short canal or "diversion channel" must be dug to carry the water while the conduit is building. The excavation of this canal at Huffman is just beginning. At Englewood and Lockington the excavation for the conduit itself has begun and is being carried forward by big "draglines," that at Englewood being shown in operation in figure 8. At the other three dams the digging for the conduit is not yet begun.

The digging just referred to is for the foundations of the conduits. These structures themselves will be built of concrete, as will the spillways and various other features of the dams. To make the concrete some two hundred thousand cubic yards of

issue of the Bulletin.

It will be clear, from a consideration of what has been said, that while an immense amount of work has been done, the construction of the dams themselves is hardly more than begun.

The War Chest

The organization of the District was gladly put at the service of the Montgomery County War Chest Committee. A committee headed by C. W. Porter-Shirley met at the headquarters office in Dayton on May 24 to outline the work. Meetings were held at the Dayton office and at the various camps. These meetings, attended by almost all the em-



FIG. 6—EXCAVATING CUT-OFF TRENCH AT TAYLORSVILLE

Taken May 16 from a point near the center line of the dam and a little west of the B. & O. R. R. tracks. The pool at the left occupies the cut-off trench, which is dug to full depth for a part of its length. The big dragline is seen here at its task, dropping a bucket of earth on the bank which it has just scooped from the trench. The bank will form part of the dam when built. The first bank at the right is a "spoil bank" of stripped top soil, which the teams are taking from the original surface by means of the elevator grader and dump wagon outfit spoken of earlier. This bank marks the downstream toe of the dam. The pile driver is seen at the left in the distance, beginning the upper trestle. The lower trestle appears at the right, connecting with the temporary construction track as shown.

gravel will be necessary. This will be obtained in most cases from the river bed or valley near by. Before being used it must be washed clean of clay and earth, and run through screens of various sizes. Gravel washing plants for this purpose are being erected at all the dams, with accessory cement houses and concrete mixers. Several of these plants are nearing completion. The one at Englewood is shown in figure 4.

Besides the gravel washers, much other plant and machinery necessary to the construction of the dams has been assembled or built; such as railway tracks, locomotives, dump cars, excavators, steam shovels, cranes, derricks, trestles, etc. A number of these appear in the various pictures. The matter of equipment, however, must be reserved for a future

ployees of the District, were addressed by various speakers and resulted in a total contribution to the War Chest of \$13,323.60, distributed as follows:

Treasurer's, Tax, Audit, and Legal pay-rolls	\$ 2,880.60
Headquarters Office payroll.....	1,909.25
Dayton Shop payroll	661.75
Englewood	2,481.00
Germantown	1,286.00
Taylorsville	1,634.00
Dayton local	607.20
Huffman	1,427.00
Feature No. 1001.....	436.80

Total\$13,323.60
These figures include Montgomery County only.

Labor Policy of the District

Right of Collective Bargaining Recognized. No Discrimination For or Against Non-Union Men.

At a recent meeting of the Board of Directors, the following was adopted as a statement of the Labor Policy of the Miami Conservancy District. It is the aim of the Board to secure uniform treatment for all labor employed, and all division engineers, superintendents and foremen are requested to govern themselves by the spirit as well as the letter of this policy. In return for fair and courteous treatment the workmen of the District are asked to give to the job their interest and the best work that is in them. In a great task like this, where the public is paying the cost, there is no room for slackers.

All labor shall have equally fair and impartial treatment. There shall be no discrimination in treatment against unskilled labor, or against any other class of labor, simply because it is not in a position to enforce its demands, but exactly the same treatment shall be given to all, except that higher skill, or skill in greater demand, shall be paid higher wages, and lower skill, or skill in less demand, shall be paid lower wages. A man's character and workmanship shall be the sole basis on which his employment shall rest.

The right of workers to organize in trade unions and to bargain collectively through chosen representatives is recognised and affirmed. This right will not be denied, abridged, or interfered with in any manner whatsoever by



FIG. 7—LOOKING NORTHWEST FROM THE TOP OF THE GRAVEL WASHING PLANT AT ENGLEWOOD

Looking northwest parallel with the river up the construction track which leads over to the Dayton, Toledo & Chicago R. R. at Union. It was built to bring in the machinery and materials to be used in the construction of the dam—locomotives, cars, excavators, steam shovels, timbers, lumber, piling, etc. The track at the right leads to a trestle built to carry it across the river. Three construction locomotives appear in the foreground. The inclined platform leads to the top of the gravel washing plant, about sixty feet in the air, from which point the picture was taken. The hopper at its foot is to receive the gravel dumped from cars which will run alongside the hopper on a standard gage track. From the hopper the gravel will be carried up the incline on a conveyor belt to be washed and screened, and then distributed to the bins. Taken June 22.



FIG. 8—LOOKING SOUTHEAST FROM THE TOP OF THE GRAVEL WASHING PLANT AT ENGLEWOOD

The big machine is the Class 24 Bucyrus dragline excavator, digging the foundation for the downstream end of the concrete conduit which will carry the water of the river after the dam is built. The excavator bucket can be dimly seen hanging from the end of the long arm, or "boom," in the act of dumping its load of clay and rock into a dump car which is hidden by the locomotive. A second locomotive can be seen on the "dump" or "spoil bank" in the distance, with the cars discharging their load. The excavator loads one train while the other unloads.

The pole line at the right brings electric power from Dayton for the operation of machinery. The skeleton of a building beside the locomotive is a carpenter and blacksmith shop in process of erection. It will take its power from the pole line. Taken June 22.

the officers or representatives of the District; and employees shall not be discharged for membership in trade unions, nor for legitimate trade union activities.

No man shall be denied employment by the district and no employee of the district shall be discharged because he does not belong to a trade union. Employees shall not use coercive measures of any kind to induce persons to join any labor organization nor to induce the officers or representatives of the district to deal therewith.

The maximum progress of the flood prevention work shall be maintained, and methods of work and operations which operate to delay or limit progress, or which have a tendency to artificially increase the cost of the work, will not be countenanced.

Eight hours will constitute a day's work, and six days' work will constitute a week's work. Overtime will be paid for at the rate of $1\frac{1}{2}$ times the ordinary rate for all time over eight hours on week days, and double time for all the time worked on Sundays and holidays; holidays being Memorial Day, Independence Day, Labor Day, Thanksgiving, Christmas and New Year's. Eight hours will constitute a day's work on Saturday, but no employee on an hourly rate of pay will be required to work on Saturday afternoon. In case the regular hours of the night shift on Saturday night extend beyond midnight, such time will not be counted as Sunday work. Provisions for overtime do not apply to employees on monthly salary.

Working time will be counted on the job and no time will be paid for which is spent in traveling to or from a job, and no transportation for such traveling will be allowed, except in special cases where a man is sent away from the location of his regular work. Accommodations for all labor are provided on the job at reasonable rates,

and anyone living away from the job does so for his own convenience and with the clear understanding that he must be governed by this regulation.

The men will be paid on each Saturday, for the work done up to and including the previous Tuesday.

The Honor Roll

The Honor Roll of the men who have gone from the Miami Flood Control work into the service of the United States Government in its prosecution of the war will be published next month, when it is hoped that a complete list will be available. Most of the names of those going from the office and the engineering forces are on file, but a number of men have gone from other payrolls whose names have not been turned in. We shall be very glad of information regarding any of these. Extensions of the Roll will be published from time to time. As far as possible, the Bulletin will be sent to all of our men who are in the service. We shall be pleased to hear from them, and to "pass around" letters of interest which they may send.

Anatole Feldman

We have been at considerable pains to find the author of the poem, "The Dam," which we republish in this issue from the Dayton Daily News, in which it appeared some days ago. So far, however, we have been unable to do so. We like the poem. It has the virtues of simplicity, strength, vividness, and sincerity. It answers the demand of the great Russian, Tolstoi, that poetry should be the natural by-product of the man at his work. We hope to hear from Mr. Feldman again.

In Memoriam—Alfred Boardman Mayhew

Alfred Boardman Mayhew was born at Heath, Massachusetts, September 3, 1878. He graduated from Tufts College in 1904 with a degree of B. S. in Civil Engineering.

His earliest engineering work was in New England on the construction of two dams for power development, one at Gavins Fall, New Hampshire, and one at Dorchester, Massachusetts.

In June, 1905, he entered the employ of the United States Reclamation Service and occupied various responsible positions connected with the design and construction of large irrigation projects in the West, principally the Minidoka and the Boise projects in the State of Idaho. He was Resident Engineer on the construction of several important sections of main canal, including diversion dams, bridges and other large structures providing for cross drainage, railroad crossings, lateral outlets, etc.

When the construction of the Arrowrock Dam (the highest dam in the world) was authorized, Mr. Mayhew was selected as principal engineering assistant to the construction engineer and had direct

charge of field engineering and designs. He was personally responsible for many of the details of design of that dam and related structures, and was closely identified with the construction work until it was nearly finished.

In November, 1914, Mr. Mayhew was given a furlough by the Reclamation Service in order that he might accept a position with The Morgan Engineering Company at Dayton, Ohio, on studies and plans for flood prevention works in the Miami Valley. He continued on that work as an employee of The Miami Conservancy District after the formation of the District under the Conservancy Act of Ohio. He took a prominent part in the preparation of the designs, specifications, and estimates for the whole project and when construction started he was given charge of the Germantown dam as Division Engineer. It was while directing the work of raising a suspension bridge above the reach of flood waters, at this dam, that Mr. Mayhew was thrown into the river and drowned, on May 12, 1918. Just a short time before the accident to himself, Mr. May-

hew had posted notices at both ends of the bridge warning the public to keep off, as it was dangerous.

Mr. Mayhew's fine personality, coupled with his well balanced capabilities as an engineer, gained for him the respect and confidence of all with whom he associated. He was not only a good engineer but also a good citizen, and took a lively interest in

the affairs of the day.

Mr. Mayhew was married on September 14, 1911, to Miss Maude O. Greene, of Princeton, Illinois, who survives him.

He was elected to Associate Membership in the American Society of Civil Engineers in November, 1909, and became a member in January 1916.

Charles H. Paul.

The Dam

You men,
Toiling by day,
And making the stars pale
With your fires at night;
You men
With your unearthly cries and grunts,
Who work with brain and brawn,
While whistles shriek and hammers
trip
That this thing should be built;—
For what do you strive?

Is it for your so much per hour
That you may eat and live,
And that you may clothe your families?
Or do you see nothing
But your spell of rest
After the day's grueling ardor?

Ah,—
Canst see
The flood's sweeping water
Checked by this thing you build?
Canst see the torrent's flood,
Eager to destroy,
Splintered to spray
Against this great base?
Canst feel
The bigness of your task?
The lives,
The infinite lives saved
By your toiling?

*Anatole Feldman,
Laborer, Englewood Dam.*

Some Figures on Men and Equipment

The following are a few statistics regarding men and equipment, showing something as to the extent of present operations.

There are now on the payroll 1681 men, distributed as follows:

Payroll	Total No. of men on Payroll
No. 1 Germantown	265
No. 2 Englewood	313
No. 3 Lockington	118
No. 4 Taylorsville	217
No. 5 Huffman	212
No. 42 Dayton	48
No. 58 Hamilton	87
No. 1001 Railroad Relocation	146
No. 200 Mess Gardens	8
No. 200 Shops	146
No. 200 Headquarters	87
'Treasurers'	34
TOTAL	1681

These men represent forty-five different occupations. They include accountants, chauffeurs, clerks, stewards, cooks, bakers, draftsmen, electricians, civil and mechanical engineers, inspectors, laborers, steam engineers, dragline and steam shovel runners, blacksmiths, boilermakers, machinists, millwrights, plumbers, carpenters, painters, riggers, rock drill men, brakemen, concrete men, hostlers, stenographers, time-keepers, doctors, and watchmen.

There have been purchased and delivered to the various dams up to date, ready for operation, 18 construction locomotives. Thirteen of these operate by steam and five by gasoline. A number are

already at work.

These locomotives will be used with 80 dump cars, carrying rock and earth for the construction work. The necessary railway track has required the purchase of 1300 tons of steel rails and more than 30,000 ties. Several miles of track have already been laid.

To carry men and materials back and forth from the warehouse and headquarters in Dayton to the various points where construction is going on, the District maintains at the Dayton garage 54 automobiles of various types, including 11 Dodge, Ford, and Hudson touring cars, 13 Ford light delivery trucks, 4 Ford runabouts, 9 Ford one-ton trucks, 5 Ford depot wagons, 7 Pierce-Arrow five-ton trucks, and 5 Pierce-Arrow two-ton trucks. These machines consume on the average about 170 gallons of gasoline per day.

There are on the work seventeen dragline excavators for digging earth and rock, varying in size from the little fellows of thirty or forty tons weight to the big machines like the one working along the river in Dayton, which carries fifty tons of ballast alone, to balance its hundred-and-twenty-five foot steel boom. To operate these draglines, and the various cranes and derricks on the work, about fifty miles of steel cable have been ordered, some four miles of which have been received.

For the concrete in the various structures about 300,000 barrels of cement have been ordered, of which about 10,000 barrels have been received and stored. The reinforcing concrete steel received to date amounts to 966,000 lbs.

For the electric lines bringing light and power to the various camps 25 miles of wire have been used, and 8 miles of galvanized cable wire.

The Camps

An Attractive Suburban Village Erected at Each of the Dams, with Modern Sanitation and Conveniences. The Houses To Be Sold After Construction Is Completed.

In the carrying out of a large construction project, the labor question is of prime importance. The problem of getting men to do your work, and of keeping them after you have got them, is one of the biggest single questions that faces the employer. Old conditions are rapidly passing; new standards must be met. Among these new conditions, that of adequate housing looms large. The days of tents and shacks, of unsightly, unsanitary, inconvenient camps, are gone or rapidly going. In conformity with this change, the Miami conservancy District is endeavoring to provide first class accommodations for its working force. At each of the five dams of the District, it has built a modern camp for its men.

At the present stage of the work, in the vicinity of any of the dams, these camps are the most striking objects in the landscape. "Camp" is scarcely the word for them. They are rather suburban villages, with all the modern conveniences, and in most cases the facility of access to nearby cities by means



FIG. 9—A NO. 2 COTTAGE AT HUFFMAN

A one-story house, 24 by 26 feet in size and renting for \$16 per month.

of railways and inter-urban lines, which such villages usually have. It is expected, indeed, that they will eventually become such villages; that men will occupy them who will work in the cities, or at gardening; or who will make of them summer homes. Several of them lie in what are really picturesque and beautiful settings, such as might well attract the growing number of people who prefer country homes. The camp at Germantown is shown on page 16. A plan of the camp is shown in figure 11.

The cottages, in the main, are of the low, broad-roofed, one-story type that fits so well with a country setting. Simple in design and inexpensive in construction, they are yet architecturally well proportioned and conveniently planned for family use. There are five different designs, numbered for identification, beginning with the "Number One," the smallest and least expensive, and running up to the largest, the "Number Five." A table below gives the size, number of rooms, and the rental for each.

Views of the No. 1 and No. 2 cottages are shown in Figs. 12 and 9 and a plan of the No. 1 in Fig. 13.

Style of Cottage.....	No. 1	No. 2	No. 3	No. 4	No. 5
Number of Rooms..	3	4	4	5	5
Size in Feet	24x24	24x26	18x26	24x32	26x34
Rental per Month....	\$13	\$16	Two-Story \$16	\$19	\$21

That these accommodations will be welcomed by the men is proved by the demand for them at the present time, several weeks before they will be ready for occupancy. A hundred and twenty-five cottages have been built or are in process of building. Most of these have been already rented. (The number given does not include messhalls, first-aid hospitals, stores, etc., but only dwellings.) In popularity the designs seem to be about equal, judging by the demand. The lowest in price naturally leads. Most of the renters have so far been foremen, superintendents, or specially skilled workers. A number of the cottages, however, will be occupied by laborers.

The cottages described are intended for men with families. For single men bunkhouses are provided. These are of two types, one providing separate sleeping rooms, the other bunking the men in one large common chamber. The first type is built in various sizes, accommodating eight, twelve, or twenty-four men. The general arrangement is the same in all of these. Each house has a porch, a sitting room, a wash and toilet room with shower baths, and sleeping rooms accommodating either two or four men each. A man may have a room to himself by paying a higher rate. Each bunk has a window at its head for ventilation in summer. A floor grating the entire length of the bunkhouse, with steam pipes below, provides heat when necessary. The occupants will usually eat at the big camp messhall. These messhalls are already in use at all the dams. A picture of a 12-man bunkhouse is shown in figure 14.

As to cost, a bunkhouse man occupying a two-man sleeping room with a mate pays 50 cents per



FIG. 10—THE WAR GARDEN AT HUFFMAN

The water and sewer trench runs diagonally across it, not yet "back-filled." The garden is some five or six acres in extent. Potatoes and garden truck of various kinds will be cultivated here during the season. Similar gardens are in at all the camps.

week rental. A man can get a small room alone for 75 cents; or a larger one for \$1.00 per week. The

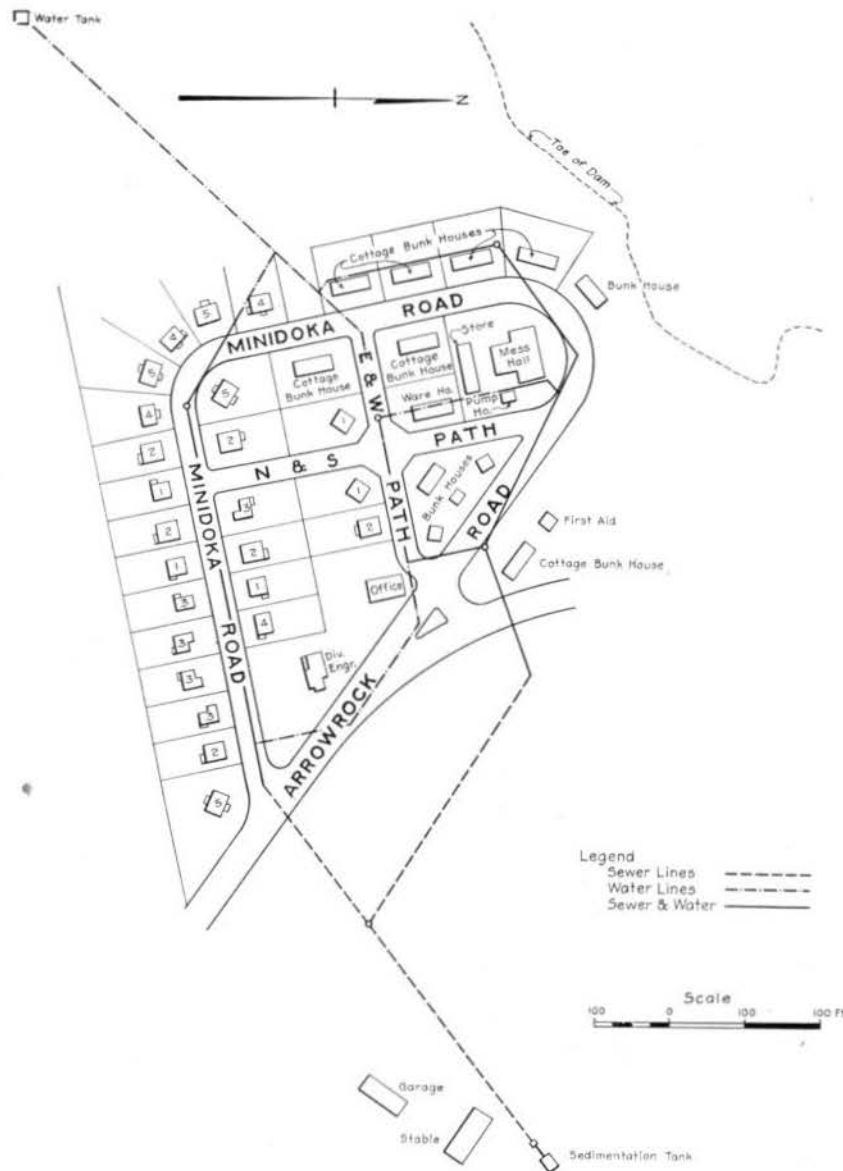


FIG. 11—PLAN OF GERMANTOWN CAMP

The dashed lines are sewer mains. The dash-and-dotted lines are water mains. Where the lines become solid, both mains are in the same trench. Note how near the northwest corner of the camp comes to the foot of the completed dam. The numbers on the houses denote the different designs.

four-man sleeping rooms also rent for 50 cents per bunk. Cots, springs, mattresses and blankets are provided with the rooms. Meals at the camp mess cost 35 cents each.

In the second type of bunkhouse, the one providing one large sleeping chamber for all the occupants, arrangements are made so that the men can do their own cooking, stoves being provided free for this purpose. In this case, cots, springs and mattresses only are furnished by the District. No rental is charged for bunks in these houses.

A third variation is the cottage bunkhouse, accommodating five men who board with a family which occupies the same house. The arrangement here is such that the domestic life of the family can be kept well separated from the sleeping chambers and living room of the men.

All of these types of bunkhouses are in demand; indeed, houses of all the designs provided—cottages,

bunkhouses, and cottage-bunkhouses, are being occupied as fast as they are ready for use.

As the pictures indicate, each camp has a water system. Pure water, obtained from drilled wells, is pumped to a tank on the higher ground and distributed through pipes to every cottage.

Each camp will also have a sewerage system, discharging into a combination septic and sedimentation tank, (a modification of the Imhoff design) and thence, where necessary, through a sand filter bed to the adjacent stream. With pure water, sanitary sewerage, and watchful camp sanitation, the health of the men should be maintained at a high level. Health is money, to employer and employee alike.

A comparative table, giving the percentage of completion of the water system, the sewer system, and the houses, at the various camps is shown below. House connections to sewer and water mains are not included.

Camp	Houses	Water System	Sewer System	Date of Report
Germantown	80%	40%	100%	July 1
Englewood	73%	60%	70%	July 1
Lockington	90%	100%	100%	July 18
Taylorville	80%	100%	100%	July 11
Huffman	92%	65%	78%	July 1



FIG. 12—A NO. 1 COTTAGE AT HUFFMAN

A one-story structure, 24 by 24 feet in size and renting for \$13 per month.

War gardens have been started at all the camps, planted by the District itself. They are cultivated by the occupants of the various cottages, the space set apart for the gardens, several acres in extent, being divided into plats about 30 by 100 feet in size, and a plat assigned to anyone who wishes to cultivate it, with the understanding that if he does not give his garden proper attention, it must be turned over to some one else. Garden plats are connected also with each of the cottages, but these are not expected to be under cultivation this year on account of the lateness of the season.

The messhalls, where many of the men are already eating, will accommodate about two hundred men at a meal. To provide for so many takes a fully

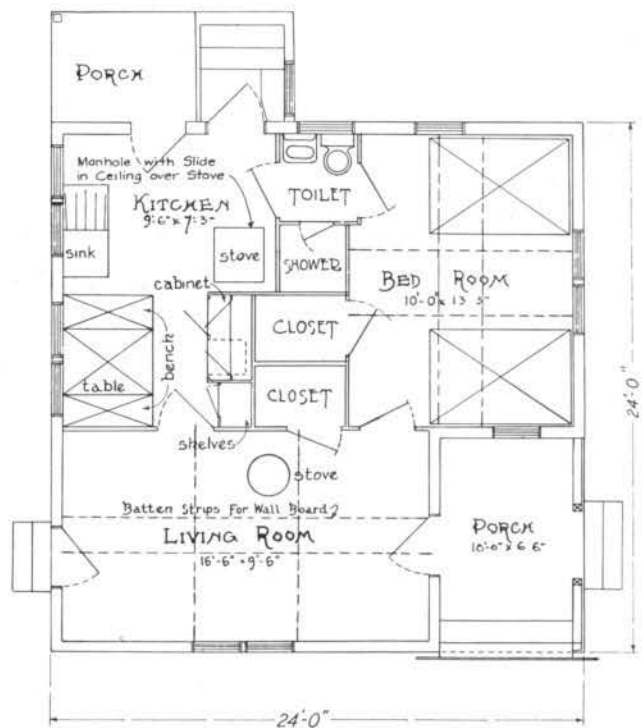


FIG. 13—PLAN OF NO. 1 COTTAGE

equipped kitchen, furnished with the conveniences of a good modern hotel—bake oven; range; vegetable steamer; butcher's block; steam serving table, dish-washing machine and a small refrigerating plant.

In addition to the above there is in each camp the usual store, a first-aid cottage-hospital, a community hall, where public meetings and entertainments can be accommodated, and a school house for the children. As has been said, it is expected that all of these "camps" will become permanent villages, and the investment in these adjuncts to community life will not only prove to be of value during the work of construction, but afterwards as well.

SEEN AND HEARD ON THE JOB

Rupe's Iceless Refrigerator

There may well be times at the various camps this summer when ice is not available, or when the expense of buying it will look too great. To meet such cases, H. H. Rupe, the Superintendent of Carpenters at Englewood, has devised an inexpensive and novel form of iceless refrigerator. It is shown in the sketch, figure 15.

Briefly, it is a very small circular cellar, made by sinking three twelve-inch drain pipes, one above the other, to a total depth of six feet in the earth. At this depth the ground is as cool as the inside of the ordinary refrigerator. In the vertical well thus formed a cylindrical tin bucket plays, fitted with three shelves. The food or water to be kept cool is placed on these shelves and let down. A rope passing vertically from the bucket bale to a small pulley fixed to the shed roof or bracket above, and thence over a second pulley to a counterweight, facilitates the operation.

The bucket is formed from a tin pipe eleven inch-

es in diameter and three feet high, the shelves being of inch board, cut to circular form and fitted inside it. A sector of the pipe is cut out and hinged to form a door, which swings open horizontally, giving access to the shelves. The affair is easily made, and ought to be useful to many of the cottagers at the various camps during the present summer. If the demand proves sufficient, arrangement can be readily made with a local tinner to make the buckets in quantity, with accessories—rope, pulleys, etc.—complete. The householder can easily dig the well and sink the drain pipes himself.

Fast Section Line Survey

The survey party under J. J. Heier, working on section lines near Huffman, recently unearthed nine old monuments in one day's work, including six section corners and two quarter section corners. This is the biggest "killing" in monuments that has yet come to our notice.

Remarkable First Aid Absolutely Without Parallel

George Pope, employed as carpenter helper at the Lockington Dam, had the misfortune to break his leg a few days ago. First aid was rendered by Mr. Downey, the blacksmith on the work, who in less than two hours had the injured party on his feet and back on the job.

The leg was an artificial one.

The leading feature of the Bulletin for September will be an illustrated article on the machinery and equipment to be used in the building of the dams, and the work of channel improvement. It will include an account of how this equipment was gathered together, this indeed being the most interesting part of the story.

The Miami Conservancy Bulletin is the regular medium through which the organization will reach the public. It hopes the public will be sufficiently interested to respond with questions and if need be with criticisms. Both are welcome and both will receive careful attention.



FIG. 14—A 12-MAN BUNKHOUSE AT HUFFMAN
A one story house 18 by 42 feet in size, accommodating 12 men.

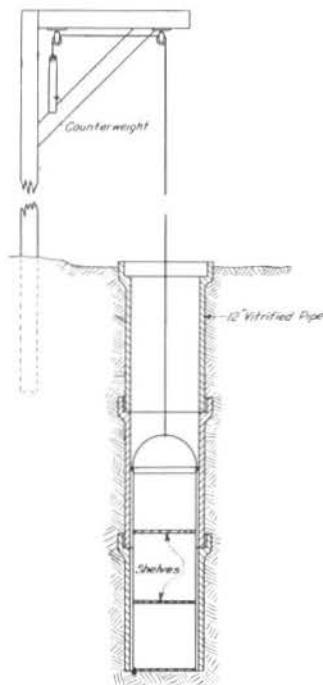


FIG. 15—RUPE'S ICELESS REFRIGERATOR

Moving Construction Railway Equipment to Germantown Damsite

At four of the damsites of the District there is either a steam or an electric railway running close to the work. At Germantown, however, no railway of either kind runs nearer than the village itself, some two and a half miles distant. At this point, the transportation to the work of the construction cars and locomotives, to be used in the building of the dams and related structures, presented a special problem, the equipment being standard gauge, and of considerable size and weight.



FIG. 16—MOVING A CONSTRUCTION TRAIN TO
GERMANTOWN DAMSITE

The difficulty was solved by laying a track down the village street and along the country highway, and running the equipment to the dam as a train, under its own power. The distance was not covered of course at one run, but in short lengths, the rails being taken up behind the train and relaid in front as the journey proceeded.

Grades were encountered too steep for the entire train to climb, even when driven by both locomotives. To overcome this a siding had to be built at the top of the hill. The front locomotive dragged the cars up the slope one at a time, and stored them on this siding, where they were made up once more into a train and moved ahead again out onto the main line.

Trouble of a different sort may be encountered when the train comes to be let down a long, steep slope which occurs near the camp. If the train is allowed to stop for any length of time on the slope the water in the locomotive boilers will all run to the lower end, leaving the upper ends of the boiler tubes without water protection, exposed to the heat of the furnace. A bad case of burning might result.

Inch-worming along in the fashion described, pulling up track behind and laying it in front, is naturally pretty slow business. The trip from Germantown village began on June 28, and the train had covered about half the distance by July 8. The picture, figure 16, shows it standing on its section of track in a street in the edge of the village, with the hill which had to be negotiated a car at a time, showing ahead down the highway. The locomotives and cars have to travel about three miles and a half to cover a highway distance of two and a half miles.



FIG. 17—THE CAMP AT GERMANTOWN

A general view looking a little south of east from the southern end of the dam site. The large building on the extreme left is the mess hall. The long, low buildings are bunkhouses, accommodating from eight to twenty-four men. The smaller buildings, grouped, most of them, at the right, are cottages for single families. The building with a cupola, formerly a barn, is the office. The dwelling to the right of it is the Division Engineer's residence. It was formerly a farm house. The barn this side of it has been turned into a shop. Twin Creek flows just to the left of the trees seen at the extreme left of the picture; then turns and runs to the right at the foot of the hill in the distance. It is hidden by the trees on the bank.*

Railroad Relocation

The most conspicuous work at Huffman at the present stage of operations is that of railway relocation. The Big Four, the Erie, and the Ohio Electric, at the west end of the damsite here, must be moved back into the hill to make room for the dam, necessitating a cut of about a hundred feet. On this

work, and on the B. & O. relocation for the Taylorsville basin, at various points, there are at present engaged some 9 steam shovels, 8 locomotives, 46 cars, 100 teams and 560 men. A fuller account of the relocation work will appear in the next issue of the Bulletin.

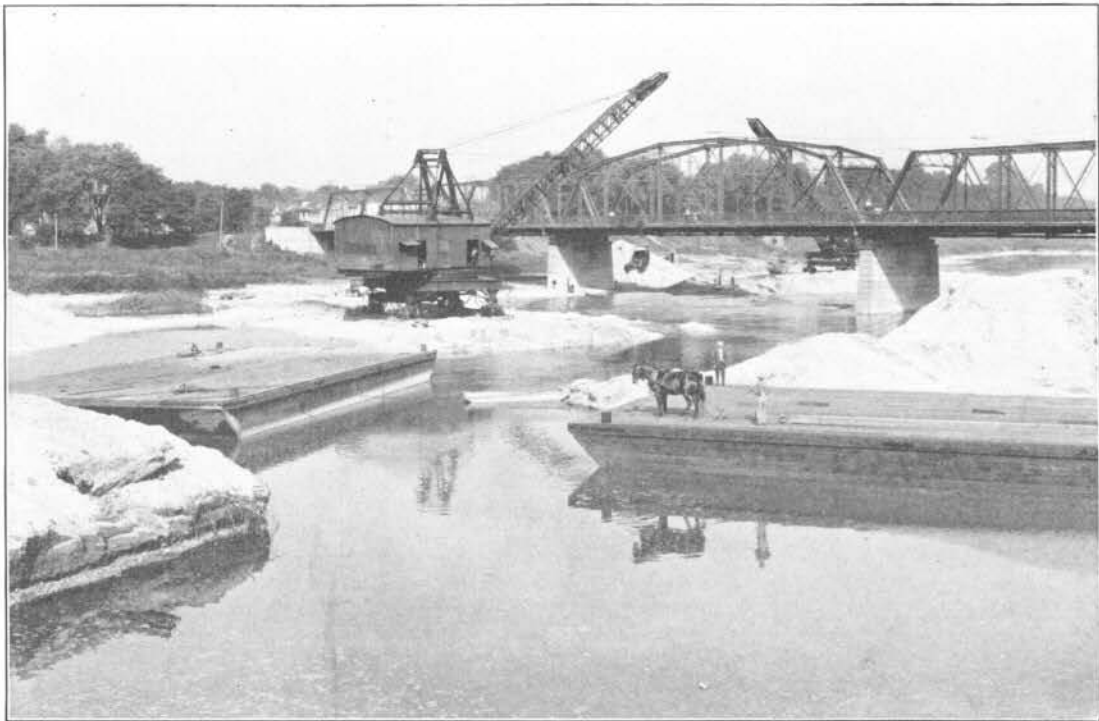


FIG. 18—THE CAMP AT GERMANTOWN

Taken April 18, 1918, two months earlier than the above view, and from the same point, showing it as it appeared in the beginning. The large barn is now the Division Engineer's office. The frame of the big mess hall is seen at the left, with siding partly on. View from south end of proposed dam.

— THE MIAMI CONSERVANCY BULLETIN —

September 1918



SCOWS AND DRAGLINES AT HERMAN AVENUE BRIDGE, DAYTON

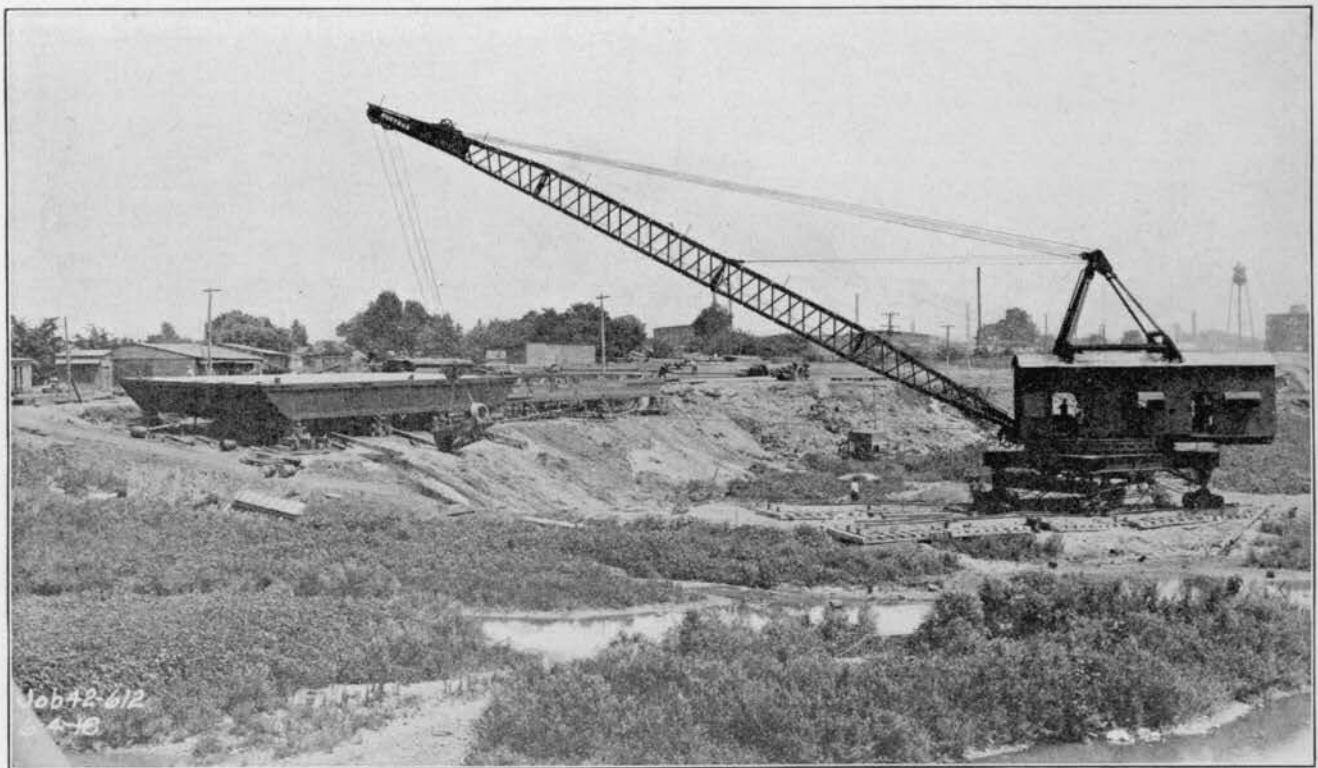


FIG. 20—DRAGLINE EXCAVATOR NEAR HERMAN AVENUE BRIDGE

The projecting steel boom is 125 feet long. It is balanced by a 50-ton counterweight, not seen, at the other end of the machine. The bucket hanging from the boom end will hold four wagon loads of earth. The scow at the left is 40 by 80 feet in size.

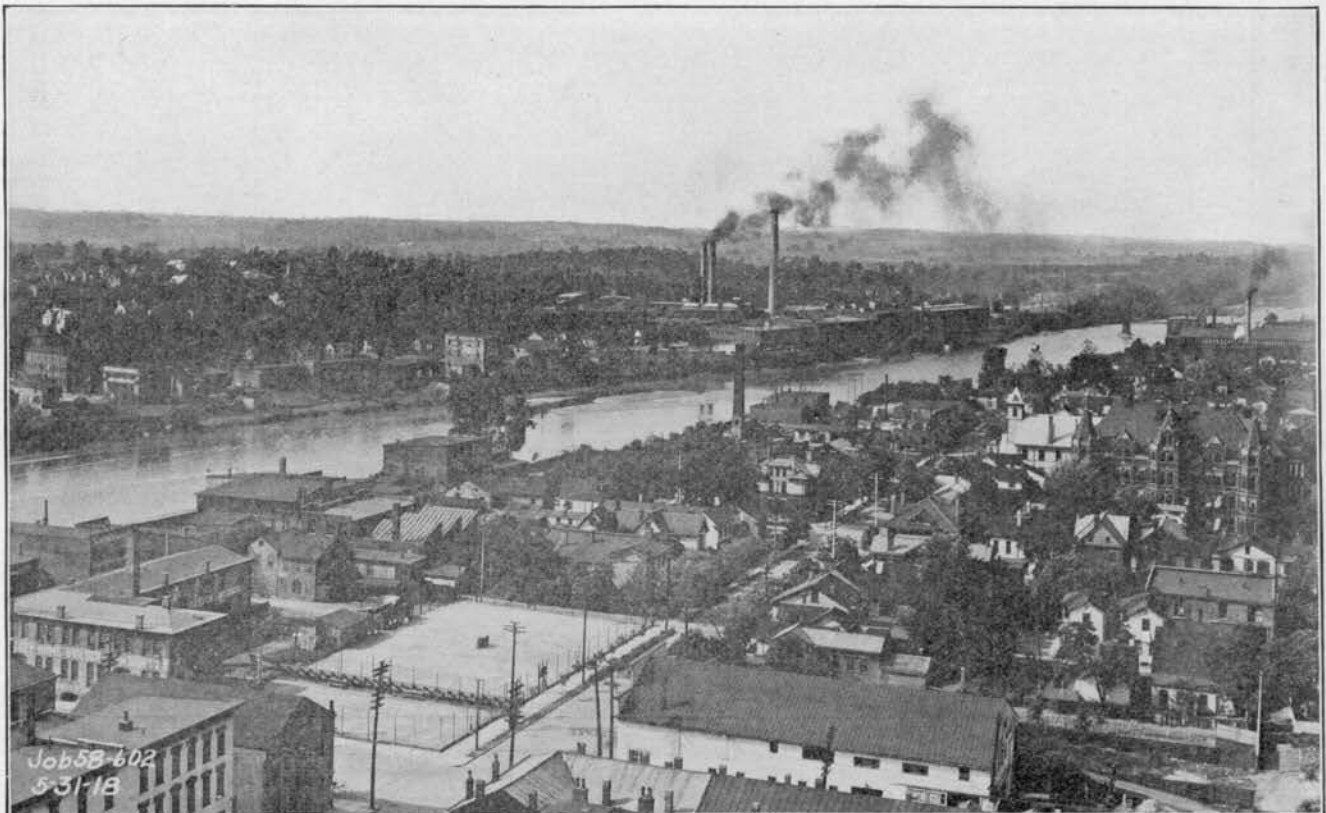


FIG. 21—THE CITY OF HAMILTON, LOOKING NORTH WEST FROM THE COURT HOUSE TOWER
A strip 150 feet wide will be taken from the entire near bank of the river as seen.

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THE MIAMI CONSERVANCY BULLETIN

PUBLISHED BY THE MIAMI CONSERVANCY DISTRICT
 DAYTON, OHIO

Volume 1

September 1918

Number 2

The Conservancy District and United States Labor Control

The war industries of the Miami Valley are of very great importance. More ship engines are made in Hamilton, and more airplanes in Dayton, than in any other city of the country. Tanks to run down German machine guns, delicate recording devices for airplanes and submarines, shells for big guns, ignition systems for army trucks, and vast quantities of other war materials, are being made here. Seeing the necessity of protecting these industries from flood, the Employment Service of the National

Government has classified the work of the Miami Conservancy District as essential war work.

The officers of the Conservancy District, on the other hand, will co-operate with the Government to the fullest extent in carrying out its labor policy. Our first job is to win the war, and we must make every necessary sacrifice to that end. A general order to this effect has been issued to all division engineers and superintendents.

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The article on Equipment announced last month for this issue will appear in the October number.

The Miami Conservancy Bulletin is published on the first of every month. Matter for publication must be in the hands of the Editor by the fifteenth of the month preceding. Address The Miami Conservancy Bulletin, Dayton, Ohio.

The subscription price for the Bulletin is 75c per year. It will be on sale at news stands at 10c the copy. Remittance by check or money order should be made payable to The Miami Conservancy District.

G. L. Teeple, Editor.

L. F. Wilcock, Business Manager.

The Improvement of the Miami River

Four Million Cubic Yards Will be Excavated from the River Bed at Dayton and Hamilton—Much Work Already Done.

The flood of 1913 sent down the Miami Valley to Dayton and Hamilton a volume of water several times as great as the river channel was able to carry. In planning to handle such volumes in the future, two fundamental means were finally seen to be necessary. The first was to hold back a portion of the flood in the upper valleys by the building of dams. The second was to make the river channel large enough and deep enough to carry that portion of the flood water which remained. Both means are essential, and the river improvement is as important as the dams, although the latter, by reason of the novelty of their application to the end in view, have attracted a far larger share of public attention.

Tippecanoe City the river does not need improvement. The levee there is to guard against possible flood water in the Taylorsville retarding basin.

The adjustment of the channels to the works in the various cities, both public and private, such as streets, buildings, industrial plants, railroads, canals, sewers, water mains, etc., has involved a very great number and variety of engineering and business problems, and the task of grappling with them has been correspondingly responsible in its demand for knowledge, resource, and sound judgment.

The heaviest work is naturally at Hamilton and Dayton. As has been said, it is principally channel improvement in both cases, yet the two cities offer

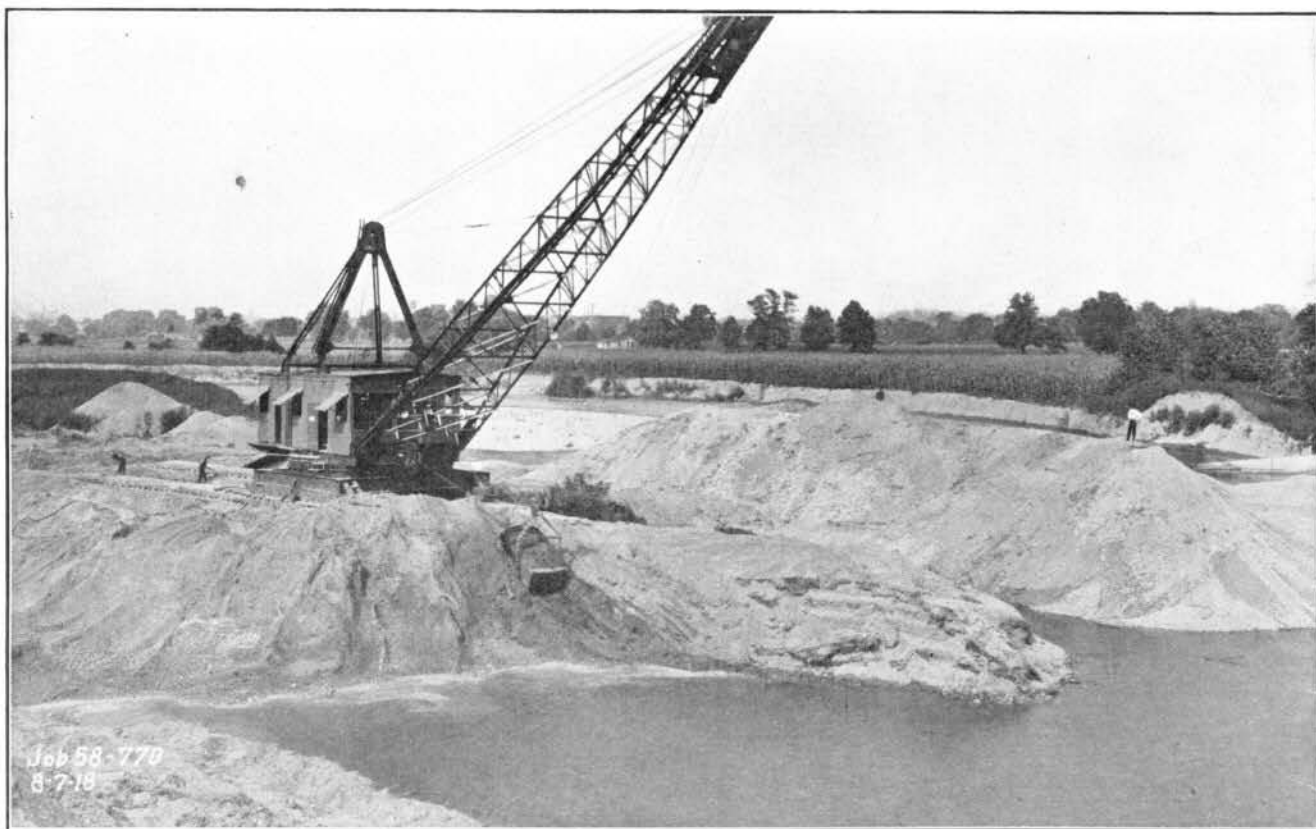


FIG. 22—DEEPENING THE RIVER CHANNEL JUST BELOW HAMILTON

A Class 175 Bucyrus Dragline is here seen. The river in the foreground will be deepened at this point about 6 feet to insure a dry river bed farther up stream. The machine is working backward. The men in the rear are laying down rollers on timbers for it to ride on as it goes back.

A river may be improved by deepening and widening its channel, or by building levees on its banks. In the Conservancy work both means have been adopted, in some places one predominating, in some the other. At Dayton and Hamilton the work is essentially channel improvement. At Middletown, Franklin, Miamisburg, and West Carrollton, it is levee building. At Troy and Piqua the two means are used in something like equal proportion. At

quite different problems. The river through most of Dayton is wide enough; in some places wider than is necessary. At Hamilton it is too narrow, and to make matters worse, its banks through a part of the city are occupied by large manufacturing and commercial plants. Hamilton needs also the greater capacity. The flood flow there in 1913 was 350,000 cubic feet per second, as against 250,000 for Dayton, a ratio of seven to five. The length of the channel

improvement in Hamilton is about $2\frac{1}{2}$ miles; in Dayton it is about 8 miles. The amount of river excavation in the two cities, however, is about the same, 2,000,000 cubic yards in round numbers in each case.

In both cities the same general standard improved cross section has been adopted, the dimensions differing somewhat with the conditions. At the center of flow the bottom is flat for a width of 150 feet. From here it rises on a very flat slope each way to the foot of the river bank. The total width, foot of bank to foot of bank, is in Dayton 620 feet. In Hamilton, south of High Street bridge, it is also 620 feet; north of this bridge, however, through the narrow, congested section referred to above, it is 520 feet. The depth in Dayton from the top of the levee is 28 feet; in Hamilton it is 35 feet. These dimensions will give in Dayton, with the assumed maximum possible flood—forty per cent greater than that of 1913—a flow of 120,000 cubic feet per second. In Hamilton it will be 200,000 cubic feet per second. The levees in both cities will be built three feet higher than this assumed maximum possible flood level, as a margin of safety.

To secure the width quoted above in Hamilton, a strip of land 150 feet wide has been purchased by the Conservancy District, running along the east bank from High Street to a point above the Black Street foot-bridge. South of High Street, where the land could be bought more cheaply, the purchased strip, situated also on the east bank, reaches a width of over 400 feet. All this land will be excavated to add to the width of the river channel. This will necessitate a considerable wrecking of present buildings, notably at the plants of the Sterling Paper Co., the Clawson and Black Co., and the Niles Tool Works. The block of buildings shown in figure 23, lying just above High Street, will disappear entirely, and the river will run where they now stand.

In Dayton, the river being wider, not many buildings will be taken, the Schwind Riverside Brewery near Dayton View bridge, and the block of frame dwellings next the levee south of the river just above Fifth Street, being the principal exceptions.

The work of channel improvement both in Dayton and in Hamilton will be done by heavy dragline excavators, built by the Bucyrus Co., of South Milwaukee, equipped with electric motors of 315 to 375 horse power, steel booms of 100, 125, or 135 feet in length, and buckets of $3\frac{1}{2}$ to $4\frac{1}{2}$ cubic yards capacity. Two of these machines are already at work in each city.

From ten to fifteen per cent of the excavated material will be used in building up the present levees, or in building new ones. The rest will be dumped upon "spoil banks." Some of it can be scooped up by the dragline, swung, and dropped directly into place. More of it will require to be so handled twice. Still another portion will have in addition to be transported up or down the river. Two methods of doing this will be used. In Dayton it will be done by scows, which will be loaded by one dragline and unloaded by the second. There being insufficient water in the Miami River to cover the width to be excavated, the water level will be raised by building a small dam of sheet piling across the river



FIG. 23—BUILDINGS AT HAMILTON

All these buildings will be wrecked to permit widening the river bed.

just above the mouth of Wolf Creek. When the work above this dam has been completed, the dam will be removed and rebuilt below Washington Street for the lower river excavation. One dam below Washington Street would, of course, answer for both sections of the work, but would have to be so much higher that it would cost more than the two as planned. The scows, three in number, and 40 by 120 feet in size, have already been built. They will be put in operation about November 1. Two of them are shown in the picture on the outside front cover. For some of the work the loading dragline will be mounted upon a fourth scow, 40 by 80 feet in size. About 40 per cent of the material will have to be thus transported.

In Hamilton scows will not be used. The excavated material there will be transported on railway tracks, by locomotives and 12-yard dump cars, arranged in three trains of ten cars each. The tracks, of standard gauge, will be laid in the dry bed of the river. To insure dryness, the river will be lowered from four to eight feet by deepening the channel for a width of about fifty feet, sufficient to carry the ordinary flow. One of the big Class 175 Bucyrus draglines, at work on this channel-deepening, is shown in figure 22.

Reference has been made to "spoil banks." A "spoil bank" is a heap or bank of excavated earth which has been dumped somewhere just to get rid of it, as distinguished from excavated earth usefully employed, as in building a railway embankment or a levee. The term is also applied to the area on which the waste earth is to be dumped. To provide such areas is often a necessary part of an engineering plan. They should be, if possible, on low ground which needs filling, and as near the excavation as possible.

Such spoil banks have been provided both in Hamilton and Dayton. In Dayton the principal one is the large triangular space between the Miami and Mad Rivers, at the mouth of the latter. There will be a new levee built along both these streams, and the spoil bank will be simply a space filled in behind these levees. That portion of the triangle not covered by the river spoil will be filled some day by the city, and the little wilderness of unpleasant sights and smells now located here will become a public park or playground. Immediately across the Miami River from this there is another somewhat

smaller spoil bank, and still another on the second Gehenna of dumpage which lies just north of the mouth of Wolf Creek. Where it is permissible and cheaper, material will also go into widening the present levees.

At Hamilton, for the excavation below High Street, there is practically limitless spoil bank in the low area within or near "Peck's Addition." The portion to be used will be a strip several hundred feet in width on each side of South Avenue, running east some nine blocks from the river, with a narrower strip running up the east bank to the Columbia bridge at Wood Street. About 1,400,000 cubic yards from the river bank and bottom will be dumped in this area. For the excavation north of High Street, comprising about 600,000 cubic yards, the spoil bank will be the low area north of the Little Reservoir and between the railway tracks and the hydraulic canal. This canal will be relocated,



FIG. 25—NEW LEVEE AT DAYTON

This levee is finished except for concrete facing on the slope. Herman Avenue Bridge is seen in the distance, with two dragline excavators at the left, the nearest of which built the levee seen. The scow will be used later to transport excavated material up and down the river.

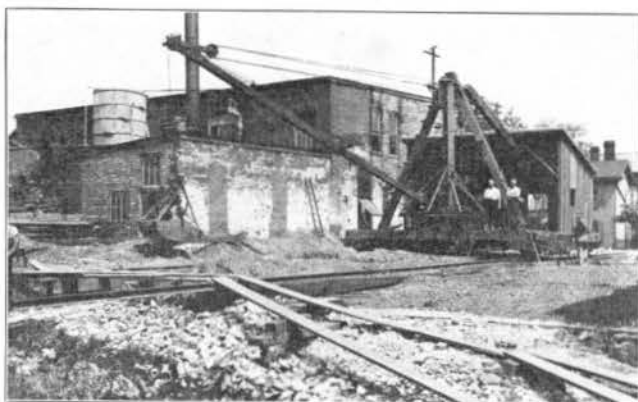


FIG. 24—"CLAMSHELL" EXCAVATOR

Just ready to dig a trench for a 5½ foot concrete sewer on Buckeye Street, Hamilton.

and the portion within the city limits entirely abandoned. A five and a half foot concrete sewer running down Buckeye Street will be built to take the sewage which one of the canal tail races at present receives. The excavation for this will be made by a ¾ cubic yard clamshell excavator, shown in figure 24 at the beginning of operations.

There has been a feeling in some quarters that the local protection along the river in the smaller

cities has been somewhat set into the background in the interest of the work in the two larger ones. There is no real ground for this feeling. The local protection as designed is not adequate anywhere, in time of a great storm, without the help of the dams. If the completion of the levees at the small cities is postponed till the dams are far enough along to afford moderate protection, there will be less danger of damage to the finished work by ordinary freshets. Economical and efficient use of the machinery of construction has been still another reason for whatever may have seemed like a favoring of the larger municipalities at the expense of the smaller.

There has been a demand also for an early building of the Middletown levee south of the Ohio Electric Railway Co.'s bridge, on account of washouts which occur there in moderate freshets across the State Highway. This work will be done early in the fall, requests for bids for the necessary work having already been sent out by the Conservancy engineers.

The entire work of the Miami River Improvement is under the superintendence of Mr. J. H. Kimball. C. A. Bock has charge of the Dayton work, and C. H. Eiffert of that at Hamilton. The sewer work at Hamilton is under the supervision of F. C. Williams.

History of the Flood Control Project to be Out in September

The History of the Miami Flood Control Project, which Mr. C. A. Bock of the engineering staff has had in preparation for some time, will be off the press about Sept. 15. It constitutes Part II of the series of Technical Reports, and contains chapters on Organization for Flood Control; Preliminary Reports; The Conservancy Act and Organization of the Miami Conservancy District; Surveys, Studies and Investigations; The Official Plan; Appraisal of Benefits and Damages; Preparation for Construction; Opposition; and Chronology. The history is brought up to the time of the beginning of construction. While not exactly what can be called popular it is much more so than any other of the reports

except the one giving the history of the flood itself, and should command a wide reading among those who desire to understand what has been done. It will be a book of nearly two hundred pages, illustrated by forty-one half-tone engravings, bound in paper covers, and sold for fifty cents the copy. It can be obtained by sending to the Miami Conservancy District, Dayton, Ohio, enclosing check or money order; or it can be bought at the news stands. The printing is being done by the General Printing Co., of Dayton, under the supervision of Mr. Ivan E. Houk. The engraving was done by the Lammers Engraving Co., also of Dayton.

The Miami Conservancy Honor Roll

"We came to France for no material gain; and we shall return empty handed, unless it be, perhaps, to take our dead with us. Each man on leaving America feels, his mother feels, his wife feels, his sweetheart feels, that we are not here to divide the spoils of the vanquished, but to fight for what we believe to be justice and what we know to be liberty. To this we will give all our money, all our young men, all that we have, and never stop until the game is won by our side."

From Paris Speech of General Johnson Hagood, U. S. A.

GERMANTOWN		
Name	Army Address	Home Address
John O'Connell		128 Crane St., Middletown, Ohio.
John Gunckle		Germantown, Ohio.
Wiley Suggs		R. R. No. 3, Germantown, Ohio.
George Milich		Germantown, Ohio.
Clarence Scoonover		Germantown, Ohio.
R. C. Schlafman		35 Ashley St., Dayton, Ohio.
C. L. Rowe	Called August 23, 1918	Germantown, Ohio.
Roy House	Called August 22, 1918	Lewisberg, Ohio.
C. F. Jenkins	Called August 21, 1918	1509 May Street, Dayton, Ohio.
Sidney Wade		Germantown, Ohio.
ENGLEWOOD		
B. F. Sheene		811 Keowee St., Dayton, Ohio.
V. R. Wombold		314 W. Third St., Dayton, Ohio.
J. T. Nash		632 N. 37th St., Louisville, Ky.
Chas. Emerick		R. R. No. 3, Tippecanoe City, Ohio.
Louis Braunstein		935 Fairbanks Ave., Cincinnati, Ohio.
Henry Cunningham		834 Young St., Piqua, Ohio.
James Cloonam		327 S. Halsted St., Chicago, Ill.
Dennis Jarratt		125 W. McMillan St., Cincinnati, Ohio.
L. A. Jones		1326 S. 18th St., New Castle, Ind.
S. E. Roush	Resigned to go into Navy August 17, 1918	73 Green Street, Dayton, Ohio.
LOCKINGTON		
Harry Welichkoff		R. R. No. 4, Piqua, Ohio.
Harry Baker		R. R. No. 4, Piqua, Ohio.
Frank Bauer		R. R. No. 8, Sidney, Ohio.
R. W. Fox		City Hotel, Piqua, Ohio.
J. W. Koogler		R. R. No. 4, Piqua, Ohio.
C. M. McPherson		1121 Nicklin Ave., Piqua, Ohio.
Oran Mahnke		1504 Washington Ave., Piqua, Ohio.
Felix Piserchia		
Clarence Schofield		
L. F. Sherman		111 Bay St., Sidney, Ohio.
Floyd Van Horn		941 N. Main St., Sidney, Ohio.
H. V. Wheeler		331 West Avenue, Sidney, Ohio.
TAYLORSVILLE		
Linus Wagner		107 Regal St., Dayton, Ohio.
Dan O'Connell		59 Wilson St., Clinton, Mass.
Harry Royce		New Richmond, Ohio.
F. T. Boye		131 East Second St., Dayton, Ohio.
J. H. Williamson, Jr.		223 Quitman St., Dayton, Ohio.
Clarence Bergevin		309 W. Grand Ave., Chippewa Falls, Wis.
H. Miller		314 East 6th St., Dayton, Ohio.
HUFFMAN		
John Vaughn		241 W. 5th St., Dayton, Ohio.
Albert Haught		Osborn, Ohio.
DAYTON		
W. M. Caye		Care Dr. W. C. Caye, 624 S. Second Ave., Louisville, Ky.
J. J. Kirby		1721 S. Park Ave., Lackawanna, N. Y.
R. F. Albert	Engineer Company A, 8th Division Training Camp, Fort Harrison, Ind.	Elizabethtown, Ky.
L. J. McWilliams	Lieut. Construction Division Signal Corps, Langley Field, Hampton, Va.	89 Tenth St., Newark, Ohio.
K. C. Grant	Captain, Care Commanding Officer, Langley Field, Hampton, Va.	Care Commanding Officer, Langley Field, Hampton, Va.
K. B. Bragg	Assistant Civil Engineer, U. S. Navy, Pensacola, Fla.	1838 Chicago Ave., Evanston, Ill.
Byron Bird	Lieut. Signal Corps, Vancouver Barracks, Wash.	1518 Second Ave., Ft. Dodge, Iowa.
C. T. Fogle	Signal Corps, U. S. A., College Park, Md.	New Bremen, Ohio.
F. R. Roche	Lieut., Care Government Office, Lindsey Bldg., Dayton, Ohio.	317 Fatherland St., Nashville, Tenn.

Name	Army Address	Home Address
Walter D. Pye	In Aviation Service	Route 4, Little Rock, Ark.
R. H. Merkel	In France in Aviation Service	Sauk City, Wisconsin.
H. B. Aikin	2 Sunset Place, Dayton, Ohio	Bell, Tennessee.
W. P. Watson	Captain, C. A. R. C., U. S. Heavy Artillery School A. E. F., France	Chattanooga, Oklahoma.
Ray Hahs	In Engineering Corps, France	Bandana, Ky.
Austin E. Page	9 Ardmore Road, West Newton, Mass, care S. K. Wainwright	Williamstown, Mass.
Myron Cornish	Engine and Plane Repair Dept., U. S. Signal Corps, 810 Fletcher Trust Bldg., Indianapolis, Ind.	40 North Dearborn St., Chicago, Ill.
E. L. Stapleton	Captain, Sanitary Corps, Gas Defense Service, Medical Dept. U. S. Army, 19 West 44th St., New York City	619 W. 113th St., New York City, N. Y.
C. H. Schwartz	10 E. O. T. C., Camp Lee, Va.	324 Sixth St., Cairo, Ill.
Harold Miller		426 Hawthorne St., Dayton, Ohio.
A. E. Lang		216 Burkhardt Ave., Dayton, Ohio.
Chas. Altfillisch		Bellevue, Iowa.
A. A. Ort	Asst. Civil Engineer U. S. Navy, 1322 Locust St., Philadelphia, Pa.	Bensenville, Ill.
R. F. Herdman	Artillery Training Camp, Camp Taylor, Ky.	611 S. Tenth St., Rocky Ford, Colo.
Ernest Gallion	Cadet R. F. C. Jesse Ketchum School, Toronto Canada	Paris, Tenn.
J. W. Cullen		10 Yale Ave., Dayton, Ohio.
H. W. Wesle	Camp Jackson, Columbus, South Carolina	411 14th St., Milwaukee, Wis.
A. E. Shanklin		
H. F. Stolz	Camp Sherman, Chillicothe, Ohio	R. R. No. 6, Dayton, Ohio.
A. O. Ochs	Corporal U. S. Army Camp, Syracuse, N. Y.	Kenton, Ohio.
W. R. Mounts		149 Bellevue Apts., Dayton, Ohio.
J. S. Tattershall		25 Palmer Ave., Dayton, Ohio.
Leo M. Wallace		324 Clover St., Dayton, Ohio.
Joseph Nastoll		325 Huston Ave., Dayton, Ohio.
Harry Reese		111 Troy St., Dayton, Ohio.
F. J. Kinderdine		135 Alaska St., Dayton, Ohio.
A. E. Beichler		
W. A. Rogers	Company 11, Field Supply School, Camp Hancock, Ga.	315 W. Second St., Dayton, Ohio.
Harold E. Drake		
Roy Jackson	Engr. Officers' Training Camp, Camp Humphrey, Va.	Elmont, Kansas.
Albert Jolly		17 Hartford St., Dayton, Ohio.
Wayne Bell		428 W. Mulberry St., Springfield, Ohio.
Fred Bishop		308 W. High St., Bellefontaine, Ohio.
Wm. Brandenburg		509 1/2 Ohio St., Dayton, Ohio.
Chas. G. Holle		
E. W. Lane	Care J. G. White Co., Arcadia, Fla.	1038 Heath St., Lafayette, Ind.
C. W. Howe	Foreman Construction Work, Lytle, Ga.	3723 E. Third St., Dayton, Ohio.
Robert F. Eastman	Coast Artillery, U. S. A., Sandy Hook, N. Y.	816 Lexington Ave., Dayton, Ohio.
Wm. S. Howe		118 Adrian Street, Dayton, Ohio.

HAMILTON

John Shirley	1946 Mt. Pleasant Pike, Hamilton, Ohio.
P. H. Shields	430 South Avenue, Hamilton, Ohio.
C. Reeves	R. R. No. 7, Hamilton, Ohio.

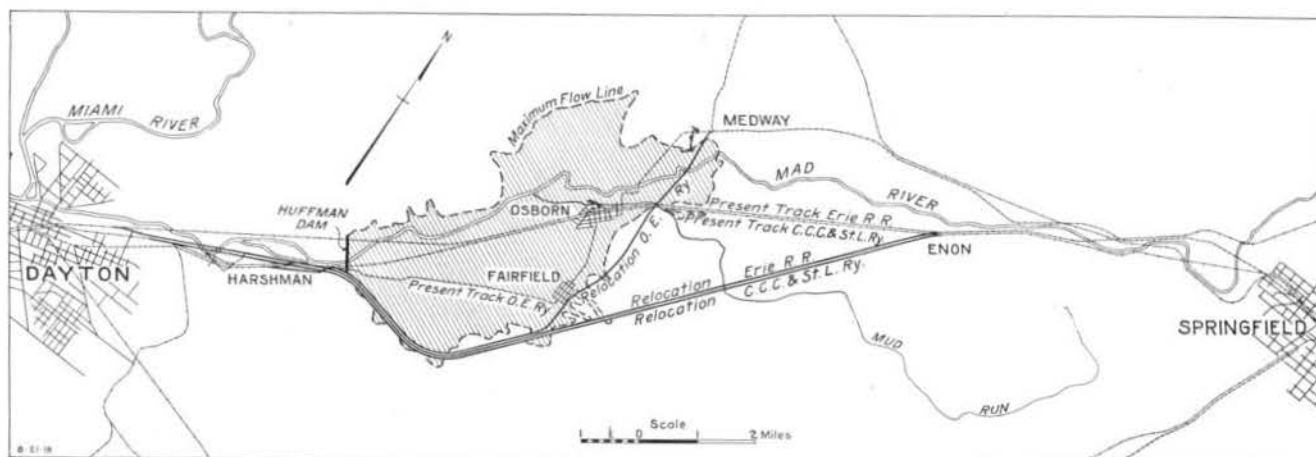


FIG. 26—MAP OF RAILWAY RELOCATION AT HUFFMAN BASIN

The shaded portion of the map shows the overflowed portion of the Huffman Basin as it will appear at times of maximum assumed flood. The relocated lines of the Erie and Big Four (C. C. & St. L.) Railways are seen to lie just within the southern edge of the basin. They will be protected by levees on each side. The old lines are seen to run directly across the basin.

The Railway Relocation at Huffman Basin

Six Hundred Thousand Cubic Yards of Rock Excavation in Hill Near Dam—
New Tracks Will Run Through Basin Between Levees.

The Big Four, the Erie, and the Ohio Electric Interurban railways all run northeasterly out of Dayton across the site of the Huffman dam. The Baltimore and Ohio runs north across the damsite at Taylorsville. Before the work at either place can be completed, therefore, it is necessary that the railways be moved so as to pass around the end of the dam, and arrangements were made accordingly at an early date in the planning of the flood control project. The arrangement, in general, was that the railways, subject to the approval of the Conservancy engineers, were to do the actual work through contractors and their own engineering departments in the usual way, while the expense was to be borne

ing an additional factor into the ordinary balancing of railway cut and fill.

Another interesting circumstance is that the new lines of these two railways are longer than the old by some four thousand feet, and have about a hundred degrees of additional curvature. This will involve a permanent but unavoidable addition to the cost of operation, for which also the railways must be recompensed. This additional operating cost, as modified by the various changes in distance, grade, and curvature, was calculated, using the classification of the Interstate Commerce Commission, and the result capitalized. The sum thus obtained will be paid to the railways by the Conservancy District

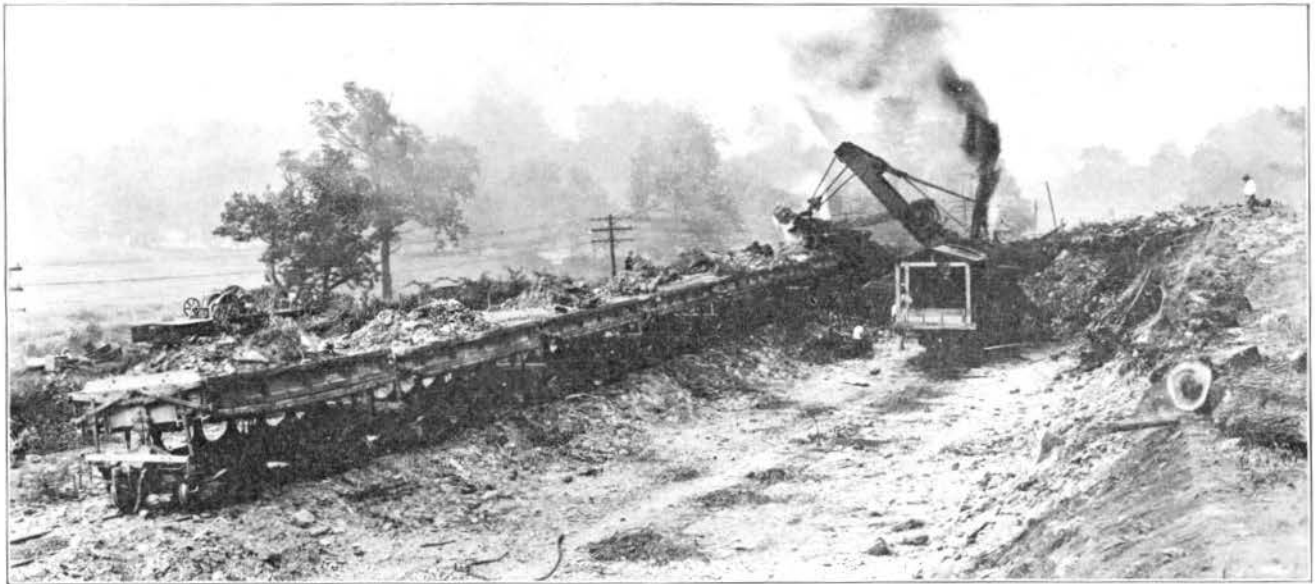


FIG. 27—"70-C" BUCYRUS STEAM SHOVEL EXCAVATING ROCK AT HUFFMAN

This machine digs the weathered upper layers of rock without blasting.

by the District. The preliminary work of track relocation, however, connected closely as it was with any changes which might prove necessary in the location or level of the dams, it seemed best to entrust to the engineers of the District, together with general supervision of the construction work. It was placed in charge of Mr. E. N. Floyd.

The problem of relocation just referred to, especially in the Huffman basin, required an unusual amount of preliminary study and calculation, some forty or more alternative lines being compared and considered before the final solution, giving safety and the maximum economy, was reached. A special complication of the problem lay in the fact that the Erie and the Big Four must run for about a mile and a half within the border of the Huffman basin, with protecting levees on each side of them, the cost of the earth work in these levees, varying with the shifting alternatives of line and grade, introduc-



FIG. 28—DRILLING BLAST HOLES AT HUFFMAN

Each stake seen in the picture plugs the mouth of a hole 20 to 40 feet deep, loaded with 125 pounds of dynamite at the bottom. There are about 200 stakes in the field of the picture. See page 26.

when the new lines are put in operation. This item alone will amount to about \$400,000.00. The entire cost of the relocation, for all four railways, will be

about \$3,375,000.00. Part of this will come back, of course, in assessments laid on the railways on account of the benefits they receive.

A reason for the unusually careful study bestowed on the railway relocation is that the cuts and fills are heavy and expensive at the best, and slight changes in grade and line produce decided differences in construction cost. The heaviest work is at the south end of the Huffman damsite. Here the Big Four track had to be moved back into the hill about 400 feet, in order to make room for the conduit and spillway of the dam. In spite of the fact that the railway grade here was raised as much as possible above the old level, a distance in fact of about 31 feet, it still leaves a cut at this point of 119 feet. To make the expense yet heavier, most of this is in rock. This cut is nearly a mile in length, and contains an estimated total of 700,000 cubic yards. Six hundred thousand cubic yards of this is rock excavation. In places the rock starts at the grass roots, and extends to the bottom of the finished grade. The upper twenty-five feet, approximately, lies in what is known locally as the brassfield limestone. The rest is about equally divided between the Elkhorn limestone, and the Cincinnati shale, the latter being at the bottom. The rock is blasted out and then handled with 70-ton Bucyrus steam shovels. These powerful machines do excellent work, the type used, the "70-C," seeming to be especially efficient in rock excavation. They often handle 2000 cubic yards per ten hour shift, and work two shifts per day.

The drilling is done partly with Ingersoll compressed air drills, and partly with ordinary well drills, the latter being used where the holes are especially deep. The drilling is pushed far ahead of the excavation. Looking up the right-of-way, one sees a forest of stakes, protruding from the ground in six or seven rows, seven or eight feet apart in the row, each stake plugging a drill hole 20 to 40 feet deep, loaded with about 125 pounds of 40 per cent Red Cross Dupont dynamite at the bottom, ready to lift and shatter the ledge. The picture, figure 28, shows this "loaded" ledge, with two well drills working down the grade, drilling additional holes. The blasts are slow and gentle, comparatively, the aim being to lift and loosen and shatter the rock, not to blow it "sky high." From two to three rows (fourteen to twenty-one holes, carrying seven-eighths of a ton to a ton and a quarter of dynamite), are set off at a blast, the ledge being thus "shot" in successive sections, one after the other. The holes to be blasted are all connected by a wire to an electrical machine set at a safe distance, the wire connecting to an exploder placed in the dynamite at the bottom of each hole, and the entire battery set off at once by a single stroke of the machine.

A rock cut of nearly 119 feet, like that described, seems excessive in the expense incurred, but it was unquestionably the best way out. The engineer in such a case has two choices;—he can pay to cut the hill down; or he can pay to haul freight over the hill, in which case the higher the haul the more it costs. Railways establish for each division what is called a "ruling grade," giving the most economical climb for the locomotives and equipment used. The Conservancy engineers had to conform to the



FIG. 29—BUILDING RAILWAY BRIDGE NO. 154

This bridge is a 12-foot concrete culvert 250 feet long, passing under three railway tracks and two levees. See page 26.

Big Four ruling grade. They started the maximum climb—three feet in a thousand, or $\frac{3}{10}$ of 1 per cent,—immediately on leaving the Dayton freight yard at Findlay street, and continued it to Huffman hill, but were still unable to avoid the heavy cut there which has been quoted.

The Erie railway line, beginning at Findlay street, swings to the right, climbing at the same time, until, in a distance of about four thousand feet, it arrives alongside the Big Four. From this point the two proceed as a double track road until they rejoin the old lines just west of Enon. These two railways are operated as a double track line at present from Dayton to Springfield, and this arrangement will be continued after the relocation is complete.

For a mile and a half easterly, after leaving Huffman hill, the two railway lines will be within the Huffman retarding basin, and below water level at extreme flood seasons. Trains at such times will run through the basin on a narrow ribbon of land, with the water above them on each side, but protected from it by dikes or levees. These levees will be about two hundred feet apart. The left hand or northernmost one will have a maximum height of about thirty-five feet, and a crown width of twenty feet, this space being provided to accommodate the Ohio Electric Interurban, which will run along the top of the dike. The crown of the right hand levee will have a width of only ten feet. Two levees are necessary because open water ways must be left under the tracks for drainage purposes. With only one levee, floods would follow these water ways and drown the tracks. A view of these levees, and of the trackway between, as they exist at present, is shown in figure 36.

To reach its location on the inner levee just referred to, the Ohio Electric, as it comes from Dayton, will pass across and under the line of the two steam roads through a concrete arch just west of the dam site. The Springfield Pike will pass through a parallel arch just beside it. This double underpass is now under construction. It is the heaviest piece of concrete work on the line of the relocation, containing some 3000 cubic yards of masonry. A number of other bridges and culverts are also being built along the new line, the heaviest of these being the triple arch bridge over Mad Run.

To make room for the outlet conduit of the Huff-

man dam, which will soon be under construction, a temporary shift must be made of the Big Four track at this point. The excavation for this has already been completed, and trains will be running on the temporary line by the time this article is published. A similar shift in the Ohio Electric has already been made, so that there will be no delay on this account in the conduit construction.

The work of grading and the building of the concrete double underpass are both being done by the

Walsh Construction Co., of Davenport, Iowa. The force comprises 20 foremen, 360 laborers, 3 steam shovels, 6 standard gauge locomotives, 35 dump cars of the 12-yard size, and 20 teams, besides derricks, drills, and other miscellaneous machinery. The superintendent is Mr. W. A. Durkin. The work on bridges and culverts other than the underpass is being done by the Conservancy District with its own men, about 100 in number, under the superintendence of Mr. F. H. Sprague.

Beginning Concrete Structures for the Outlet Conduits

Absorbing Destructive Energy of Water at the Outlets the Most Difficult Problem—How It Was Solved.

The 10th of August marked the beginning of construction, at Englewood and Lockington, of the outlet conduits. The fact is worth emphasizing, not only because the conduits presented the most difficult problem connected with the design of the dams, but because the solution was unique.

Dams have long been built to **store** water, for power, irrigation, drinking, or other purposes, and their outlet conduits have carried this water either in comparatively small volumes or at low speeds. But the flood control dams of the Miami Valley are not being built to store water. They are being built to hold back, at crucial flood seasons, the dangerous excess. The remainder will pass through in enormous quantities and at very high velocities. Behind

the Englewood Dam, at the maximum assumed flood, the water would stand in the reservoir one hundred and four feet deep. It would shoot through the outlet conduits under a pressure of over six thousands pounds—three tons per square foot—and at a speed of fifty-six feet per second—faster than a two minute trotter at top speed. At Taylorsville, it will come through at the rate of over three million pounds—or sixteen hundred tons—per second.

The possibilities for destruction of such an enormous moving mass if left uncontrolled are self evident. In California and the Rockies a three or four inch stream from a special nozzle, known as a "giant," is used to wash hillsides into the valley below, for mining purposes, or in hydraulic dam con-



FIG. 30—EXCAVATION FOR ENTRANCE TO OUTLET CONDUIT AT LOCKINGTON

The steel mast of the derrick in the center is 120 feet high. The slanting boom is 105 feet long. The timbers in the pit at the left mark the forms for the first concrete at Lockington.

struction. At the Santa Maria dam in Colorado, such a "giant," shooting a four-inch stream at about the same velocity as might occur at Englewood, washed an eight hundred and sixty-seven pound boulder into the sluice boxes, whence it was carried by the water into the body of the dam. With fifteen hundred tons of water per second pouring through four conduits, fifteen by nineteen feet, even at less speed, the possibilities for destructive wash of the valley below the dam are easily conceived. The question before the Conservancy Engineers was—how should that energy be curbed and controlled?

The answer of the Conservancy Engineers to the question will be found in the massive concrete structures such as were begun at Englewood and Lockington on August 10th. The pictures, figures 30 to 34, show how things looked at these two places on that day. The general impression they give is that of two large holes in the ground, and the political speaker who objected not long since in reference to the Conservancy project, that he "didn't see why it should be necessary to dig a hole in the ground to build a dam in" probably had one of these places in mind. The excavations, in fact, were made to receive foundations for the outlet conduits, and they were carried so deep in order to get down to absolutely solid rock. It will be well understood that with water moving under a pressure of six thousand pounds to the square foot the firmest possible rock foundation is necessary, and the excavation was carried to a depth where such a foundation was obtained. Notches will have to be cut in this rock, dove tailing with projections on the concrete, to keep the water pressure from moving the structure.

Such conditions as these are not uncommon in high dam construction. The peculiar problem before the Conservancy Engineers, that of the destructive energy of swiftly moving masses of water below the dam, remained to be met.

After much study and experiment, two ways of meeting it were finally adopted. One was to destroy the destructive speed by placing obstructions in the water's path. Experiments were made in which water was shot against the faces of square angled piers, whence it glanced and shot against the faces of other piers, and from these to still others. But the scheme was not entirely satisfactory, because with different heads of water the speed of the stream issuing from the conduit will vary, and the water will glance from the faces of the obstructing piers at constantly differing angles. It was found impossible to design a spacing for the piers to meet this objection. What was done in the final design was to lead the water issuing from the conduit down what may be described as a flight of concrete steps with square notches cut in them. These steps and notches break up the water into conflicting jets and streams, thus destroying some of its speed. The steps also will widen as they go down, leading the water to spread out into a thin sheet.

The greater part of the destructive energy of the water, however, will still remain to be dealt with. This will be done by means of what is known as the "standing wave," or "hydraulic jump." The water will flow on from the foot of the concrete stairway just mentioned, over a concrete floor, which curves gradually upward until it becomes a concrete wall inclined at an angle of about sixty degrees with the

horizontal. At the sides, steeply inclined walls will rise. The water will indeed descend into what, before the conduits are put into operation, will appear like a great, empty audience chamber, hollowed out of the solid rock, and concrete lined, rectangular in form, fifty feet or more from the front wall to the foot of the stairway, and two hundred feet from side to side, floored with concrete and roofed by the open sky. The inclined wall at the front will be twenty-six feet in height, the side walls fifty feet or more; at the rear the great concrete stairway, two hundred feet wide, will rise, step after step, twenty-seven feet in vertical rise by more than a hundred in the horizontal. As it rises it will converge toward the four empty concrete archways—the mouths of the four outlet conduits—each fifteen feet in width by nineteen feet high, and occupying a total space from side to side of some ninety-four feet. Behind and above the arches, wider still and widening more as it rises, will go up the "spillway" walls and apron to a total width of a hundred and thirty-eight feet at the crest, and a height of a hundred and four feet above the "audience chamber" floor.



FIG. 31—FIRST CONCRETE AT LOCKINGTON

North end of the east wing wall of the entrance channel to the outlet conduits. The level area just beyond the men is the solid top of the bed rock.

But of course it is no audience chamber. It is simply a hollow to hold a pool of water. And the object of the pool of water is to absorb and destroy

But of course it is no audience chamber. It is simply a hollow to hold a pool of water. And the object of the pool of water is to absorb and destroy the destructive energy of the sixteen hundred tons of water per second which, when the maximum flood arrives, will come plunging out of the four concrete tunnels down the concrete stairs. The pool will probably hold, under working conditions, thirty thousand tons. Into this ponderous mass the descending mass will hurl itself, and batter its energy in pieces as against a liquid wall. Over the front of this liquid wall the descending water will rear up in a great wave, the "standing wave," at

Taylorville probably twenty feet in height, where it will be dashed into a white spray, and will roll on over the inclined concrete wall at the lower end of the chamber. Over this wall it will pass, at greatly reduced speed, into a second pool, where it will spread and even and quiet itself. At the lower end of this pool it will flow, very smoothly and evenly now, over a second wall built to help form the pool, and then on to the ordinary gravel bed of the valley below, its former destructive 50-feet-per-second speed now curbed to only six or eight, and powerless to harm.

The pictures exhibited of course do not show all this. They show structures of the kind described as they appear in their very beginning. The concrete which appears in the pictures lies in the lowermost layers of the foundations. Only one of the finished surfaces is seen. This is the smooth slab of concrete which appears in the foreground in figure 34. This slab is one of those in the concrete floor at the foot of the flight of steps in the pool chamber at Englewood. It marks the lowest point which the water there reaches.

Mention has been made of the necessity of deep excavation to reach solid rock. At Englewood and Germantown, the foundations have to be carried still deeper on another account. While the dam is being built, the stream must have another channel to flow in. The outlet conduit itself, at both these places, will provide this channel. That is why it is being



FIG. 32—FIRST CONCRETE AT ENGLEWOOD

The semi-fluid fresh concrete is seen pouring down the trough in the center upon the solid rock below, to form the bottom of the pool chamber described on page 28. It will cover the flat area shown in the foreground of figure 33.

built in the earliest stage of construction. But it is not being built of the finished size, fitted to the full height of the dam. For if it were, and a great flood came during construction, the water might back up behind the unfinished earthwork of the dam to such a height that it would flow over the top, and might wash away large portions of the structure. To guard against this, the outlet conduit during construction will be given a capacity two and a half times that which it will ultimately have. This is obtained by digging deeper into the rock at the foundation. After the earthwork is completed, the lower portion



FIG. 33—EXCAVATION FOR POOL CHAMBER AT ENGLEWOOD

The flat area in the foreground will be covered by the concrete floor of the deeper pool chamber. The excavation is in Cincinnati shale rock. The farther flat area is the foundation for the bottom of the second (down stream) pool. See page 29.

of the temporary conduit will be filled up with broken rock or gravel, and a floor of concrete laid on top of the filled portion. This will become the floor of the final conduit opening.

To go down into rock seems an expensive way of getting additional conduit capacity, but after a careful consideration of the whole problem of securing a temporary and sufficient river channel during the

work of dam construction, covering eight different alternative plans, this method was adopted as the cheapest that could be used.

The solution of the entire unique problem of outlet conduits, as it presented itself in flood control dams, was primarily due to Prof. S. M. Woodward and Mr. Walter M. Smith. The experimental work was carried out by J. C. Beebe and R. M. Riegel.



FIG. 34—CONCRETING OUTLET CONDUITS AT ENGLEWOOD—VIEW LOOKING UP STREAM

The higher block of concrete at the center of the picture is part of the lower steps of the "stairway" leading to the pool chamber. The lower wide block a little nearer is the finished bottom of the pool chamber. The fresh concrete flows down the two slanting troughs at the left from a train of four dump cars (not seen), at the top of the bank. See page 29.

War Service Notes

J. F. Burkin, Chief of Field Parties, was notified of his call to the colors on Monday morning, August 5, and left Dayton for his old home in Troy, N. Y., the same evening. The editor of the Bulletin feels a sense of personal loss in Mr. Burkin's departure, the latter's desk being next his own in the Dayton office. His place will be taken by S. K. Young. Mr. Young has had charge of the monthly progress estimates and cost reports, and will add the new duties to his old ones.

H. F. Stolz, who left the Conservancy last month for U. S. army service, reports that he has been accepted, "shot" twice for typhoid, and placed for two weeks in quarantine. He expects transfer to the Engineering Corps.

C. W. Howe, who went from the railway reloca-

tion office into war service under the selective draft, last month, is at Lytle, Ga., acting as construction foreman.

Lockington Camp, which the Bulletin was unable to include in last month's report, came in with a War Chest contribution of \$3206.50. This puts Lockington in the post of honor, heading the column by several hundred dollars. This camp gave not only the greatest sum total, but the greatest amount per man.

The Bulletin repeats its invitation to the soldiers, their relatives and friends, to send us extracts of letters, or other news, which would be of interest to their old friends in the Conservancy District. We shall be glad to give such matters all proper publicity.

Seen and Heard on the Job

The Department of Engineering and Construction has made some 6500 purchases, aggregating \$2,000,000.00, during the last six months. During the past four months there have been 10,000 requisitions on the Department warehouse, for materials and supplies of all the various kinds used in engineering construction work.

It is perhaps worth noting that on July 29 there was a rainfall of sufficient intensity covering a few square miles in Clark County, northeast of New Carlisle, to produce a flood flow in the East Fork of Honey Creek some two feet higher than that of March, 1913. The rainfall at New Carlisle, the nearest rain-gaging station, was not excessive, being only 1.74 inches in about two hours. Farther up the valley the rain lasted three hours—from 2 to 5 p. m.—and seems to have been harder. This same region, in March, 1913, as indicated by the rainfall charts, experienced a fall of nine to ten inches in four days. The sudden concentration over a small area for a few hours produced the heavier local flood of July 29 last.

On a recent visit to Lockington we were struck by the neatness, the comparative coolness, and especially by the effective riddance, practically total, of the summer pest of flies, in the camp messhall. Careful screening, and care on the part of the attendants, had accomplished their perfect work. Some of the other camps should follow the example of Lockington.

Mr. J. K. Cochran, who was Assistant Engineer in charge of railway relocation at Huffman, has gone from the Conservancy work to take a position as Superintendent of Water Works and Electric Lighting at Wellsville, N. Y. His associates note his departure with regret, and wish him success and prosperity in his new undertaking. His place has been taken by Mr. W. R. Yount, who comes from the government work at Wilbur Wright Field.

The heat of the period August 5-6 of the present summer, breaks all August records for the Dayton Weather Station. On the afternoon of the 5th the station thermometer on the top of the U. B. building registered 103 degrees. July records of earlier years, however, surpass it in several instances, as will be noted from the following figures:

Date	Temperature
July 9 and 10, 1897.....	103 degrees
July 27, 1901.....	104 "
July 22, 1901.....	108 "
July 4, 1911.....	107 "

Four other dates in July of previous years give a maximum of 102 degrees. Germantown camp reported August 6 hotter than August 5, the temperature reaching 105 degrees in the shade on the north side of the office building, against 103 on August 5. It ought perhaps to be noted that the weather bureau thermometers are also protected, being enclosed in little roofed and slatted structures, some three or four feet square, open to the air, but not to the sun.

J. W. Everhard, instrument man on the Dayton surveys, by a prompt plunge into the Miami River recently, was able to save a ten-year-old boy from drowning. The boy, with a companion, had been out in a canoe, which overturned. Everhart, who was at work on the bank, lost no time in going to the rescue.

Copies of the regular photographs of Conservancy work can be obtained by ordering from the storekeeper at any of the camps, or by sending to the official photographer, Mr. E. E. Neukom, at the headquarters office in Dayton. The charge is thirty-five cents each. A complete set of the views at any camp is on file in the Division Engineer's Office, each view being numbered. Ask for this file, pick out the view you want and order of the storekeeper by number. There is much inquiry regarding these views, and this announcement is made for the convenience of all concerned.

Huffman reports that fourteen out of its twenty-four cottages are already occupied and the rest have been spoken for. At Taylorsville new houses are to go up, to accommodate enlarged demand.

Half a dozen members of the Big Four corps of engineers at Huffman came of their own motion to Dr. Sayler not long since to be "shot" against typhoid fever. They have received all three doses, with so little inconvenience that they have kept at work every day. A somewhat sore arm from the first shot, and a feeling as if the starch had been taken out of your spinal column from the second, are the usual effects. The third you scarcely notice. Insurance against a dangerous case of typhoid, these men felt, was worth the price of a little inconvenience, many times over. Every man working for the Conservancy District ought to follow their example. Apply to Dr. Smalley or Dr. Sayler. The shots will cost you nothing.

The Camp Overseers have been appointed as local representatives and Assistant Editors of the Bulletin. They will be glad to receive from you any items of news which you think may be of interest.

If any worker at Englewood or Huffman has an automobile which he could make use of as a jitney or motor bus to carry his fellow workers to and fro between Dayton and the job, the District authorities will be glad to co-operate with him in making such an enterprise successful. It is thought that he might add several dollars to his daily earnings in that way. Or he might have some friend in Dayton who could take advantage of such an opening. If you know of anybody who would like such a chance, kindly communicate the fact to the local superintendent at the dam, or to L. F. Wilcock at the headquarters office in Dayton.

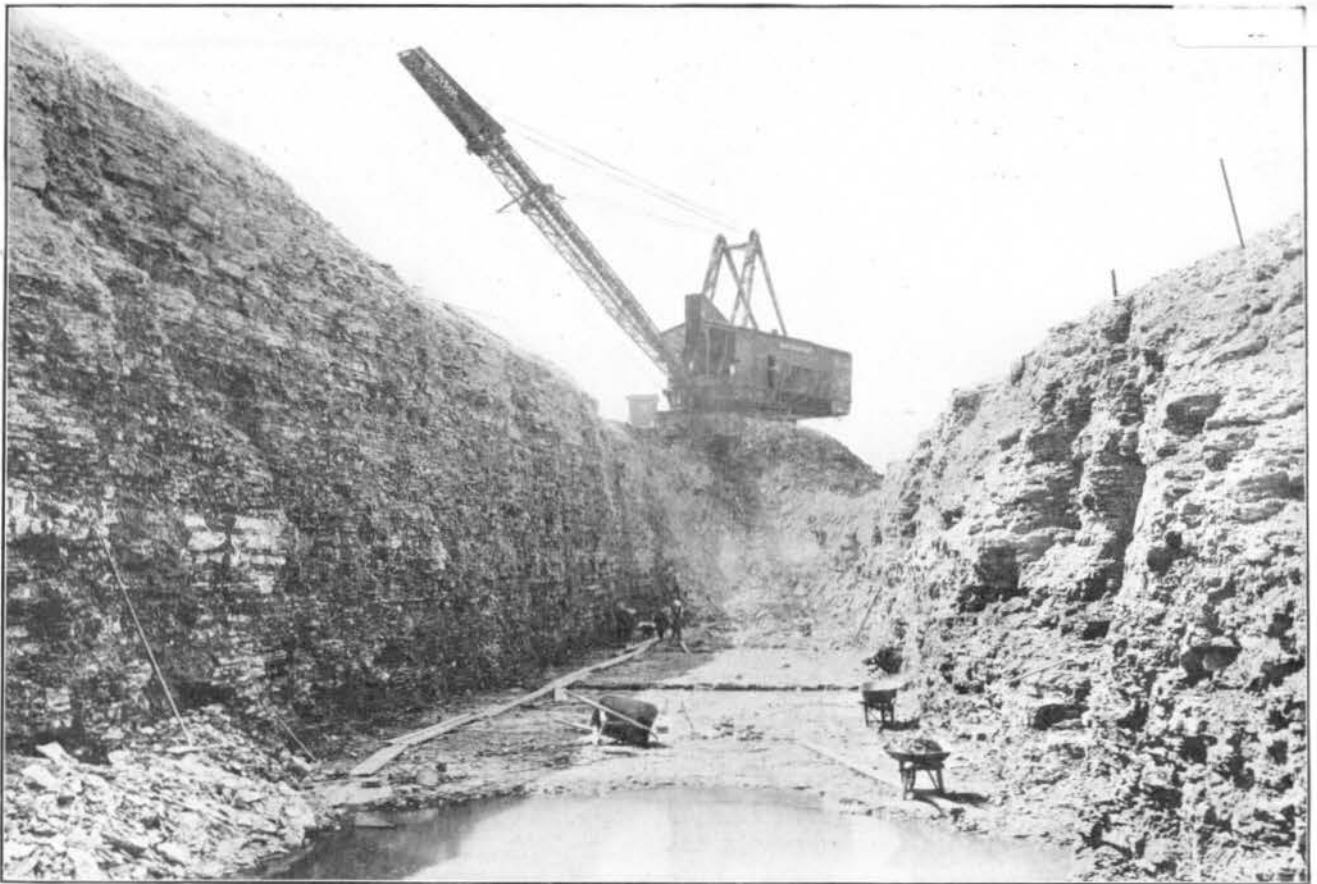


FIG. 35—LOOKING UP STREAM INTO THE EXCAVATION FOR THE OUTLET CONDUITS AT ENGLEWOOD, FROM THE BOTTOM OF THE POOL CHAMBER

The excavation was done by the Class 24 Bucyrus dragline excavator seen above. The rock is Cincinnati shale. The upper layers are dug by the dragline dipper without blasting; the lower have to be drilled and blasted. The flat floor is solid rock free from seams and furnishing excellent foundation. It will permit the floors of the conduits to be flat, instead of being inverted arches, thus saving considerable expense. Excavation is carried to the depth shown in order to provide ample outlet facilities for flood water during dam construction, and thus prevent possible wash and damage to the uncompleted structure. The Stillwater River will come through the opening seen in two large concrete tunnels. It now flows just to the right of the right hand rock wall in the picture.



FIG. 36—LOOKING EASTWARDLY ALONG THE LINE OF THE RAILWAY RELOCATION AT HUFFMAN

The two embankments are the two levees mentioned on page 26. The one at the left will carry the Ohio Electric Railway. It is 20 feet wide at the top, and 35 feet in maximum height. It is built of rock from the railway cut at Huffman Hill. The two levees are about 200 feet apart. The Erie and the Big Four Railways will run in the depression between them. The concrete culvert shown at Fig. 29 passes under all three tracks and both levees, just beyond the trestle seen in the distance. It will drain the country at the right into Huffman basin, which lies at the left.

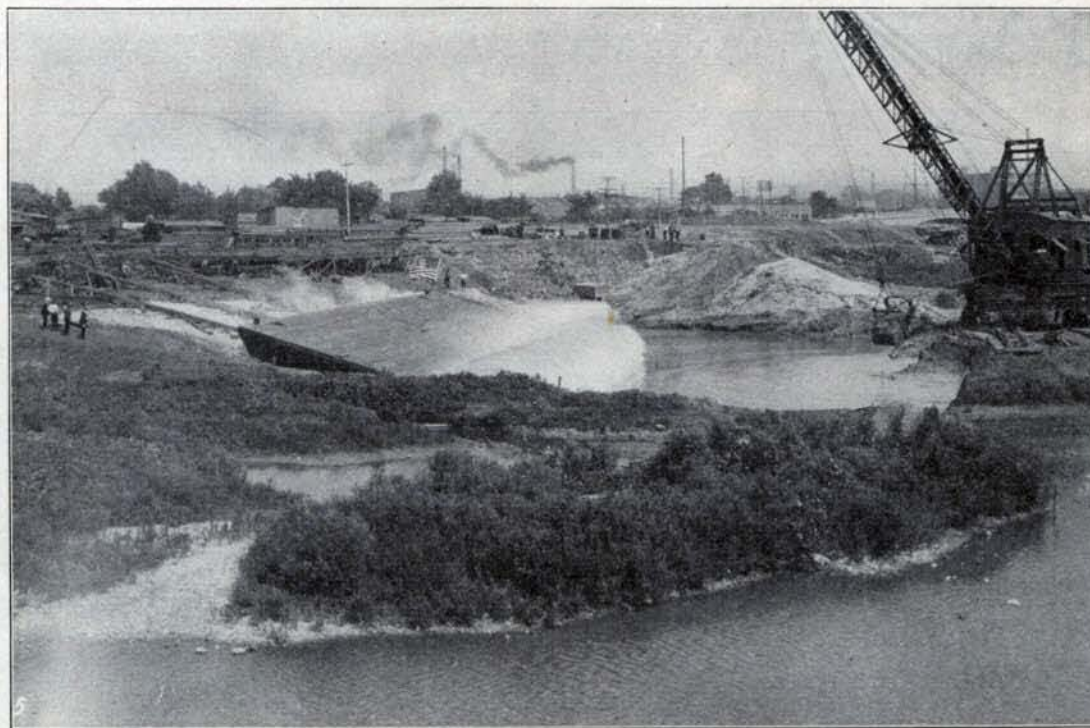
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THE MIAMI CONSERVANCY BULLETIN

LIBERTY LOAN NUMBER

October 1918



LAUNCHING A SCOW INTO THE MIAMI RIVER AT DAYTON

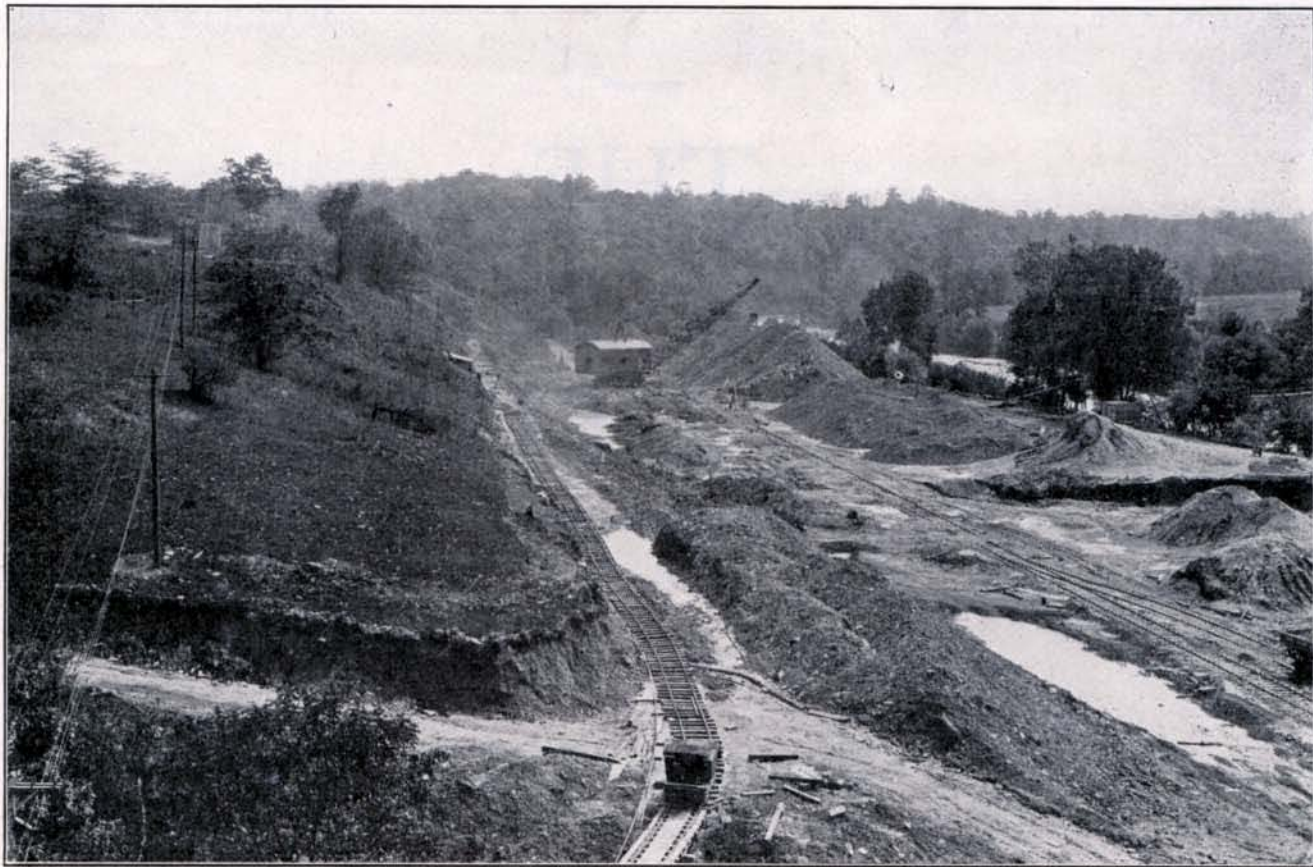


FIG. 38—GENERAL VIEW OF THE GERMANTOWN DAMSITE, FROM TOP OF GRAVEL PLANT

The dragline is excavating for the down stream end of the concrete outlet conduits. The excavated material which is not suitable for use in the dam is hauled away on the track at the right. Concrete for the outlet foundations will be hauled on the track at the left. The conduits will run parallel to the present position of the two tracks. They will be built in a dry trench, whose upstream and downstream ends will then be connected with the present creek.



FIG. 39—LIDGERWOOD DRAGLINE EXCAVATING CUT-OFF TRENCH IN THE MIAMI RIVER

Shows how the dragline adapts itself to river excavation. The bucket is just dropping into the water. The dragline runner has thrown it out as a trout fisherman casts a fly, about fifteen feet beyond the bottom end. In favorable circumstances this distance can be increased to about 40 feet. (The boom shown is 100 feet long). The river here was deepened to a depth of twenty feet. Scene is at Taylorsville.

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THE
MIAMI CONSERVANCY BULLETIN

PUBLISHED BY THE MIAMI CONSERVANCY DISTRICT
DAYTON, OHIO

Volume 1October 1918Number 3

The Fourth Liberty Loan

Today on the soil of France there stand 1,750,000 American soldiers, facing the German Rhine. They are there to fight. They are there to pay the obligation which, in common with you and me, they owe to the America which bred them and brought them up. It is a debt that you and I and every one of us owe to this great land of ours, whose blessings, like the sun and air, have become so common that we forget the obligation they lay us under. But the men in France do not forget. They remember the obligation. They pay* the debt with their blood. They pay it for you and me.

What on our part can we do in return?

We can pay the debt with our money. That is the least we can do. There is a sense of shame which comes at times, I believe, to all of us, to think that

we only pay money, where they over there pay blood. Those men bear wounds for me, endure death for me. What is the trifle that I do, this handful of money I give, for them? I do not even give it. I loan it; I lay it away at profitable interest in the safest treasury vault in the world, against my future needs; while they go down to their graves. It is a wholesome and humbling thought, which ought to be with every one of us, day by day in these times, as we face this fourth call to do the little we can do, the loaning of a handful of money for them to use, while they fight the battle for liberty, which is the battle for us all. It is well for us to dwell much on that thought, and as it comes to us, to cast our money in "without stint or limit" till the victory is won.

The Conservancy Work An Essential Industry

The District Exemption Board with headquarters at Cincinnati has just made a ruling which places the work of the Miami Conservancy District in the class of necessary industries. The following extract from their letter speaks for itself:

"Replying to your letter of September 16th would advise that, after carefully considering the evidence as submitted in your letter, together with copy of

letter of December 6th from the Treasury Department, the District Board will recognize the Miami Conservancy as a necessary industry.

"It will, however, be necessary for you to file an industrial claim for each employee for whom you ask deferred classification, and each case will have to show this man is necessary to the enterprise and cannot be replaced without material loss to the Government and your work."

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Subscription to the Bulletin is 75 cents per year. At news stands 10 cents per copy. Business letters should be sent to L. F. Wilcock, Assistant Engineer, Miami Conservancy District, Dayton, Ohio. Matter for publication should be sent to G. L. Teeple, Miami Conservancy District, Dayton, Ohio.

Getting Together the Equipment

The Crisis Which Developed As the Work Was About to Begin—How Difficulties Due to Heavy Demands on the Machinery and Supply Market Were Overcome.

The work of the District includes two distinct jobs; first, the building of the five great protecting dams; and second, the deepening and widening of the Miami River channel through the cities. Each involves the moving of earth in large quantities. To construct any one of the dams means the digging, transporting, depositing, and compacting of 850,000 to 4,000,000 cubic yards of earth. For the river the figure is more than 4,000,000 cubic yards. Dams and river together will mean the excavation and transportation in all of some 13,000,000 cubic yards.

Last January none of the machinery and equipment necessary for this great task was on the ground. During three and a half years of war, American manufacturers had been engaging more and more energetically in making supplies for the Allies. Our own entry into the conflict had immensely stimulated this activity. Equipment and materials had grown exceedingly hard to obtain and were becoming ever harder. The demand on labor had increased to an equally serious degree.

Thus when the period of construction approached a serious question arose. It had been expected to do

the work in the ordinary manner, by contract. But the conditions just referred to had by this time become so serious that it became practically impossible to get contractors to do the work. The risks were too great. To protect themselves, their bids would have to be so high that it would be better for the Conservancy District to go ahead and do the work on its own initiative. This course was therefore adopted. To aid them the Conservancy Engineers secured the services of Mr. C. H. Locher, a contractor of unusual ability, experience and resource, to manage the construction work.

At the beginning of 1918, then, the Conservancy Engineers and Mr. Locher found themselves quite suddenly in the market for the purchase of machinery and equipment whose larger items alone have since totaled over \$1,500,000. There were pessimists who shook their heads at this. They declared that the machinery could not be obtained, or if it could be, only after long delays and at prohibitive cost. They declared that the entire project ought to be indefinitely postponed.

The Board of Directors of the District, however, after carefully considering the matter from various angles, determined that the risk involved in delay was so great that they ought to go ahead. The project was one of great public importance. It involved the safety of many millions of dollars' worth of property, including many important war industries. In case of another great flood, it involved the possible loss of hundreds of human lives. The Directors had previously put themselves in personal touch with the Priorities Committee of the War Industries Board at Washington and had secured their interest in the project. In December, 1917, Col. Deeds wrote the Secretary of the United States Treasury a frank statement in regard to the financing of the project, and obtained his personal approval in the matter.

The Engineers had put very careful study on the various types of equipment needed. The chief items, as has been indicated, concerned the ma-

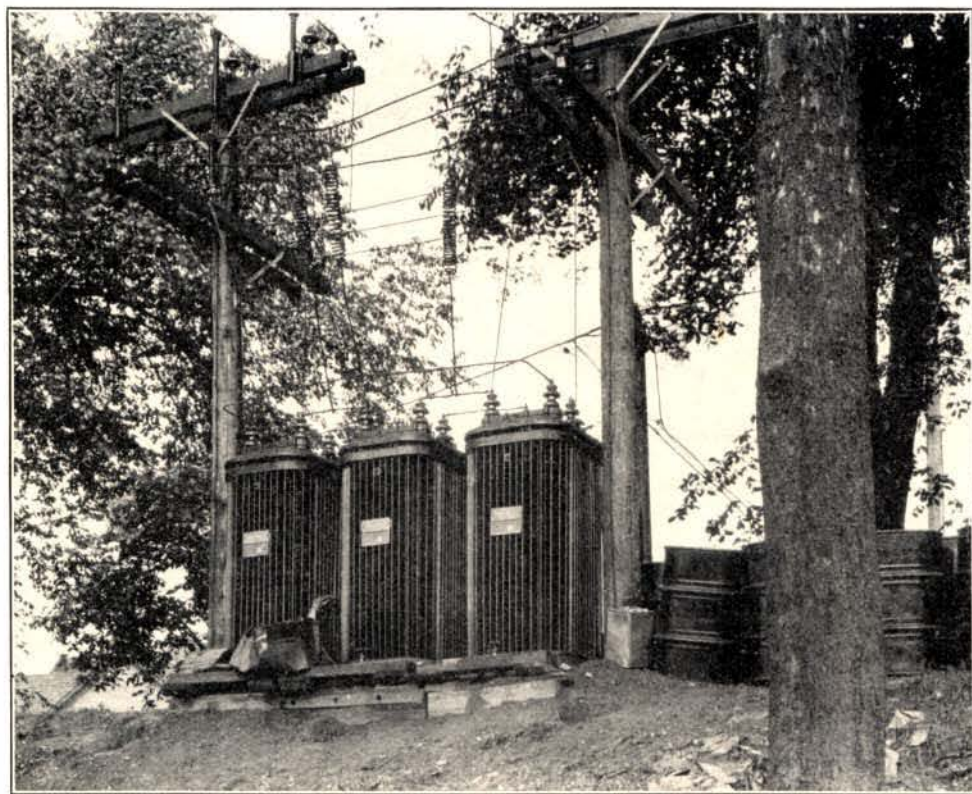


FIG. 40—BIG TRANSFORMERS FURNISHING POWER TO THE DRAGLINE EXCAVATORS IN DAYTON

These transformers take current from the Dayton Power & Light Co., at 6600 volts, and deliver it to another set at 2300 volts. These again deliver it at 440 volts to the machines. The poles, trees, and gasoline barrels give a measure of size. The transformers will deliver 600 kilowatts (806 horse power) of electrical energy.

chinery for excavation and transportation. In excavating machines they had, broadly speaking, the choice between draglines, steam shovels, and dredges. Under certain conditions, several of which were present in connection with the Conservancy work, the hydraulic dredge furnishes the cheapest and most efficient method of excavation. By this method of construction, the earth, together with about ten times its volume of water, is picked up by the suction pipe of the dredge pump, and the mixture pumped to the point desired, where the water is permitted to run away, leaving the earth behind it. For filling wide, flat, low areas adjoining streams or lakes, and where the material is suitable, no other method equals this. Its advantages are so great that in modified form, in what is known as the method of "hydraulic fill," it has been applied to earth dam construction. In this application it is one of the latest developments of engineering science, making not only a cheaper dam but a better one. For these reasons the dredge pump has been chosen for a considerable part of the embankment work.

For the greater part of the excavation, however, the dragline excavator was chosen. Something of the history and advantages of this machine, which is also a development of recent years, will be given elsewhere in this issue. It was chosen for its great flexibility, wide range, long reach, and its ability to dig efficiently and cheaply either in water or out of it, and at a level far below that on which the machine stands. Another reason was that after the work is done, the dragline equipment, costing hundreds of thousands of dollars, can be easily disposed of, and its cost thus largely salvaged.

It was determined to secure for most of the work electric draglines. Steam machines involve the problems of transporting coal, and of loading it into the machines while they are operating, which interrupts work. Moreover, the Dayton Power and Light Company had just completed a new station furnishing ample electric power, which could be carried over transmission lines to all parts of the District.

The electric dragline being a new type, it was possible to get track of practically every one that ever has been built. The principal manufacturers are the Lidgerwood, the Marion, and the Bucyrus Companies, and machines of all these makes were obtained. Several partly built Bucyrus steam draglines were altered so as to use electric power, while they were in the shops. Several second-hand machines in good order were also secured. By a thorough search, which uncovered practically every electric dragline which was in use or building in the



FIG. 41—A BIG DRAGLINE USED AS A DERRICK

The machine itself is not seen; only the bucket, hanging in midair, with cables hung from one corner which carry a big alternating current transformer. The transformer has just been lifted by the dragline out of the five-ton truck below, and will be swung into position at the point where it is to be set up.

United States, a sufficient number were secured of all the various sizes necessary.

The search for these machines is itself a story of great interest, too long to be more than suggested here. To inspect one of the big Bucyrus machines now at Hamilton, Fowler Smith, the Purchasing Agent of the District, and "Big Bill" McIntosh, the Master Mechanic, waded through four feet of January snow in northern Michigan, where the drag-

line had been working in an open mine. To get it to the railway a gang of men shoveled snow six feet deep for four days, and for a distance of a quarter of a mile, with the thermometer thirty-five degrees below zero. The three Lidgerwood machines were also dug out of snow in much the same sort of weather, on the drainage canal near Chicago. Two other draglines, and these among the largest ever manufactured, were dragged out of the swamp in southeastern Mississippi. Such difficulties, whether physical or of other kinds, were never allowed to stand in the way. The search was indeed pursued so vigorously that the engineers found they had one more dragline than they needed; but this caused no worry, since to dispose of a spare dragline was a very easy matter.

In all, eighteen draglines were bought at a total cost of about \$425,000, and are now at work. Eight of these use steam. Where a dragline, as in some

the end to the American Locomotive Works. Six small 3-ton gasoline locomotives of twenty-four inch gage, for hauling concrete from the mixers, were obtained from the J. D. Fate Co. A second-hand 18-ton Porter saddle-tank engine was also bought, making twenty locomotives in all.

To go with these, 81 standard gage 12-yard Western dump cars were secured, and eight of the 4-yard size, and of 3-foot gage. For the concrete a dozen 1½-yard hopper cars were bought.

Dredge pumps proved a harder problem, the few firms engaged in their manufacture being busy with war work. Fortunately these were not immediately needed. They were finally obtained from the United Iron Works and the Byron-Jackson Co. of San Francisco, and the Morris Machine Works and the American Manganese Steel Co. in the east. It is worth noting that the Pacific coast people, although so much farther away, have beaten the eastern firms

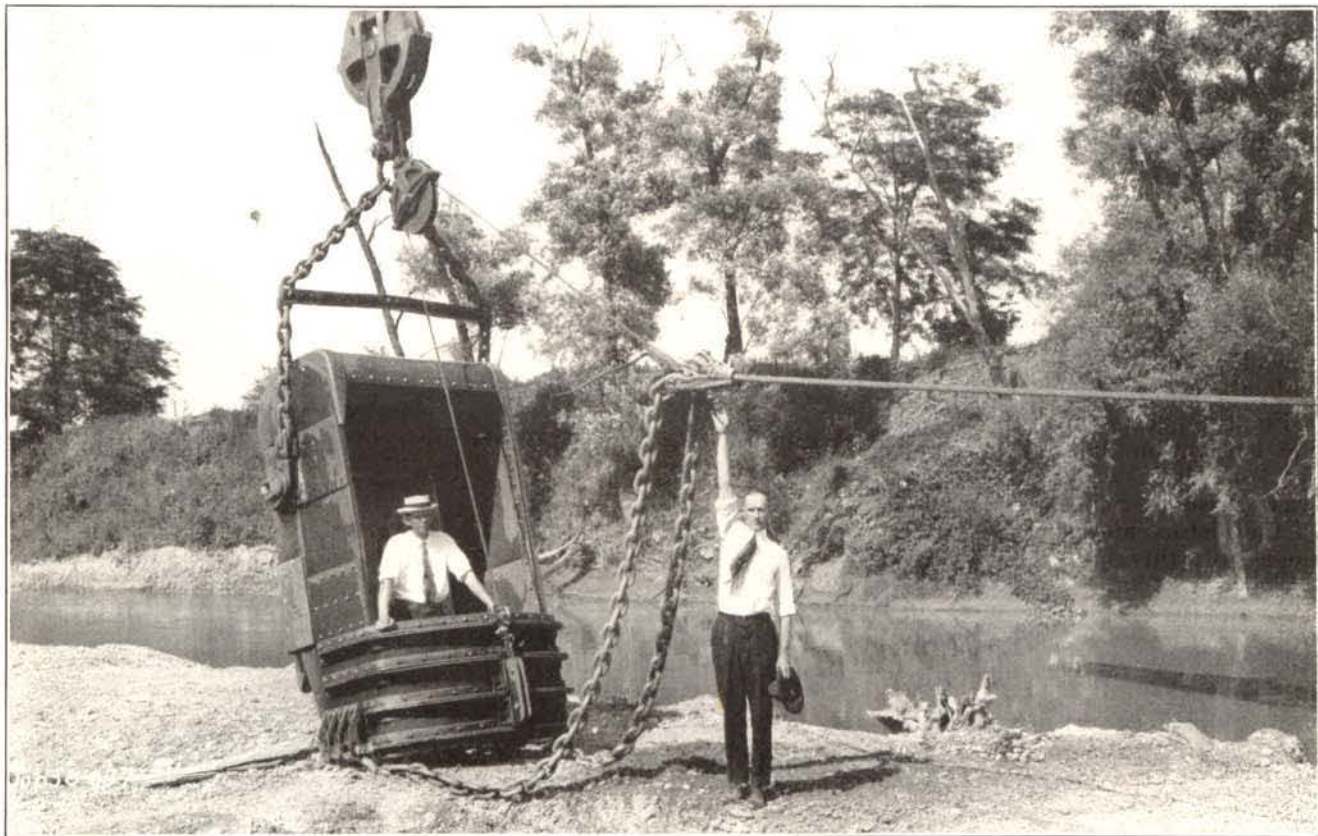


FIG. 42—4½ YARD BUCKET OF THE BUCYRUS CLASS 175 DRAGLINE AT HAMILTON

The same bucket shown in figure 43. The men are tall men. The picture shows clearly the attachment of the two cables, the loading cable at right, and the hoisting cable, barely seen, passing round the big pulley at the top. The bucket is standing on its nose, held erect by the hoisting cable.

cases at the dams, does a good deal of moving about, it is better if it can carry its own power. Moreover, to have waited in all cases for electric draglines would have delayed the work.

Locomotives and cars proved comparatively easy to secure. The engines principally desired were the forty and fifty-ton sizes of the standard gage, saddle-tank type. These, rather curiously in the present state of the machinery market, were not in great demand at the time, and there was sharp competition among the locomotive men for the Conservancy business. The order, for thirteen engines, went in

in shipment, their machines being already on the ground and sufficient in number for the present need. Water pumps have been furnished by the Cameron Pump Works, the Allis-Chalmers Co., and the Gould Co., the latter supplying the five units needed for camp water supply. All of these pumps use electric power.

To carry water for the hydraulic fill at the dams some 12,000 feet of steel pipe will be required. About half of this has been obtained from the American Rolling Mills at Middletown, Ohio. The remainder came from the Thompson Iron Works and

the American Spiral Pipe Co., the latter for the high pressure lines connecting with the "giants" used in the hydraulic fill. About eight miles of cast iron pipe was also bought for the water supply to the various camps.

The five gravel washing plants, needed for the concrete work at the dams, there was no special difficulty in obtaining. Various manufacturers suggested layouts, the one presented by the Raymond W. Dull Co. being finally adopted, a design practically uniform at all of the dams. The concrete mixers connected with these plants were purchased from the Smith Co. of Milwaukee.

More trouble was anticipated in getting the electrical equipment than with any other, but by persistent search and following up of orders, it has been obtained as rapidly as it has been required for use. This was due in large part to the hearty co-operation of the local agents of the large electric manufacturing companies. The Dayton Power & Light Co.

also helped greatly by arranging for special power lines. These have been extended from its system to all the large centers of activity in the Conservancy District. This company has also loaned motors and transformers to the District to help tide over needs which could not be met immediately by manufacturers, the Conservancy Engineers having had a closer call on this equipment than on any other.

The determination of the Conservancy Engineers and Directors to go ahead, in spite of the equipment difficulties, has been thus amply justified by the outcome. When the needs of the District were properly brought to their attention, manufacturers and dealers have been friendly in filling them. The problems have been to obtain just the equipment wanted, to get it quickly, and at a reasonable price. They were very live problems, to solve which took the greater part of the time of Charles H. Paul, the Assistant Chief Engineer, and C. H. Locher, the Construction Manager, for three solid months.

Steam Shovel Versus Dragline

The Advantages of Each, and Why the Dragline Was Chosen for Most of the Conservancy Work.

Among the most important and effective machines at work in the Conservancy District are the dragline excavators. They have cost more money, and are staged to do a bigger share of the work, than any other single type of mechanism. There are eighteen of them now operating, all but one owned by the District, and costing a total of about \$425,000—more than a quarter of the total investment in large equipment since the work began.

Something was said in the article on equipment as to why these machines were chosen, and it may be of interest to go more fully into the matter.

There are many types of excavating machines, of which the best known is no doubt the steam shovel. These machines can now be bought in a great range of standard sizes, from the smallest, such as are used for cellar excavation or light grading, to a huge machine with a boom sweeping a radius of 100 feet or more, and carrying a dipper that will hold five wagon loads of earth.

In its own field nothing can surpass the steam shovel. It is compact, powerful and fast. It will work in all kinds of soil—even rock if not too solid. It has, however, some disadvantages. Its reach is very limited. It cannot, unless especially constructed, dig far below its track or place earth far above its base. This difficulty is inherent in the mechanism, as a study of Fig. 44 will show. The dipper, which appears thrust out over one of the cars, is carried at the end of an oak and steel dipper handle. The dipper handle works through a slot in the projecting boom, the two together forming a sliding and jointed mechanism which works much like the human arm. The dipper is the cupped hand, the dipper handle the forearm, the upper part of the boom the upper arm, the elbow being the wheel which shows at the center of the boom. If the human forearm were telescoped so that it could be lengthened and shortened, the parallel would be very close. The boom being fixed in position with

respect to the steam shovel platform, the depth of digging is determined by the length of the dipper handle, and becomes a maximum when the dipper is directly under the wheel referred to. The excavating in fact is done as the dipper swings out and up from this position, on the wheel as a center. The marks of the dipper teeth in the bank at the left in the picture show this motion.

It will be clear by a little study that such a machine is not adapted to deep digging. It is efficient only on such a job as it is working at in the picture—digging away a bank, as in a railway cut. There it is very efficient. That is why nine of them are at work on the Conservancy railway relocation. But it cannot reach the bottom of a ditch or river. To excavate in water it must be mounted on a scow and set afloat. Then it becomes a dipper dredge. Even when transformed into a dredge, however, it is subject to the same limitation—it cannot dig deep, nor reach far out.

Just there lies the great advantage of a dragline excavator. This machine works on a totally different principle. It is a development of the slip scraper, with steel cables and steam engines in place of man power, leather tugs and mules. Imagine a very heavy slip scraper hung at its rear end by a cable from the upper end of a projecting boom (see figure 43) and with a second cable attached to the front end of it in place of a team, both cables running back around drums on the same revolving platform which carries the boom, and you have the essentials of a dragline excavator. The first is the **hoisting** cable; the second the **loading** cable.

How it loads its bucket is shown clearly in figure 45. There the loading cable, at the right, is pulling the bucket toward the machine. The hoisting cable, above, lifts on the rear end just hard enough to tilt it up and cause the cutting edge in front to dig into the earth and fill the bucket. By adjusting the pull on the hoisting cable, the bucket can be tilted at any

desired angle to take its load. In figure 43 a loaded bucket is shown just coming up out of the water. This figure shows clearly also the ingenious bridle rope used while hoisting the bucket, to keep it from turning upside down, as explained under the figure.

The wide reach of a dragline bucket is clear at a glance. The steel boom in the last figure is 100 feet long. A similar machine in Dayton will carry a boom 135 feet long. Standard machines of this type are built with booms 150 feet long. The lower end of the boom is at such a distance from the center on which the dragline platform swings that the bucket can be dropped vertically from the boom end to a distance from the center of rotation a trifle greater than the length of the boom—in the last instance 150 feet. This means that this drag line can drop its load anywhere inside a 300-foot circle (except, of course, in the small circle the machine itself stands on). But a skillful operator can do better than this, and does so often in practical operation. By drawing the bucket close up with the loading cable, and then giving it a strong pull and quick run out and up

with the hoist-cable, while the other runs loose, he can throw it from ten to forty feet beyond the boom end, the principle being the same as that by which a trout fisherman casts a fly. Figure 39 shows this. The bucket, after its quick run up and out, appears just in the act of striking the surface of the river. It is probably fifteen feet beyond the end of the boom. The picture was taken at Taylorsville. The dragline on that day was dredging in twenty feet of water, having already excavated ten to fifteen feet of river silt, for the cut-off trench, which here crosses the river. Greater depths could be reached if necessary, the depth varying with the material, size of machine and topography. In clay a machine of the size shown can excavate to a depth of 35 to 40 feet below the ground it stands on; in looser material, like the silt in question, considerably deeper. The machine in the picture had just reached hardpan and could go no deeper without blasting.

The advantage of the dragline over the steam shovel in reaching wide and deep is very marked. No steam shovel of such a size could possibly stand



FIG 43—DRAGLINE BUCKET COMING UP FROM BOTTOM OF THE MIAMI RIVER WITH A LOAD

This is at Hamilton. The bucket is being pulled toward the machine, mouth foremost, by the loading cable, (the horizontal cable). Inside the house the other end of the cable is winding up on a steel drum hitched to a 250 horse power electric motor. The hoisting cable (at the left) is just beginning to hoist the bucket into the air.

Notice the bridle cable running from the nose of the bucket up over the small pulley and down to the loading cable, and how it keeps the nose of the bucket thrown up in the air, so as not to spill the load as it is hoisted (operating like the check rein on a horse). When ready to dump, the loading cable, heretofore taut, is let run, the bucket front drops mouth down, and the load drops out.

on the shore like the Lidgerwood just looked at, and touch even the water below its boom end, to say nothing of going beyond the boom and down to the bottom. To increase the advantage, the dragline has a boom much longer than the steam shovel of corresponding bucket capacity. The Lidgerwood boom just noted is 100 feet long. The corresponding steam shovel boom is 60 feet long.

done, the combination being facilitated by the fact that both steam shovels and draglines use three sets of engines or motors to produce the various motions needed. By substituting a steam shovel boom and dipper for the dragline boom, bucket and cables, the dragline is converted into a steam shovel. The Class 36 Marion Draglines used on the Conservancy work are combined machines of this type. For road



FIG 44—MARION MODEL 36 STEAM SHOVEL EXCAVATING THE EAST BANK OF THE MIAMI AT TAYLORSVILLE

The process is described in the text. See page 39

For river and levee work the dragline is, taken all round, the best excavator known. Its flexibility and wide range are highly advantageous. If it cannot reach material from the bank, it can go out into the river to get it. If necessary it can go on to the other side. It does this by pushing a peninsula out from the bank into the stream ahead of it, built of material which it scoops out on each side, and drops in place. It then picks up its timber "mats," or platforms, on which it travels, lays them down in front, hooks its bucket into the river mud in front, like a ship anchor, and pulls itself ahead out onto the peninsula. Arrived at the tip, it reaches back and scoops up the earth of the peninsula neck, which it deposits in front, leaving itself perched on an island in mid stream. From this point of vantage it excavates the bottom in reach to the desired depth, and then pushes on across, building the island on ahead, and picking it up behind, till it reaches the farther shore. The powerful draglines working in Dayton have crossed the Miami River in this manner several times.

For excavating in a bank or cut, however, a steam shovel is superior to a dragline. The dragline can do the work, but not so well. The steam shovel dipper being mounted on a compact solid arm can swing and dig more quickly. Each machine having thus its superior points, it would clearly be a good thing to combine the two. This has in fact been

building and railway building they have been used as steam shovels; for gravel pit and river work, they have been used as draglines. Another advantage of these machines is that they are mounted on caterpillar traction, such as is used by the tanks along the battle lines in France. The essential feature of caterpillar traction lies in the two moving platforms, one on each side, on which the machine travels, and which are the substitute for wheels. These give so broad a bearing that such a machine will travel without miring or stalling even in a soft, wet marsh. No track has to be laid in front of these machines or picked up behind them. They are ready to move at any time by throwing a clutch and opening a throttle.

An advantage of the dragline not mentioned is that by means of its transportation by car or barge is often obviated. The material instead of being loaded on a car or barge is dropped by a dragline in a heap as far as possible in the direction in which it is desired to carry it. The dragline then walks around the heap to the other side, picks it up again bucket by bucket, and drops it where it is wanted. The reach of the dragline, as explained, being so wide, a large size machine, such as many of those in the District, can thus by twice handling the material, deliver it at a point four hundred feet or more from its original position. Along the Miami River this method is

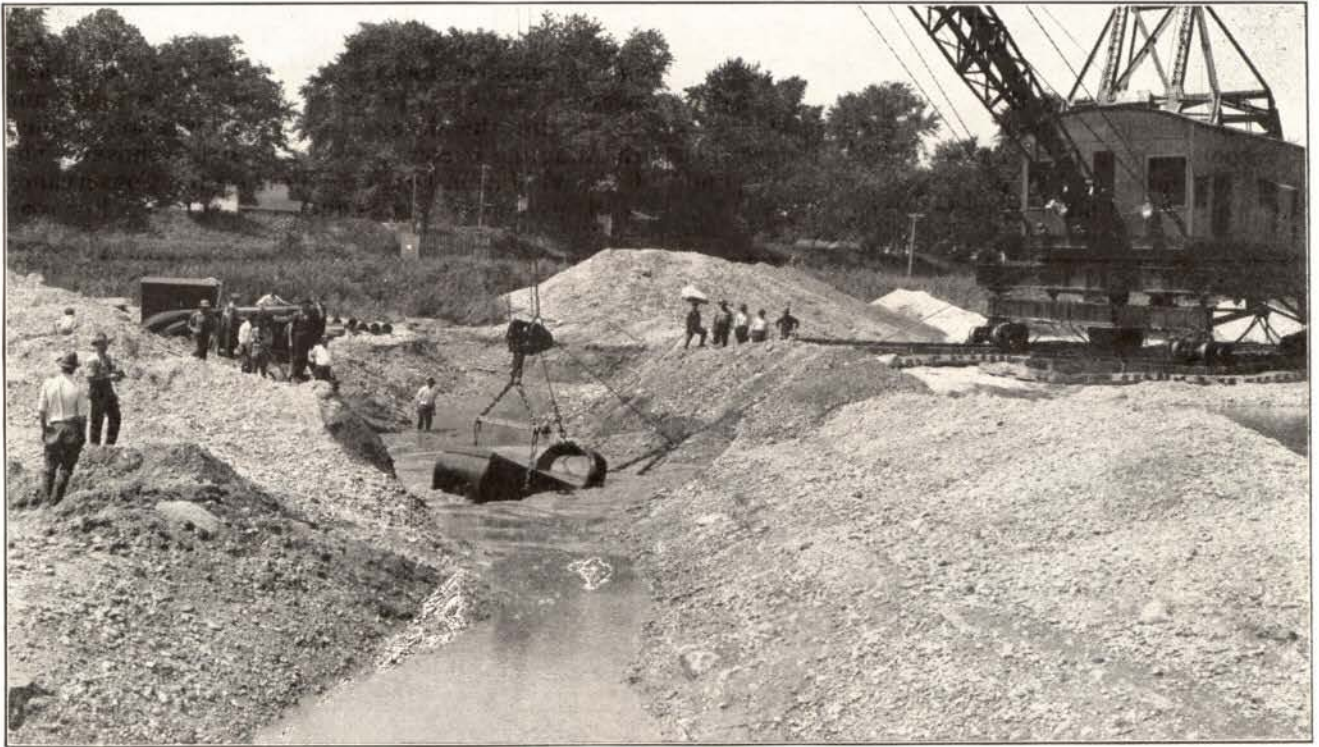


FIG. 45—DRAGLINE DIGGING A TRENCH IN THE BED OF THE MIAMI RIVER AT DAYTON

Shows clearly how the bucket loads. The loading cable (at the right) is pulling it toward the machine. The hoisting cable (above) lifts on the rear end just hard enough to tilt the lip (not seen, being under water), and cause it to dig in and fill the bucket with earth. By adjusting the pull on the hoisting cable, the bucket can be tilted at any desired angle to take its load. The dragline will build a dam on each side of the trench, and across it at the river end, with the excavated earth. An electric pump (the motor being in the little house at the left) will then pump out the trench water, and pipe will be laid in the trench bottom to carry compressed air across the river.

being largely applied. The long bank of earth, extending up the river from Herman Avenue Bridge in Dayton, is an excellent example. The dragline travelled down the river, deepening the channel along the west edge, picking up materials from the river bottom on one side and dropping it eastward in the bank on the other. Arrived at Herman Avenue Bridge, this dragline will pass around the end of the bank and travel up stream on the other side of it, picking up earth from the bank and depositing it in its final place still farther eastward.

It will be clear from a consideration of the foregoing why the dragline was chosen for so much of the

work in the Conservancy District. Whether at the dams or in the river, much of the excavation had to be carried on below water level, either in the river or in the borrow pits along the valley bottom, in places which a steam shovel could never have reached. Moreover, the material as a whole had to be moved farther than a steam shovel could move it. The dragline has thus been the main excavating mechanism relied upon. For the railway work and in part of the work at the dams, it is supplemented by the steam shovel, where the latter has the advantage in speed, as has been above explained. For placing the hydraulic fill in the dams, it has been supplemented also by the dredge pump.

Organization of the District for the Liberty Loan

Organization of the Conservancy Committee for the Fourth Liberty Loan was effected on Wednesday, September 18, at the Headquarters Office. The drive will be in general charge of G. H. Matthes, Office Engineer, and L. F. Wilcock, Assistant Engineer. These two will also handle personally the work in Dayton. One or two committeemen, appointed to direct the work at each construction camp, on the railway relocation, and in Hamilton, will give any information necessary. Their names will be found at the foot of the advertisement on the outside back cover page of the Bulletin. The Conservancy drive will fall in line with the work of the local authorities everywhere. Germantown,

Englewood and Taylorsville camps will work with the Montgomery County Committee. Similarly, the Huffman camp, and Mr. Sprague at Osborn, will co-operate with Greene County, Lockington camp with Shelby County, and the Hamilton office with Butler County. Joint meetings will be held, at which county committee speakers will address the men at the camps; and each township will receive and handle the funds, and receive credit for the work done, at each Conservancy center within its limits.

At the same time the Conservancy drive, while interlocking with all others, will keep its own separate organization, receive and distribute its own reg-

ular reports from all its locals, keep a tally sheet of every Conservancy contribution, and properly accredit each to the source from which it comes. There is going to be a friendly race, a handicap race, based as it ought to be on the payroll, in which every Conservancy center is going to be a contestant. The relative standings will be bulletined every day at every center. Every committeeman in the District is going to buckle down to see that his camp wins. Lockington led the bunch on the War Chest fund. With this scheme working, we feel safe in predicting that it will have to go a lot faster if it expects to win on the Liberty Loan. Englewood has carried a chesty swing for some time over its

pep on construction. It will have to steam up on Liberty Loan or get left. There is hard work ahead—and loads of joy for the spectators.

Hearty acknowledgments are due Mr. Bernis Brien, Liberty Loan Sales Director for Montgomery County out of Dayton, for his inspiring aid. Messrs. Matthes and Wilcock are going into the work with energy and the campaign opens with many signs of promise. Chief Engineer Morgan, Mr. Paul, the Assistant Chief, Mr. Locher, the Construction Manager, and Mr. Kuhns, the Secretary of the Board of Directors, have all pledged not only their heartiest co-operation, but their funds to the limit.

September Progress on Conservancy Work

GERMANTOWN

During the first half of the month the coal unloading hopper was completed and put into operation. The motors were set in the concrete plant and final adjustments made to the machinery. The plant is now ready for operation. The excavation for the outlet works has progressed throughout the month, the portion for the lowest part of the hydraulic jump being completed. As an average 750 cubic yards of material have been moved per day.

Work has been carried on throughout the month on the roads, but the excessive rains have put them in very poor condition. A rainfall of 3.75 inches has been recorded between the first and 18th of the month.

Carpenter work on the camp cottages has been 95 per cent completed and the coal sheds are nearly completed. Most of the cottages are occupied. The schoolhouse has been built and will be ready for occupancy in another week.

A piano has been purchased, for use in the community house, by a donation from the employees.

A. L. Pauls, Division Engineer.

ENGLEWOOD

The conduit excavation by means of the dragline has progressed to a point about 100 feet beyond the center line of the dam. This means that the excavation for this structure is considerably more than half done.

Concreting has progressed steadily and the bottom and steps of the main pool at the outlet are about completed. Forms for both weirs at the outlet, and for conduit sidewalls are being erected.

The 48-in. pipe line from river to sump for hydraulic pumping, together with wet well, sluice gate, etc., are completed.

One dragline is excavating in the main borrow pit and another is spreading material in the end dam to retain the hydraulic fill.

The blanket of impervious material on the upstream side of the dam, contracted for with Ward Bros., is completed.

The work on cottages, camp roads, etc., is nearing completion.

A track has been graded for bringing impervious material to the end dam from the spillway excavation.

H. S. R. McCurdy, Division Engineer.

LOCKINGTON

The present season's work at Lockington is centered on the concrete outlet works, through which Loramie Creek will flow when the dam is finished. Progress on this is satisfactory. The Class K Lidgetwood electric dragline has excavated 65,000 cubic yards of earth and gravel, laying bare the bed rock for most of the concrete outlet foundations. About two-thirds of this material is gravel, which has been stored in a pile to be used in the concrete, of which there will be about 38,000 cubic yards. The gravel washing plant is completed and gravel is being washed and screened for use in concreting the foundations, now in progress. The first concrete was poured August 10 at the upstream end of the inlet channel. Up to September 23 about 2,500 cubic yards had been placed, the largest single day's run being 182 cubic yards. This was in the retaining wall. Movable wooden forms, in panels 27x16, are handled by two guy derricks with 120-foot masts and 100-foot booms. Concrete is hauled in bottom dump buckets on small flat cars by a gasoline dinky. Bed rock is grouted before concrete is poured on it to insure against fissures or cavities.

To protect the construction against possible high water a levee has been built north of the entrance channel. Machinery for repair shops has been installed. Electric power is supplied from Piqua and Dayton.

B. M. Jones, Division Engineer.

TAYLORSVILLE

The installation of the dredge pumps and the water pumps, to be used for washing down and sluicing the material for the hydraulic fill, is well under way. The pumps are expected to be in operation within a month. The end dam next the west bank of the river, for retaining the hydraulic fill, is progressing favorably. The fill can be started as soon as the dredge pumps are ready. The excavation of the cut-off trench on the east side of the river is well begun, and the dragline now engaged upon it will soon be at work on the cofferdam for the outlet conduits. The bins for the gravel washing plants are nearly completed and the installation of the machinery can be started soon. The sewer and water systems for the camps, including the sedimentation tank, have been completed, and are in full operation. A camp telephone system is also

nearly complete. Five new cottages have been built to supply the increased demand, and the hospital and schoolhouse are progressing. One thousand feet of permanent road and 800 feet of temporary road have been constructed.

O. N. Floyd, Division Engineer.

HUFFMAN

All the buildings and other features in the original plan for the Huffman Camp have been completed, and all occupied with the exception of a few cottages that are reserved for employees who are coming to the job in the near future. Three cottages have been added to the original plans and are under construction.

All preparations for beginning work on the outlet works have been made, so that actual work can be started within a few days after the Big Four Railroad tracks are moved to their temporary relocation. The gravel washing and screening plant for the 42,000 cubic yards of concrete required has been built. The large electric dragline, that will make the 180,000 cubic yards of excavation for this con-

crete work has been erected, and the construction tracks for the disposal of the excavated material have been laid.

A part of these concrete outlet works will be placed in the present bed of Mad River, so that it has been necessary to divert the river channel for a distance of 2,000 feet. The diversion channel required the excavation of 24,000 cubic yards. This has been completed. 10,000 cubic yards of material has been placed in earth dikes across the old river channel above and below the location of the outlet works, and along the river bank, to protect the work from high water during its construction.

Nine thousand cubic yards of material have been excavated from the cut-off trench. This material has been assorted and placed in its proper place in the permanent embankment for the dam. 3,300 cubic yards of additional selected material has been placed as rolled embankment to form an impervious blanket under the upstream half of the dam.

Twenty-two thousand cubic yards of soil stripping have been removed from the base of the dam.

C. C. Chambers, Division Engineer.

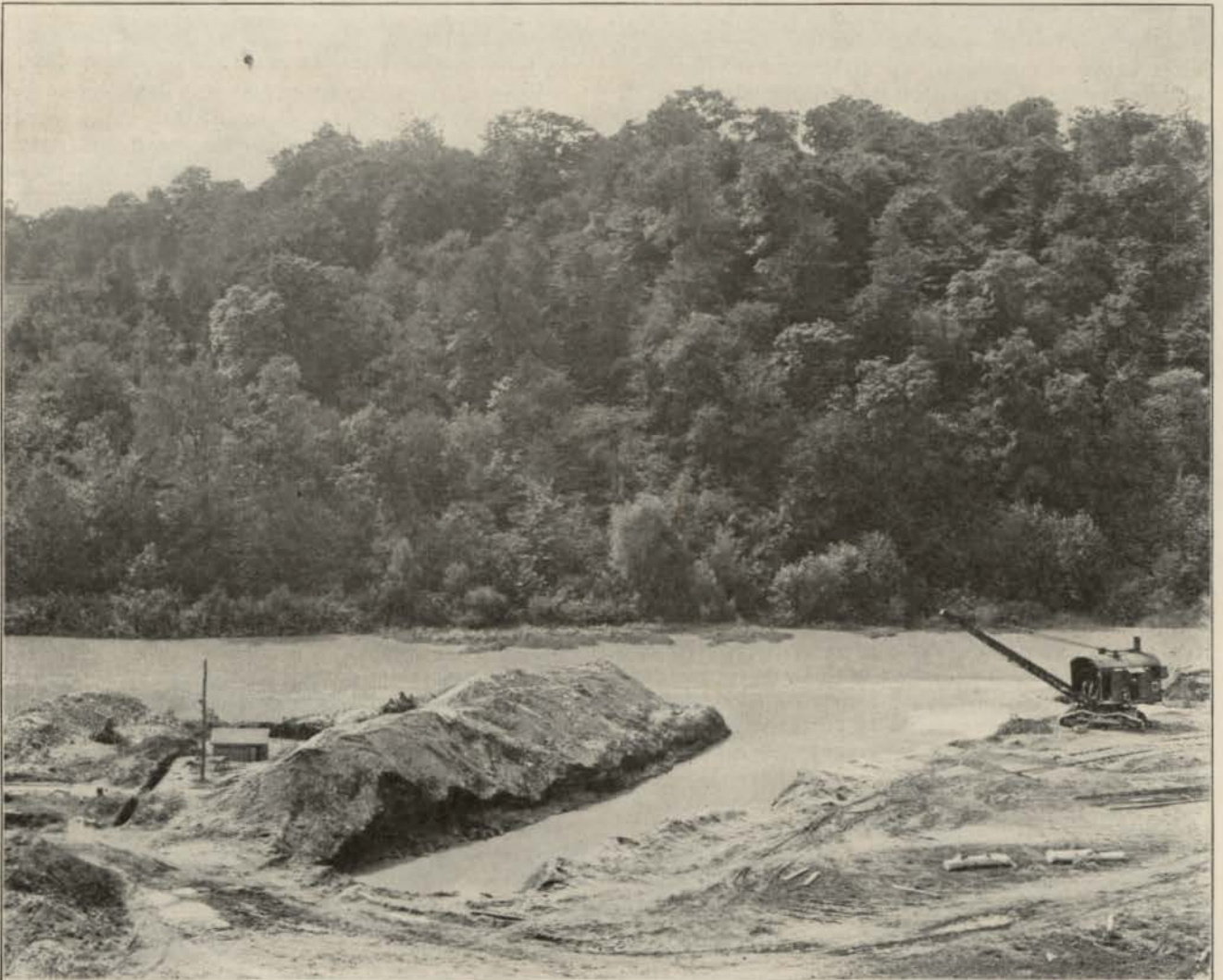


FIG. 46—ENTRANCE TO NEW CHANNEL FOR TWIN CREEK AT GERMANTOWN

Showing where the creek will run after the dam is completed. The stream appears still flowing in its old bed, just beyond. The excavation for this was made just at this time in order to get gravel for the concrete of the conduits. The work of excavation thus serves a double purpose.

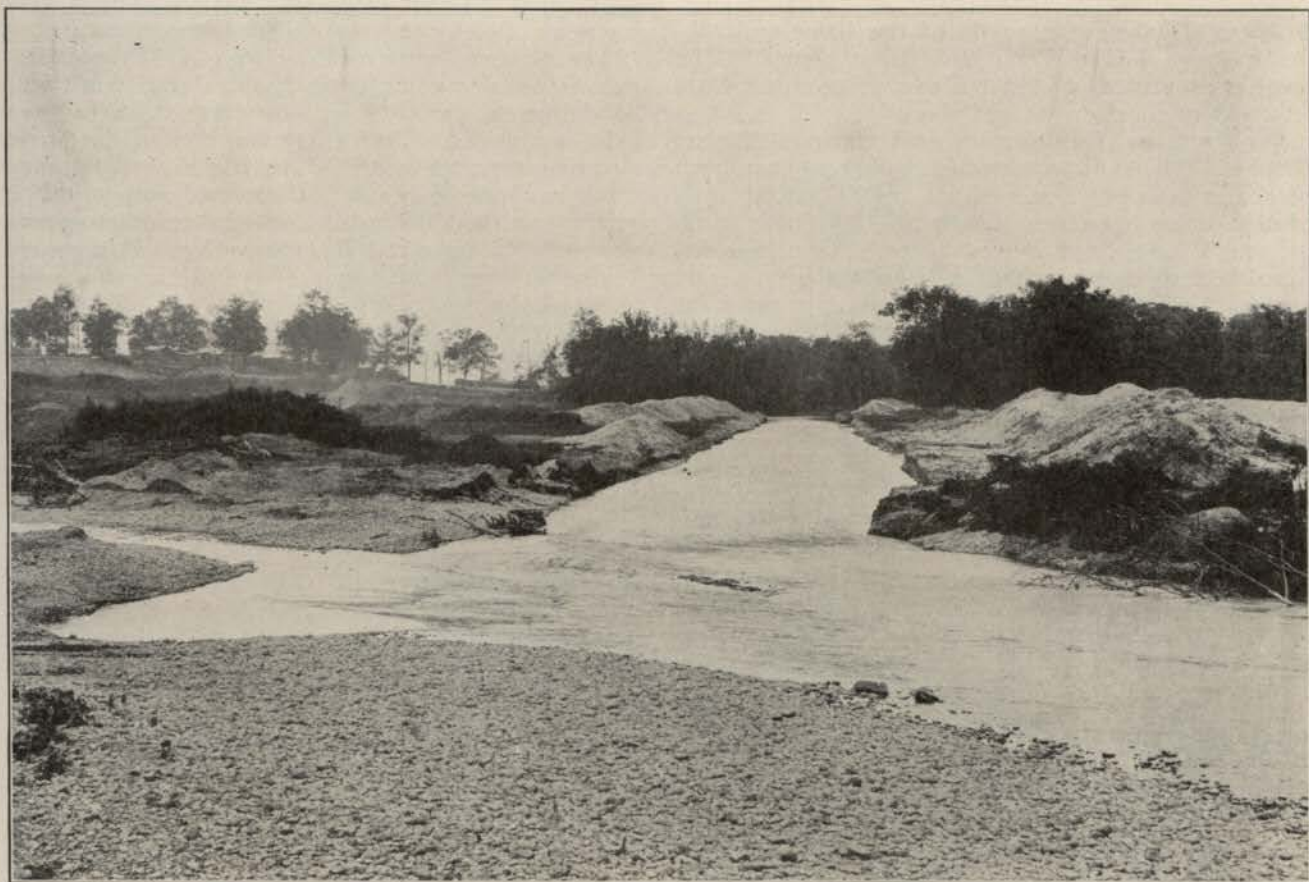


FIG. 47—THE DIVERSION CHANNEL AT HUFFMAN

The concrete outlet structure being best located in the bed of Mad River, the stream had to be diverted in order to permit its construction. A new river bed was dug by one of the big Lidgerwood dragline excavators, and the stream turned into it. The result appears in the center of the picture. The river at the right still keeps its original channel; then turns and flows straight away down the new bed as seen. The narrow inlet at the left marks the old bed. The banks of earth on each side were dug from the new bed.

HAMILTON

The old Fort Hamilton Mill building has been cleaned out and remodeled for an office. This work was begun on March 23 by the F. K. Vaughn Building Co. and completed on April 9. Four large rooms were partitioned off and part of the building is used as an electrician's shop. This building is centrally located just south of the Monument and makes a very convenient office. The brick livery stable, just south of it, formerly occupied by Ross and Jenkins, has been equipped as a warehouse, shop and garage.

The first equipment for the Hamilton job, consisting of part of the Class 24 electric dragline, arrived on March 24, and the work of unloading and erection was begun at once. Erection was done entirely by hand. The machine started moving June 8 and began actual excavation on June 24. Since then it has dug a channel one mile long, 45 feet wide on the bottom and from 5 to 20 feet deep, having moved a total of about 130,000 cubic yards.

The first construction work was on the electric power transmission line, on March 18. It was completed and the power turned on and tested on June 7. The power is obtained from the Champion Coated Paper Co. The line crosses the river opposite Vine Street and runs down the east bank to a point opposite the north end of Riley's Island, thence crosses to the island and continues to the south end

of same, a total length of 3.1 miles. About 50,000 feet of No. 2-0 copper wire was used.

Erection of the Class 14 Bucyrus dragline was begun about June 1. Since its completion this machine has graded an area of about 100 feet by 500 feet for storage yard, built about 3,000 feet of railroad embankment from 10 to 18 feet high and built about 700 feet of levee and diversion channel for supplying water to the O. E. power station, the former supply from the river having been cut off by the work of the other dragline in lowering the river.

Work was started on the Buckeye Street sewer on August 8. This is a concrete sewer with a vertical diameter of 5 ft. 8 in. and horizontal diameter of 5 feet; depth of trench about 25 feet. Concreting was begun on August 24, the outlet walls and 40 feet of arch being now completed. About 200 feet of trench have been dug to grade, this being the most difficult section, as it passes under the Hamilton and Rossville Hydraulic canal and a number of old building foundations west of Front Street. The construction plant for this job consists of a derrick of 28 feet gage, 30 feet boom, and 55 h. p. hoist; a Smith $\frac{1}{2}$ -yard concrete mixer; a Plymouth gas locomotive; and four $1\frac{1}{2}$ -yard Western rocker dump cars.

C. H. Eiffert, Division Engineer.

DAYTON

About 21,000 cubic yards of the levee embankment above Island Park have been placed. The levee is practically completed to a point about 2,000 feet east of the New Troy Pike.

On the main channel work near Herman Avenue Bridge, 47,000 cubic yards of embankment have been placed in final position. About 174,000 cubic yards of excavation have been handled, 31,000 cubic yards of which have been moved twice. Nine hundred lineal feet of cast iron water main and compressed air pipe have been uncovered and relaid in the river channel. About 800 lineal feet of the completed levee south of Herman Avenue Bridge has been seeded. Four timber deck scows have been launched from the shipyard at Herman Avenue as follows: one 8-foot by 18-foot scow for general use, one 40-foot by 80-foot scow to be used for mounting dragline excavator, and two 40-foot by 120-foot scows for transportation of excavated materials. A third 40-foot by 120-foot scow will be ready for launching before the end of September. As soon as this is in the water, construction will be started on a 20-foot by 70-foot stern paddle wheel steam tug, which will be used in transporting the scows.

The temporary dam under construction at the mouth of Wolf Creek is about 25 per cent completed.

A. C. Bock, Division Engineer.

THE RAILWAY RELOCATION

Erie and Big Four—One steam shovel is working day and night in the big cut at Huffman Hill. Highway changes east of the dam and near Mud Run, are practically completed. The grading on the Enon end of the railroad work will be completed within a few days and the outfits will be moved into the 20,000-yard cut on the J. H. Stevens farm, southeast of Fairfield. The channel change in Mad River to provide a new inlet for the Harshman Improvement

Co.'s canal has been completed, the old channel having been filled by the new railroad embankment.

The masonry work on the Springfield Pike underpass is nearing completion and the steel work will be delivered soon. Three concrete culverts have been completed. Six others are well under way; also one concrete bridge. The Big Four temporary track is about 95 per cent completed and would be entirely finished had not the railroad contractors suspended work upon it. The Ohio Electric temporary bridge has been completed and traffic is now operating on the new line.

Baltimore & Ohio—Both Kahl Bros. and McAndrews have about finished their grading.

The Vang Construction Co. has completed the cut immediately south of Poplar Creek and their shovel is now working in the 135,000-cubic yard cut just north of Johnson Station. Their upper shovel has finished the grading up to the Taylorsville Dam and has been moved to the 20,000-yard cut about three miles below it. The excavation for the highway undercrossing at Johnson Station has been finished and the footings concreted. The same is true for the 30-foot arch at Poplar Creek.

Condon & Smith have one large steam shovel working in the big cut north of the Taylorsville Dam and are now making good progress. They have a good layout and their tracks are in excellent condition. The Condon Bros. steam shovel has excavated about 25,000 cubic yards and is now working in a 15,000-yard cut about four miles above Taylorsville.

Miller Bros. have completed two concrete culverts north of Tadmor, and are making good progress on the 26-foot arch at Picayune Creek.

All of the railroad construction work has been very much delayed during the month due to the heavy rains.

E. N. Floyd, Division Engineer.

War Service Notes

Mr. Dickson, Secretary of the Dayton Y. M. C. A., who has just returned from France, reports that Captain W. P. Watson, formerly of our engineering staff, is in charge of a training school for heavy artillery located near Paris. These big guns are mounted on caterpillar tractors, like the tanks. The smaller draglines used on the Conservancy District are mounted in the same way, and move over the ground in the same manner. Captain Watson's superior officer told Mr. Dickson that he considered the Captain a great find. It had been a relief to turn over the management of the school to so good a man. We are glad to learn also that A. A. Ort, formerly the District's Assistant Office Engineer, has been placed in entire charge of transportation at the Philadelphia Navy Yard. With Philadelphia as the headquarters of the United States Ship Building Corporation, and the location of the biggest ship building plant in the world, Mr. Ort has a real job. We have always thought the District was able to choose good men, and are pleased to see its judgment corroborated by the authorities of the United States Navy.

The Bulletin was pleased to receive a call on September 12 from E. W. Lane, formerly of the Conservancy District. As Assistant Superintendent of Construction, he has been in charge of sewerage waterworks, drainage and road work just completed at Dorr Aviation Field, Arcadia, Florida.

Myron Cornish, who was formerly with the Conservancy, has been since March at Riverside, California, as Assistant Superintendent of Construction, on the March Aviation Field. The work there has just been completed and Mr. Cornish is awaiting further orders.

The Bulletin was glad to receive a call, on September 5th, from Second Lieutenant R. F. Herdman, formerly with the District, who has just finished his training in the United States Artillery School at Camp Taylor, Kentucky. He did not then know where he would next be stationed.

W. R. Mounts was lucky enough to be transferred overseas after only three weeks' training.

Seen and Heard on the Job

THE LABOR DAY PICNIC

The Picnic at Englewood on Labor Day was a pleasant and successful affair. Representatives from all of the camps were present. The forenoon and early afternoon were spent in looking over the work at Englewood and the cottages there, many of which are now occupied. The dinner at the mess hall, served under the personal direction of Mr. McCarthy, Chief Steward for the District, was an uncommonly well cooked and palatable meal, and reasonable in price. More than a hundred and forty people were served. Others brought their own lunch in baskets.

The games of the afternoon, under the direction of Messrs. Chandler and Everhard of the headquarters office, proved the most enjoyable feature of the occasion. Men, women, and children took part, including the chief engineer and the wife of the construction manager. The athletic events indeed made of the picnic a family affair, full of fun and informality, the children's and ladies' races contributing not the least to these features. The winners were as follows:

Three-Legged Race—Messrs. Zull and Sylvester of Dayton.

100 Yard Dash—Horton of Englewood.

Fat Man's Race—Chief McIntosh of the Dayton Shop.

Special Challenge Race—Chief McIntosh vs. Chief Engineer Morgan. Won by Mr. Morgan.

Special Challenge Race—Division Engineers. Ones of Lockington, and McCurdy of Englewood. McCurdy won by a nose.

Small Boys' Race—Valentine Stock of Englewood.

Little Girls' Race—Myra Saltmarsh.

Larger Boys' Race—Ernest Morgan.

Ladies' Race—Mrs. Porter-Shirley and Miss Saylor. Tied.

Tug of War—Blondes vs. Brunettes. Won by the Blondes. (They stripped the "Brunettes" off the rope against a tree like beads off a string.)

Obstacle Race—Sylvester of Dayton.

The whole affair was under the supervision of Mr. C. W. Porter-Shirley, General Camp Overseer. Mr. Porter-Shirley wishes to return thanks to all who contributed to the success of the picnic. It is not knocking anybody else to add, what we are sure all concerned feel, that special thanks are due to Messrs. Chandler and Everhard for their successful staging of the athletic events, which made of the picnic a genuinely get-together occasion. It is hoped and expected that this will be only the first of a number of such affairs.

Population Note. On August 26 an eight pound girl was born to Mr. and Mrs. O. N. Floyd of the Taylorsville Camp. On September 1 an eight pound boy came to Mr. and Mrs. N. A. Pageott of Huffman. Beaten by five days, Huffman consoles itself by boasting that nevertheless Huffman had the first baby born right on the job at any camp, the Floyd infant having appeared at the Miami Valley Hospital. The Bulletin congratulates all four of the p. ps.

NOTICE TO CONSERVANCY EMPLOYEES

In order to relieve the automobile situation and save expense, will you kindly notify L. F. Wilcock, Headquarters Office, whenever you leave Dayton by automobile, advising him when and where you plan to go?

This will frequently enable sending out one machine where otherwise two or three would be going to the same locality about the same time. Also, parties desiring to go to our various projects can be thus taken care of, saving considerable annoyance and cost of operation.

All parties not having the use of District automobiles should communicate with the Headquarters Office whenever they wish to make a trip, making their wants known in ample season, so that arrangements for their transportation may be made.

ARTHUR E. MORGAN,
Chief Engineer.

FLAG RAISING AT TAYLORVILLE DAM

An impressive program was carried out recently at Taylorsville, when all the workmen gathered around the newly erected flag pole, to do honor to the new camp flag. Two large flags were purchased by the workmen, who donated so liberally that the fund over ran the price of the flags by \$19.22. This amount will be retained as a start towards a general welfare fund.

Division Engineer Floyd opened the program with a few appropriate remarks, and introduced Chief Engineer Morgan, who gave a short talk. He dwelt on the importance of winning the war, and the kind of life we are fighting for. He outlined the principles of a true democracy and explained the position of the Conservancy District, its work being listed as a war project, which will protect the war industries that are located in the Miami Valley. Mr. Morgan emphasized the importance of co-operation among the workmen at the camp in making living conditions the best possible. He urged the men and women to take advantage of the educational opportunities that will be offered at the camp, in the way of lectures and night school classes, all this being important to the highest standard of efficiency and service.

The school children were ready with their part of the program. They sang America, after which Mr. Rogers raised the flag which floated out amid the cheers of every man, woman and child of the camp.

E. A. Berkley, Camp Overseer.

H. L. Rodgers, of the headquarters office, was married on September 3 to Miss Laura Minton, of Pleasant Hill, Ohio, and of Oregon. The Bulletin extends congratulations and kindest wishes.

Mr. George P. Ellis, member of the firm of Tanner, Gilman and Ellis, Certified Public Accountants, was in Dayton September 20, looking after the auditing of the Conservancy books, which has been in progress for four months. This audit is now approaching completion and the results will be filed with the Conservancy Court in the near future.



• BUY A BOND • FOURTH LIBERTY LOAN

L. DUBOIS

The First American Army Under General Pershing Struck at St. Mihiel Two Weeks Ago. In Just Twenty-Seven Hours They Had Wiped the Salient Out. American Shells Are Now Falling on the Great German Fortress of Metz, the Key to the Rhine Valley.

On September 26 the Americans Struck the Second Blow, in the Champagne. They Advanced Seven Miles in a Day—and Are Still Going. 2,000,000 Americans Are Now in France—On the Way to BERLIN!

Next Spring There Will Be Four Millions of Them—Five Millions—Six Millions—Ten Millions if Ten Millions Are Needed—On the Way to BERLIN!

Will You Back Them ? Silver Bullets Must Help the Steel Shells Shoot Yours!—Buy a Liberty Bond!

Besides doing the boys “over there” \$50 or \$100 worth of good right now when they need it, it does this for you:—

1. It lays up \$50 or \$100 against a rainy day—for **you**, your wife, your child—in the safe keeping of the United States Government—the solidest government in the world.
2. The United States will pay you interest on it at $4\frac{1}{4}$ per cent.
3. The fund which it lays up you can **cash in on at any time**.

Independently of helping the boys “over there,” doesn’t it look like common sense to buy one, just for your own benefit?

The Following Persons Will Sell Bonds:—At Dayton, G. H. Matthes, Office Engineer, and L. F. Wilcock—At Germantown, Alex. Mackinnon—At Englewood, H. S. R. McCurdy and C. C. Williams—At Lockington, C. H. Shea—At Taylorsville, E. A. Berkley—At Huffman, Dr. J. M. Sayler—At Hamilton, R. B. McWhorter—On the Railway Relocation, F. H. Sprague.

75 CENTS PER YEAR

10 CENTS PER COPY

THE MIAMI CONSERVANCY BULLETIN

November 1918



THE LOCKINGTON LAYOUT AS SEEN FROM THE ROOF OF THE DRAGLINE



FIG. 50—"A DRAGLINE IN THE ATTITUDE OF PRAYER"

A Bucyrus machine caught in one of the swift rises characteristic of the Miami River at Dayton. The picture shows the unavoidable danger to which the Conservancy river equipment is sometimes exposed. No harm resulted in this case.

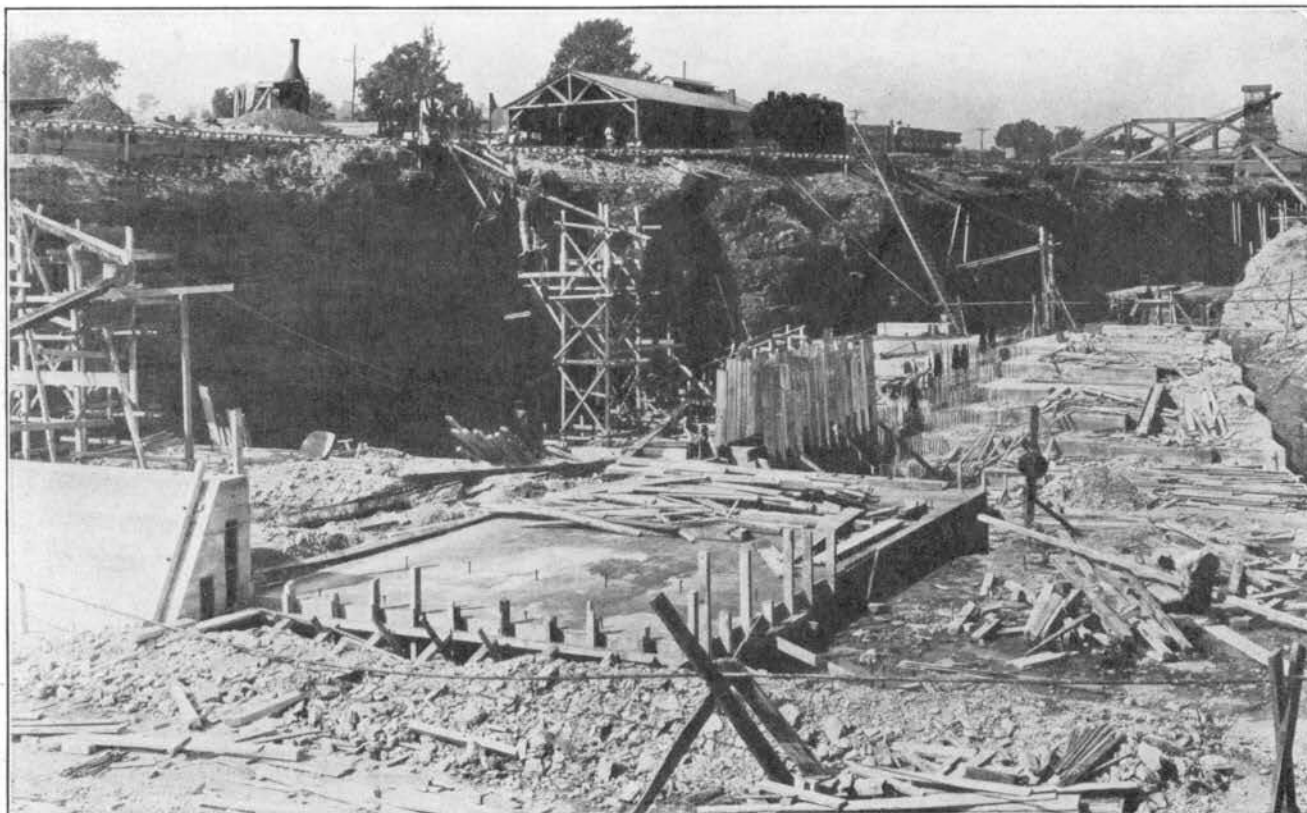


FIG. 51—CONCRETING THE OUTLET STRUCTURE AT THE ENGLEWOOD DAM

The view is looking upstream with the river out of sight at the right. The cross wall at the left is the downstream weir of the lower pool, the concrete floor in the foreground being the floor of that pool. The floor of the standing wave pool can be seen at the right beyond it, with the concrete stairway rising in the rear.

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Arthur E. Morgan, Chief Engineer
Chas. H. Paul, Asst. Chief Engineer
C. H. Locher, Construction Manager
Oren Britt Brown, Attorney

THE MIAMI CONSERVANCY BULLETIN

PUBLISHED BY THE MIAMI CONSERVANCY DISTRICT

DAYTON, OHIO

Volume 1

November 1918

Number 4

To the Men of the Conservancy District

We feel that we cannot let the occasion go by without expressing our unusual sense of satisfaction at the manner in which the men of the Conservancy District have carried through the Fourth Liberty Loan. It is a record in which all of us can take a just pride. The thing which was given our men to do they have done, and done exceedingly well. We feel the more bound to express this because the matter has so deep a meaning. Our government is en-

gaged in putting through the biggest and most important job which has ever been done in the world, and it is doing it in a manner which commands the admiration of the world. That job is our job also. We have our part in it, and the manner in which we have carried through the Fourth Liberty Loan gives gratifying assurance that in doing our part, in the future as in the past, we shall not fall down.

ARTHUR E. MORGAN, Chief Engineer.
CHARLES H. PAUL, Asst. Chief Engineer.
C. H. LOCHER, Construction Manager.

Obituary—William A. Obrein

Word has just been received of the death of Wm. A. Obrein of Cape Girardeau, Missouri, on October 12.

Mr. Obrein was Chief Engineer of the Little River Drainage District in Missouri, an undertaking to drain and prevent floods on an area of six hundred square miles. He has been untiring in his efforts and has maintained a high standard of work-

manship throughout this great project. The works of the Little River Drainage District will stand as a monument to his memory.

During the development of plans for the Miami Conservancy District, Mr. Obrein was a member of a special Consulting Board, which examined and passed on the plans of the District.

ARTHUR E. MORGAN.

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Subscription to the Bulletin is 75 cents per year. At news stands 10 cents per copy. Business letters should be sent to L. F. Wilcock, Assistant Engineer, Miami Conservancy District, Dayton, Ohio. Matter for publication should be sent to G. L. Teeple, Miami Conservancy District, Dayton, Ohio.

The Work at Lockington

All Necessary Gravel Obtained from the Excavation. Top of Bed Rock Furnishes Excellent Foundation. Working Layout Simple and Efficient.

Necessity dictated the location of the Lockington Dam across the wide, flat valley of Loramie Creek, which does not present the bold approaching shoulders of a natural dam site. The best location, and the one finally selected, is about $1\frac{1}{2}$ miles above the junction of the creek with the Miami River, and about three-eighths of a mile north of the village of Lockington. The dam, which is to be built of earth, is 954 feet above sea level at the crest. It is 7,000 feet long, 440 feet thick at the base, 74 feet in height above the valley floor, and will contain 974,000 cubic yards of earth. With the maximum flood provided for, the water in the retarding basin would back up the valley behind the dam, diagonally northwest, nearly across Shelby County. With a flood equal to that of 1913, 3,600 acres would be covered to an average depth of $17\frac{1}{2}$ feet, making a total volume of 63,000 acre feet, an acre foot being the amount of water necessary to cover one acre one foot deep.

Most of the earth will be deposited in the dam by the "hydraulic fill" method. It will be obtained from shaded area, labeled "borrow pit" in figure

53, comprising about 40 acres. This land is at such elevation that when the earth has been loosened by a powerful stream of water from a nozzle or "giant," it can be washed or sluiced down a five per cent grade to the pit or "sump," (so marked in the figure) near the upper toe of the dam. From this sump, the material, mixed with enough water to carry it, will be pumped by dredge pumps through pipes to a long pool maintained during construction on the top of the embankment. The admixed earth falls to the bottom of the pool, thus building up the dam. The excess water will be drawn off through openings provided into the creek below the dam. The water necessary for these operations will be pumped from the Miami and Erie canal, conveniently situated a little to the east of the borrow pit.

The hydraulic fill at Lockington will not be started until next season. The work now in progress is on the concrete structure for carrying the water of Loramie Creek after the dam is completed. By building this now it will carry the creek water also during dam construction.



FIG. 52—THE WORK AT LOCKINGTON AS SEEN FROM THE TOP OF THE GRAVEL WASHER

The two walls are the retaining walls of the concrete entrance channel. The entrance to the conduits through the concrete cross dam will begin just beyond the first derrick mast. The gravel stock pile is at the left, the gravel track beside it, with the dragline excavator in the distance. The tracks in the center are the concrete tracks.

The conditions for building it are very favorable. Bed rock occurs to the east of Loramie Creek, only a few feet below the elevation of the creek bed, with a floor almost as level as it could be laid out with an instrument, and so firm that under the greater part of the outlet structure it furnishes an excellent foundation simply by cleaning off the superimposed earth. Solid rock is nowhere more than a foot or a foot and one-half below the rock surface. Gravel for the concrete is obtained directly from the excavation necessary to reach the bed rock. The gravel has been piled in a long bank to the east of the excavation. The waste earth has been piled on the west side where it will become a part of the embankment of the dam. Comparatively little water collects in the bottom of the excavation, so that the concrete structure can be built "in the dry." This obviates the use of expensive coffer dams, such as are often necessary to keep water out in such work.

The building of the concrete structure, now well under way, is the principal work to be done at Lockington during the present season. Its purpose, as stated, is to provide an outlet through the dam for the waters of Loramie Creek. Its sides are formed of two heavy concrete retaining walls, passing entirely through the earthen embankment of the dam, from its upstream to its downstream toe, and from its bottom to its top. These walls are parallel to each other at the middle of their length, but diverge at each end to facilitate the entrance and exit of the water. The space between them, forming the channel for the stream, is floored with concrete placed on bed rock, and blocked across the center by a very heavy cross wall pierced with two openings at the bottom which carry the water. These openings are rectangular in shape, 9 feet wide by 9 feet 2 inches high, and placed side by side. They will carry the water except during extraordinary floods. To safeguard against the latter, a third opening, or "spillway," is provided at the top, an open concrete channel 16 feet deep and averaging 77 feet wide, its sides being the two retaining walls and its floor the top of the cross wall. The entire structure is 82 feet in height, 140 feet in maximum width, and about 500 feet from its upstream to its downstream end. It will contain 38,000 cubic yards of concrete. To provide still more abundant water way during construction of the earthen part of the dam, so as to avoid any possible danger of overflow, the concrete cross wall will not be built until after the earthen part of the dam is completed.

Besides the building of the forms, which will not be here touched upon, the concrete construction involves the following processes:—excavating the earth down to solid bed rock; transporting gravel and cement to the screening and mixing plant; washing and screening the gravel; mixing the gravel and cement to form concrete; transporting the concrete to the structures; and depositing the concrete in the forms. The working layout for these various operations is shown in the plan, figure 53.

Excavation to foundation rock, of course, comes first. This is being done by a Class "K" Lidgerwood dragline excavator, which is now at the point marked "large drag line" in figure 53, the excavation north of it having been completed. This is an electric dragline with 170 H. P. motor capacity, a 100-

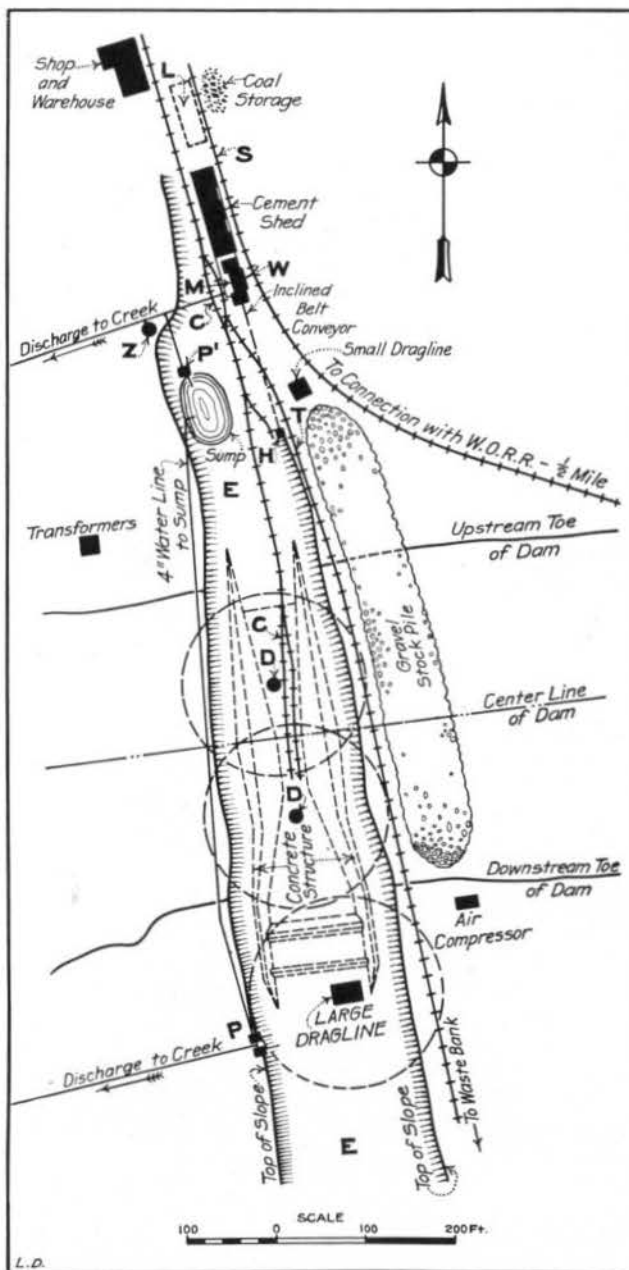
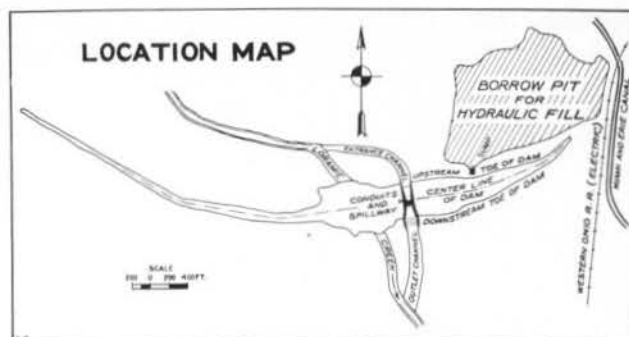


FIG. 53—PLAN OF LOCKINGTON LAYOUT

EE, excavation for new channel, the concrete structure now building shown in outline by dashed lines in the middle of it. Downstream end is below. DD, derricks. CC, concrete tracks. T, gravel track. H, gravel hopper. W, gravel washer. M, concrete mixer. S, electric railway service track. L, lumber yard. PP', pumps supplying gravel washer. Z, reserve water tank.

foot boom, and a $2\frac{1}{2}$ -cubic-yard bucket. It will excavate 50 buckets, or about 100 wagon loads per hour.

The gravel is carried in 4-yard Western dump cars by an 18-ton Porter "dinkey" locomotive, running on the track "TT." This track runs on a shelf or berm between the gravel stock pile and the edge of the excavation. At present the gravel is dumped into these cars directly from the excavation by the large dragline. Later it will be obtained from the gravel stock pile. It will be handled then by a small dragline, (shown in figure 53, just north of the pile), thus releasing the large machine for other work.

The gravel is dumped from the cars into the hopper "H," whence it is carried up an inclined conveyor belt to the top of the gravel washer, marked "W," where it is dumped into another hopper; thence it passes successively through three conical revolving steel screens, assorting it into four different sizes, which are collected in bins. While passing through the screens, it is sprayed by streams of water from nozzles which wash it clean of earthy impurities. The screens are sheet steel cones pierced with holes, and sort out successively stones above 3-inch size, then between 3-inch and $1\frac{1}{2}$ -inch, then between $1\frac{1}{2}$ -inch and $\frac{3}{4}$ -inch, and last, the sand smaller than $\frac{3}{4}$ -inch. All silt and impurities are carried off with the wash water.

The cement is brought in over the service track "S," connecting with the Western Ohio Electric Railway, and is unloaded into the cement shed, just north of the gravel washer. From the cement shed, it is wheeled to the 1-yard Smith mixer "M," under the same roof as the gravel washer, where it is mixed with the sand and gravel to form the concrete. It is transported from the mixer to the derricks "DD" over the track "CC," by three trains of two cars each, hauled by two Fate, three-ton, gasoline dinkeys. The cars are small platform cars, built by the Sanford-Day Iron Works, carrying $1\frac{1}{4}$ -yard dump bottom buckets.

The derricks lift and swing the buckets, and dump them into the forms for the concrete structure. The latter is indicated in outline in figure 53 by dashed lines. The sweep of each derrick boom is indicated by a dashed circle. These circles lap each other, as shown, so that one derrick begins to serve where the other leaves off.

The boulders from the gravel are separated by a "grizzly" or grating at the mouth of the hopper at "H," and loaded into dump buckets. They are then washed by a water jet, run to the derricks and dumped as "plums" into the concrete in the forms. The larger stones from the bed rock, which have to be removed from the top layers to get to solid foundation, are similarly used.

Each of the two guy derricks, which are alike, has a tall mast of latticed steel 120 feet in height,

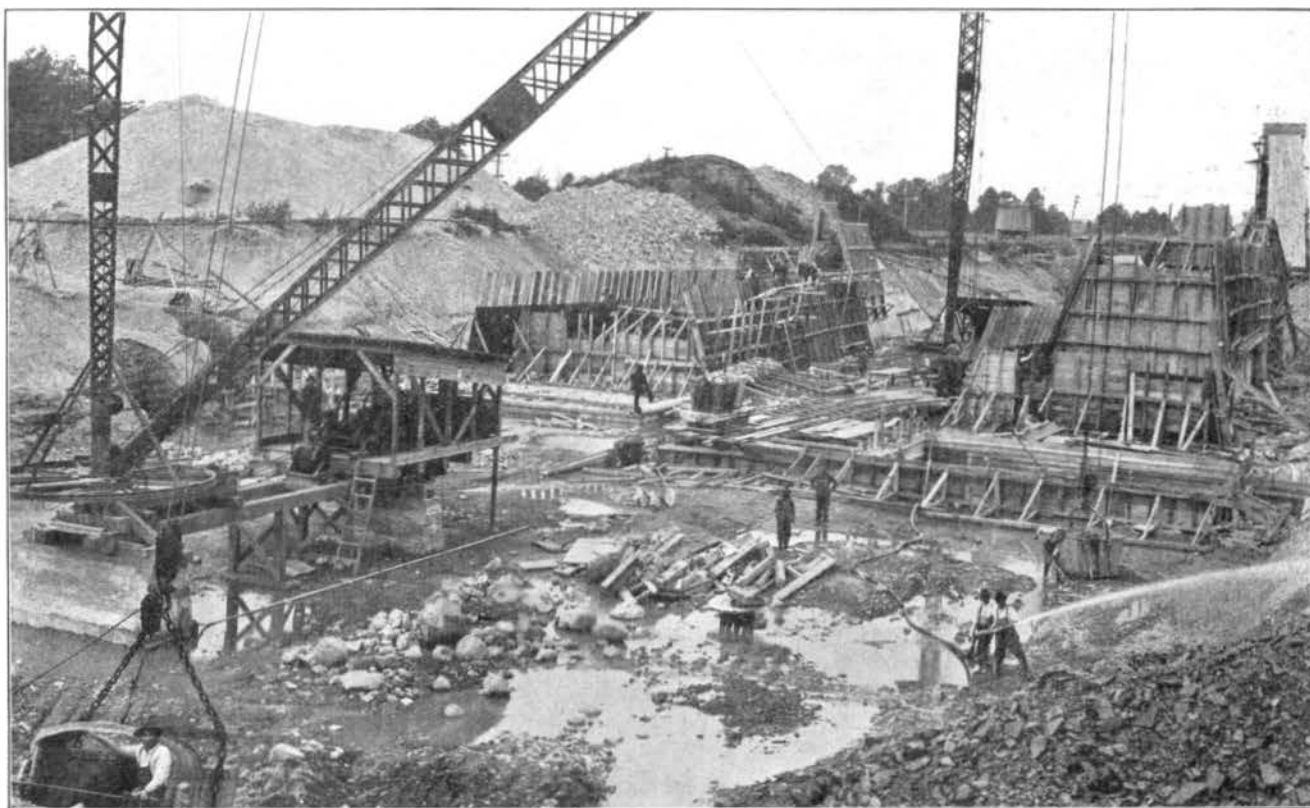


FIG. 54—THE WORK AT LOCKINGTON FROM A POINT NEAR THE DRAGLINE EXCAVATOR

The foreground shows how level the top of the bed rock lies, the lighter portions being pools of water. Much of this bed rock only needs to have the top surface washed clean. The downstream derrick is seen at the left, the hoisting drums and motors being housed in the shed. These derricks have 120 ft. masts and 105 ft. booms. The two heavy walls seen going up will be 82 ft. in height. The standing wave pool will be about in the center of the picture. The stream of water in the foreground is washing "plums" to be dropped into the mass concrete. The dragline bucket appears in the lower left corner.

with a latticed steel boom 105 feet long, and is operated by an electric hoist. (See figures 52 and 54). With a boom of this length, buckets can be handled and concrete placed anywhere in the width of the excavation, and in the walls at any level from the rock foundation to the top, 82 feet higher. Besides placing the concrete, these derricks move and set the sectional forms in which the concrete is placed. The south derrick, in addition, handles the rock which is excavated from the foundation.

As in most such construction, some ground water collects in the excavation and must be continually removed or it will flood the work. This is done by two pumps, shown at "P" and "P'." At "P" there is also a third pump for emergency use. Some of the water is used to wash the gravel and in mixing the concrete. For this purpose, it is collected in a pit or sump, so marked in figure 53. From that it is pumped to the screens at the top of the gravel washer. If the supply in the sump is low, it is filled from water in the south end of the excavation by the pump at "P." Excess water is discharged by both pumps over the embankment into Loramie Creek. A tank "Z" filled from the north pump furnishes a reserve supply for concrete mixing.

In connection with the building of the forms for the concrete, and the necessary repairs to equipment during construction, a carpenter, blacksmith and machine shop has been built. This is conveni-

ently located a little northwest of the gravel washer. It is served by an extension of the concrete track "CC," enabling lumber, machinery, repairs, etc., to be conveniently transported from the shop to the work. The electric railway spur is extended north from the gravel washer, permitting lumber to be brought in from the Western Ohio Electric line, and stored conveniently in the yard "L."

With the exception of the dinkeys all of the machinery is driven by a 3-phase, 60-cycle alternating electrical current. This is tapped at Piqua from the Dayton Power & Light Company's station. It is obtained at 2300 volts, stepped up to 33,000 volts by transformers, and transmitted five miles to the dam over a pole line built by the Conservancy District. Here it is stepped down again to 2300 volts for use by the large pump motors. For the rest of the machinery, it is stepped still further down to 440 volts at a second transformer station. With the completion of the new transmission line of the Dayton Power & Light Co. from Dayton to Piqua, this power will come from their new large plant at Miller's Ford in Dayton.

The work at Lockington is being carried out under the direction of Barton M. Jones, Division Engineer, aided by C. H. Shea, Assistant Division Engineer. The electrical work was installed under the supervision of Frank Harvey, Chief Electrician for the District.

District Medical Service and the Influenza

The men in charge of the carrying out of the Miami Flood Control Project feel that in the interest both of the work, and of that finer co-operative spirit which is the distinguishing mark of modern industry, the Conservancy District should use all proper diligence in looking after the interests of those who become disabled in its service, through either sickness or accident. It takes great care to prevent the occurrence of either, and when they occur, to attend to them as speedily and as efficiently as possible. Before the work of construction began, steps were taken to secure the services of a man who should give his entire time to these matters. From among a number of men considered, Dr. W. M. Smalley, a physician of experience and ability, was selected. He was given an office in the Headquarters Building, where he could keep in close touch with all the camps and centers where work was being done. A local physician in each of these localities was also chosen, to act on emergency calls which Dr. Smalley himself could not immediately reach. The camp overseer or superintendent on the work was held responsible for first aid in all cases that might occur, with the added duty of seeing that both the emergency physician and Dr. Smalley should be notified at once. The physicians selected were Dr. Furnas of Englewood, Dr. Riley of Vandalia, Dr. Gabriel of Lockington, Dr. Kemper of Germantown, and Dr. Saylor of Vandalia, the latter consenting to remove to Huffman and give all his time to the Conservancy work there. Whenever necessary, these men are called at once. Dr. Smalley also gets to the case as soon as he can. If it is serious, and if the worker has no home of his own

where he can be cared for, or if better than home care is necessary, the patient is removed to St. Elizabeth's or the Miami Valley Hospital, or the local institution at Piqua, where he remains as long as the case requires.

As regards compensation, a distinction is made between cases of injury and cases of sickness. An injured workman is compensated in accordance with the Workmen's Compensation Act of Ohio, which provides, in general, that after one week, the employee shall receive two-thirds of the pay which he received at the time of the injury. This arrangement lasts until the employee is again able to work.



FIG. 55—FIRST AID HOSPITAL AT HUFFMAN

This Hospital, 30½ by 18 feet in size, contains a ward room accommodating three beds, a kitchen, an office and an operating room with the necessary supplies and appliances. See Figure 56.

In case of permanent loss of a member like the foot or the finger, compensation is made in a lump sum commensurate with the loss. In case of total disablement, the worker receives payment in the nature of a pension, payable at regular intervals as long as he lives.

For cases of sickness the District does not assume financial responsibility. Such cases involving an employee or a member of his family are visited by Dr. Smalley on his regular inspection trips, however, and for these visits no charge is made. Medical advice in general on these trips is free. For special visits payment must be made.

The results of the system outlined have been excellent. There has been no case of major accident. Injuries have been confined to minor cuts and bruises, which in most cases have been quickly cured. Likewise there has been no case of serious sickness. The endeavor has steadily been to head off the sickness so that it could not occur.

The application of this systematic vigilance to the influenza is worth noting.

At the outbreak of the epidemic, steps were immediately taken by C. W. Porter-Shirley, District Camp Inspector, to see that the health at the various camps was properly safe-guarded. It was arranged that Dr. Saylor, Camp Physician, at the Huffman Dam, should visit the cottages at Huffman, Taylorsville, and the railway relocation camp at Osborn, every day. In a similar way Dr. Smalley has visited the camps at Englewood and Germantown. The Lockington camp has been visited by Dr. Gabriel, the emergency physician at the village. These visits were much more than perfunctory. The physicians have interviewed the workmen and their families, and given personal instructions regarding the nature of the disease, the symptoms denoting it, and the steps to be taken, emphasizing especially the necessity of prompt action and of calling a doctor at once. In addition, a circular was printed by the District, a copy of a letter sent out by the Division of Sani-

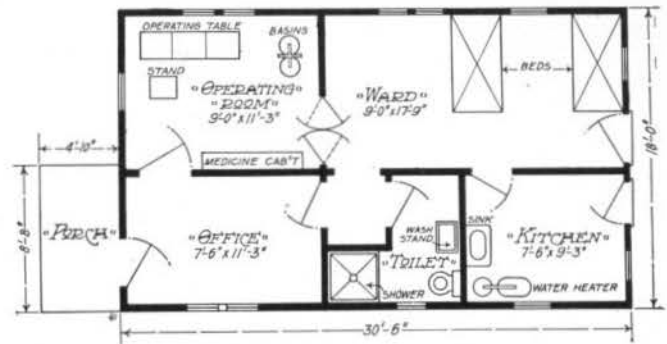


FIG. 56—FLOOR PLAN OF HOSPITAL

tation at Washington, D. C., regarding the subject. This was distributed throughout all the camps, with the request that it be read carefully. The circular was, in effect, a repetition in print of the instructions and warnings which had been conveyed orally by the visiting physicians.

As a result the disease has appeared in only a few scattered cases, which have in general been easily handled. At Englewood there were seven or eight, at Huffman, three or four, at Germantown, five or six, at Taylorsville, only one or two. Of all these, only one or two of the Englewood cases have been severe. In the headquarters office at Dayton, there have been five or six scattering cases, only two of which were severe, and neither of these dangerous.

The only death which can fairly be attributed to the epidemic is that of a little girl, daughter of a working man at the railroad relocation camp at Osborn. The number of Conservancy railway workers there being so small, it was out of the question to build a special camp for them like those at the dams. It is likewise practically impossible to enforce the same thorough-going sanitary regulations. We believe this fact is not without significance as showing the value of such camps as the District has constructed at the dams.

The Conservancy Schools

The Construction Camps of the Conservancy District being, except at Lockington, remote from towns, the children of employees cannot receive school privileges without special arrangements; and as many workmen, especially the more skilled, refuse to work where there are no educational facilities, it has been necessary for the District to establish four schools of its own. While these are being provided at the least practicable cost to the Conservancy District, it is hoped by an intelligent direction of the school policy to secure results which will be equal to those of the best city schools. Intelligent interest and co-operation often will secure what mere expenditure of money cannot. At Huffman, an existing schoolhouse has been loaned for the District's use. At Englewood, a summer residence, which later must be torn down, has been remodeled and will be used as a schoolhouse. At Germantown and Taylorsville, small schoolhouses have been built. Until these are ready, the school at Germantown will be held in one of the camp houses, at Englewood in one of the large cottages,

and at Taylorsville in the farmhouse which had been used as the Division Engineer's Office. At Lockington the children attend the village school near by.

The District has been fortunate in securing experienced teachers. Miss May Turner is in charge of the Germantown School; Mrs. Eudell Everdell at Englewood; Miss Caroline F. Stearns at Taylorsville; and Miss Mildred Goss at Huffman.

The whole trend of modern education is in the direction of a more practical fitting of boys and girls to the parts which they will play later in life. The program for the Miami Conservancy Schools has been outlined in harmony with this view. It has been carefully worked out and it is felt that the result will amply justify the care which has been put upon the plan. Any parent, who may see his child doing things in school a little out of the ordinary, may take it as a sign of live education adapted to present date needs.

A successful school anywhere can only arrive by the co-operation of the parents. In the Conservancy

schools, this co-operation should be received to the fullest extent. It is hoped that in every camp, a man from among the carpenters can be secured to teach the boys how to use carpenter tools, and that good cooks from among the housewives will teach the girls how to cook and how to take care of the house. It is quite likely some of the boys will want to learn blacksmithing. In that case, it is hoped that a blacksmith can be induced to help them. Good

schools, like good government, depend upon each interested person giving a hand. If we all do this, we can have the best schools in Ohio. The people of the Miami Valley are paying the cost of the work and they are right in demanding that not a cent be wasted in unnecessary expense, but the success which comes from every one helping as best he can adds nothing to the public burden, and makes possible results that money alone cannot secure.

Beginning the Hydraulic Fill at Taylorsville

The equipment for the hydraulic fill at Taylorsville has been installed and is now in operation. The general nature of such a fill has been described in the article on the Lockington dam in this issue. The equipment comprises three connected systems of pipes and pumps. One of these supplies water at high pressure to the "monitor" or "giant" at the borrow pit, to tear down the earth. The second supplies water in much larger quantity at low pressure to sluice the eroded earth down the borrow pit slope to the dredge pump. The third carries the mixed earth and water from the dredge pump inlet to the embankment of the dam, where the earth is deposited.

The borrow pit for a hydraulic fill is best situated on a slope, down which the water from the sluicing line can pass by gravity. At Taylorsville it lies on the hillside which rises from the east bank of the Miami River at the end of the damsite. The giant, built by the Joshua Hendy Co., is mounted on the hillside and throws a 2½-inch jet. (See figure 59). The 15-inch spiral steel high pressure pipe line supplying it is carried across the river on a railway trestle from a pump house on the west bank just north of the damsite, where it connects with two 6-inch Allis-Chalmers centrifugal pumps, each of 1400 gallons capacity per hour, and of 150-foot maximum head. They draw water from a sump connected with the river, and are so arranged that they can be connected "in parallel," thus supplying double quantity; or "in series," thus doubling the pressure to a maximum head of 300 feet.

The second pipe line, the sluice water line, passes from the same pump house to the borrow pit, beside the first. It is of 15-inch wood pipe, and is supplied by a 15-inch Allis-Chalmers pump of 5500 gallons capacity and 80-foot maximum head.

The third pipe line, the dredge pipe line, carrying the mixed earth and water from the borrow pit to the fill at the dam, is of 15-inch lap-welded steel, and is carried across the river on the same trestle which carries the others. It is fed by a 15-inch United Iron Works pump, located at the foot of the borrow pit, driven by a 350 horse power Allis-Chalmers electric motor.

The dredge pipe discharges into the hydraulic fill pool at a point near the south toe of the damsite. This pool, nearly three hundred feet wide, extends east and west about a quarter of a mile, nearly across that portion of the valley floor occupied by the damsite, and is retained in place by four embankments of earth. As the water from the dredge pipe spreads in the pool it drops its load of suspended earth. The bottom of the pool, gradually built up as the deposit proceeds, thus forms the top of the dam embankment. The retaining levees at the sides and ends are built up from the coarsest material from the dredge pipe as the bottom rises. Overflow from the pool is discharged back into the river through pipes which pass through the levee on the west bank of the river at the pool surface level, inflow and outflow being so regulated that the depth of water is maintained approximately constant at about six feet.

Night Schools Started at the Camps

The schools at the Conservancy Dams have opened prosperously. At Englewood, there are forty pupils; at Germantown, twenty-two; at Taylorsville, twenty-three; and at Huffman, twenty-four. The new schoolhouses at Taylorsville and Germantown are completed and in use. At Englewood the sessions are being held in one of the No. 4 camp cottages, pending the completion of the changes in the one which will be finally used. A small but well selected library has been added to the equipment of each school. The new schoolhouses at Germantown and Taylorsville are being used also for general community purposes, both of a social and religious nature. At Germantown reg-

ular church and Sunday School services are held.

A night school has been started at each of the camps for the special benefit of employees. The subjects include advanced mathematics; industrial arithmetic; penmanship; English for foreigners; mechanical drawing; and first aid work. The classes began Monday, October 21, and will be run for terms of twenty-four lessons each, meeting two evenings a week. The instruction is free, and it is hoped that many employees will receive the benefit to be derived from it. A special effort is being made to interest foreigners in the ideals of American life and citizenship. There will be occasional lectures at each camp, by men who will volunteer for this service.

October Progress on the Work

GERMANTOWN

The concrete mixer was started on October 5, and has been in operation since that date. The concrete is being placed in the floor of the outlet structure. A daily average of 100 cubic yards was made for the first week's run.

Good progress has been made by the carpenters on the movable forms for the conduits. At the same time forms for the floor sections of the outlet structure have been built ahead of the concreting.

Excavation by the dragline for the new channel and conduits has been continuous throughout the month. At this writing the excavation for the outlet structure has been completed, and that for the conduits started.

The graveling of the highway from the Germantown State road to the Camp has been completed. The camp streets have been gravelled and the necessary gutters constructed.

The division engineers held their monthly meeting at Germantown on the 16th. The morning was spent in inspecting the Germantown job and the afternoon in discussion of various problems connected with dam construction. The latter was preceded by a lively experience meeting in stimulation of the Liberty Loan drive.

The Liberty Loan drive started on September 26, with noon speeches by Mr. Morgan and Mr. O'Brien of the Dayton office. The sale of bonds for the Germantown feature has amounted to \$14,000.

Arthur L. Pauls, Division Engineer.

ENGLEWOOD

The large dragline, excavating for the outlet conduit, has reached the upstream portal, and is cutting an incline for itself as it progresses, to enable it to cross the river. It will be only a very few weeks until the excavation for the outlet conduit, amounting to more than 11,000 cubic yards in earth and 43,000 cubic yards in rock, will have been completed. About 20,000 cubic yards of the rock from this excavation has been placed as a buttress at the downstream toe of the dam, just east of the river. This disposition of the rock was simply a convenient method of putting otherwise worthless material in a place where it would form a buttress to prevent any possible wash of flood water, discharged through the conduit, from reaching the dam.

Concreting in the outlet conduit has progressed favorably. The floor of the pool at the discharge end, where the hydraulic jump will take place, is nearly completed. Portions of both the weirs are concreted, as are several sections of the lower conduit. The floor of the conduit has progressed to a point beyond the center of the dam; in other words, it is more than half finished. A progress of 38 cubic yards per hour was maintained recently on this work for several hours. The partition wall, to control the flow from the outlet, is well under way.

The rock foundation for the outlet conduit, which is a most vital factor in the safety of the work, has proved upon excavating to be even more solid than preliminary investigations had indicated.

In order to utilize with the utmost economy the time available for construction, and to commence the actual construction of the dam before the river

can be diverted through the outlet conduits, a portion of the dam east of the river will be started first. To prevent the hydraulic fill in this portion from spilling into the river, a cross dam is being constructed, extending across the dam from toe to toe along the river bank, and forming an earth retaining wall. The material for the cross dam is being excavated by a large electric dragline in the alluvial flat upstream from the dam. The character of this material, with its layer of clay on top and gravel beneath, makes it ideal for hydraulic purposes. The dragline bucket works a face extending well below the standing water level and as the material comes up it is in a saturated condition. Transported to the dam in 12-yard dump-cars, the earth is dumped along the toe of the cross dam and worked into place by a second large electric dragline. To insure a complete puddling of the material, a hose from a 4-inch pipe line is continuously played upon it as it is deposited in place—making mud pies on a large scale, but a most effective method of compacting earth fill.

A second cut has been started in the gravel pit, where a small dragline, on caterpillar traction, is loading into 12-yard cars for transportation to the screening plant. Daily tests are made of the sand and its quality is proving all that could be desired.

Mr. Morgan has moved from the cottage occupied by him to enable this building to be utilized for the camp school. With comparatively little remodeling a well-appointed school building can be produced. Work on this is progressing.

H. S. R. McCurdy, Division Engineer.

LOCKINGTON

Good progress has been made during the month on the concrete structure, the total quantity placed to date being 6300 cubic yards. The largest single day's run has been 365 cubic yards. Starting from the north end, the floor of the channel and the bases of the retaining walls have been poured to a point about 50 feet south of the center line of the dam. Concrete has been placed in the walls to a maximum height of 35 feet. A second Plymouth gasoline locomotive is now at work with the concrete equipment. Gravel for the washing plant is being excavated by the Class "K" electric Lidgerwood dragline, and loaded directly into cars, which are hauled to the hopper. This gravel comes from the necessary conduit excavation. A Class "B" Lidgerwood steam dragline is being erected just north of the large storage pile of gravel, east of the outlet excavation. This machine, when completed, will load the gravel upon the cars, thus releasing the larger Class "K" machine for other work.

A few teams have begun the grading of Road No. 9, connecting the Lockington Road just south of the dam site with the Turtle Creek Valley Road.

A contract for repairs to the State Dam at Port Jefferson has been awarded to Price Bros. of Dayton, and work will start on it about November 1. This work, together with minor repairs to aqueducts along the Miami and Erie canal feeder, will be necessary before water from the canal can be obtained from the state for operations at the dam. The water will be needed next year for the hydraulic fill.

Forms for the flaring entrance to the concrete outlet conduits are being erected. A new improved screw conveyor, to perfect the separation of the sand from the admixed water as it comes from the fine screen of the gravel washer, has been built at the District shop at Dayton, and will be immediately installed. The shop and warehouse building has been enlarged about 50 per cent.

B. M. Jones, Division Engineer.

TAYLORSVILLE

During the past month, about 5,000 feet of camp road has been graded and surfaced with gravel. This practically completes our system of camp roads. About 1,500 feet of Road No. 12, which runs northwesterly through the camp, connecting the public roads east and west of it, has been graded and now is being graveled.

The schoolhouse and the hospital are practically finished.

The 15-inch dredge pump, direct connected to a 350 H. P. electric motor, has been installed on the east bank of the Miami River. A 15-inch high pressure, spiral pipe line has been completed crossing the river connecting the pumphouse on the west bank with the monitor or "giant," which will wash down the earth in the borrow pit on the east bank to the dredge pump. A low pressure pipe line for the sluicing water has been laid along side the other. The pumps connecting to both these lines have been installed in the pumphouse on the west bank. The 15-inch dredge pipe, running from the dredge pump on the east bank across the river to the south toe of the dam on the west side, has also been completed. The entire system has been tested out, and the hydraulic fill at the dam is about to begin. Some ground sluicing has already been done, in filling the east end of the cut-off trench.

The gravel washing plant is nearly ready for the machinery.

O. N. Floyd, Division Engineer.

HUFFMAN

Three new cottages have been built to supply the increased demand. All of the cottages have been put in shape for winter, and a coal shed built for each one. A steam plant to supply steam for cooking and heating in the mess hall, and heating the office and store room, has been put in operation during the past month. The camp roads have all been surfaced with gravel. A carpenter and blacksmith shop has been built, and the machinery installed.

A well drill has continued drilling holes for blasting the rock excavation for the outlet works, during the entire month. Basting began about the 15th of October.

The placing of the impervious blanket on the upstream side of the dam has continued, and is nearing completion.

6,500 cubic yards have been excavated for the entrance channel to the outlet works. 4,000 cubic yards of ballast gravel have been excavated with a drag line, loaded on cars, and distributed for ballasting the temporary relocation of



FIG. 57—EXCAVATION FOR THE CONDUITS AT ENGLEWOOD

The floor of the excavation is already concreted as far as the inclined concrete chute. The excavation is in Cincinnati shale rock. Two temporary conduits will be built side by side just above the floor, and the two permanent conduits will be built just above these.

the Big Four Railroad. A crew of our men have been ballasting this track since October 2, and getting it in shape to carry traffic so that excavation for the outlet works can be started.

C. C. Chambers, Division Engineer.

DAYTON

Channel excavation on the east side of the Miami River above Herman Avenue Bridge is nearing completion. The levee embankment and trimming of slopes will be finished as soon as the smaller dragline machine is available for handling material. The mouth of Mad River has been cut through on its permanent location and the point of the Herman Avenue spoil bank opposite this location has been graded.

A total of 198,000 cubic yards of channel excavation has been moved, 52,000 cubic yards of which have been handled more than once. 51,000 cubic yards of this levee have been placed in final position, 4,000 in levee embankment and 47,000 in spoil bank and channel fill.

McWilliams Northern Dredging Co. has placed 25,000 cubic yards of levee embankment on the Miami River work above Island Park.

Building of the steam tug is well under way.

Sunset Avenue Dam is complete except for the flash boards and the making of the fill at the west end, which is now being placed.

Dragline No. 789 is making the fill at the site of the concrete block factory, and placing a stock pile of gravel for use in making the blocks.

Plans are being made for construction of a dry dock at Sunset Avenue Dam.

C. A. Bock, Division Engineer.

HAMILTON

The Class 24 Bucyrus dragline is continuing its work on Riley's Island. It has made a second trip through the island during the past month and is now returning toward the north along the east bank of the river. On its way it will flatten out the slope of the bank and finish the top of it to a uniform grade so that it can be made into a roadway in the future at a minimum expense. The total quantity of earth moved to date by this machine is about 160,000 cubic yards. This has lowered the low water surface at the north end of the island between 6 and 7 feet. The dragline will continue its cutting in the river north of the island while the weather is favorable and will then start a cut on higher ground where it will be able to work to better advantage during the high water season.

The Class 14 steam dragline is building a railroad embankment along the east side of the river between the city sewage pumping station and the Columbia bridge. Track laid on this will carry trains which will be loaded by the large dragline with material excavated from the river. This work will be completed in the near future and the machine will move to the north end of town to begin work on the head-race for the new hydro-electric power station.

The work of track laying on the loading and dumping tracks has been resumed and will now be completed in a short time. A 3500-foot transmission line has been built for lighting these tracks and the coal storage yard.

On the Buckeye Street concrete stormwater sewer about 250 linear feet has been completed and

the excavation carried to grade about 75 feet ahead of this. The excavation is retarded by a layer of tough blue clay about 4 feet thick which is encountered about 8 feet below the surface. It is necessary to loosen this material before the clam-shell can excavate it and this has been done mostly by hand. During the past week dynamite has been used with moderate success. The clay stratum appears to be getting thinner, and indications are that it will run out.

The automatic recording river gauge which is now at the City Engineer's office is being moved to the Conservancy office. The U. S. Weather Bureau thermometers and rain gauge will also be taken over by the District. A. F. Griffin will be the observer.

The shop machinery is now in running order and is being used almost continuously for sewer forms, blacksmithing and miscellaneous work.

A contract has been awarded to Horace Shields for clearing, sawing lumber and cutting piles on the west side of the river. This work has been begun. It is expected that over 100,000 feet of lumber will be cut.

C. H. Eiffert, Division Engineer.

RAILWAY RELOCATION

Erie and Big Four—The Big Four temporary main track to carry trains around the work on the concrete structure at Huffman Dam has been completed, and traffic is operating over it. Gravel for ballasting it was excavated from the channel of Mad River at the dam site by the Lidgerwood steam dragline. One steam shovel is working in the 700,000-yard cut at Huffman Hill, excavating approximately 4,000 cubic yards of solid rock per day, in two ten-hour shifts. Drilling and blasting are carried on ahead of the shovel. The levees across Huffman Retarding Basin are 50 per cent completed. The railway grading from Mud Run to Enon is finished. The contract has been let, and work begun, on the water-bound gravel surface of the highway changes at Mud Run, and southwest of Fairfield. Excavation for the channel change in Mad River at Harries, above the dam of the Dayton Hydraulic Co., is well under way. This is being done by a $\frac{3}{4}$ -yard clam shell bucket operated by a revolving derrick, mounted on a wide truck.

The concrete work on the double underpass, carrying the highway and the Ohio Electric Railway under the steam railway lines, just west of the dam-site, has been completed, and work on the steel structure will begin within the next two weeks. Six concrete culverts are finished, and 8 others well under way. Two concrete pipe culverts are also completed.

Baltimore and Ohio—McAndrews Bros. have completed their contract, including about 30,000 yards a little north of Dayton, and are loading up their equipment to move out. Kahl Bros. have completed about 100,000 yards of grading about 2 miles south of Johnson Station, and now have both their shovels at work in two cuts, totaling about 70,000 cubic yards, a little further north. The La Boiteaux Co. is working on the 12-foot concrete arch about 2 miles south of Johnson Station, on which they have completed the footings. The 6-foot arch

south of this, and the 8-foot arch north of it, they have completed. The Vang Construction Co. have the 20-foot concrete arch at Johnson Station and the 30-foot concrete arch at Poplar Creek completed up to the springing lines. The Vang shovel, at work in the 135,000-yard cut just north of Johnson Station, is progressing very favorably. The other Vang shovel is working in the side hill cuts along the river about $2\frac{1}{2}$ miles north of Dayton. Condon & Smith's shovel, in the 97,000-yard cut north of

Taylorville, is making excellent progress. They now have three 12-car trains at work hauling dirt to the fill south of Tadmor, moving about 1,500 cubic yards per day. Miller Bros. have completed the footings for the 26-foot arch at Picayune Creek. They also have a gang concreting head walls for culvert pipes from Tadmor to Picayune Creek, and have begun excavation for the 8-foot concrete arch just north of Taylorville.

E. N. Floyd, Division Engineer.

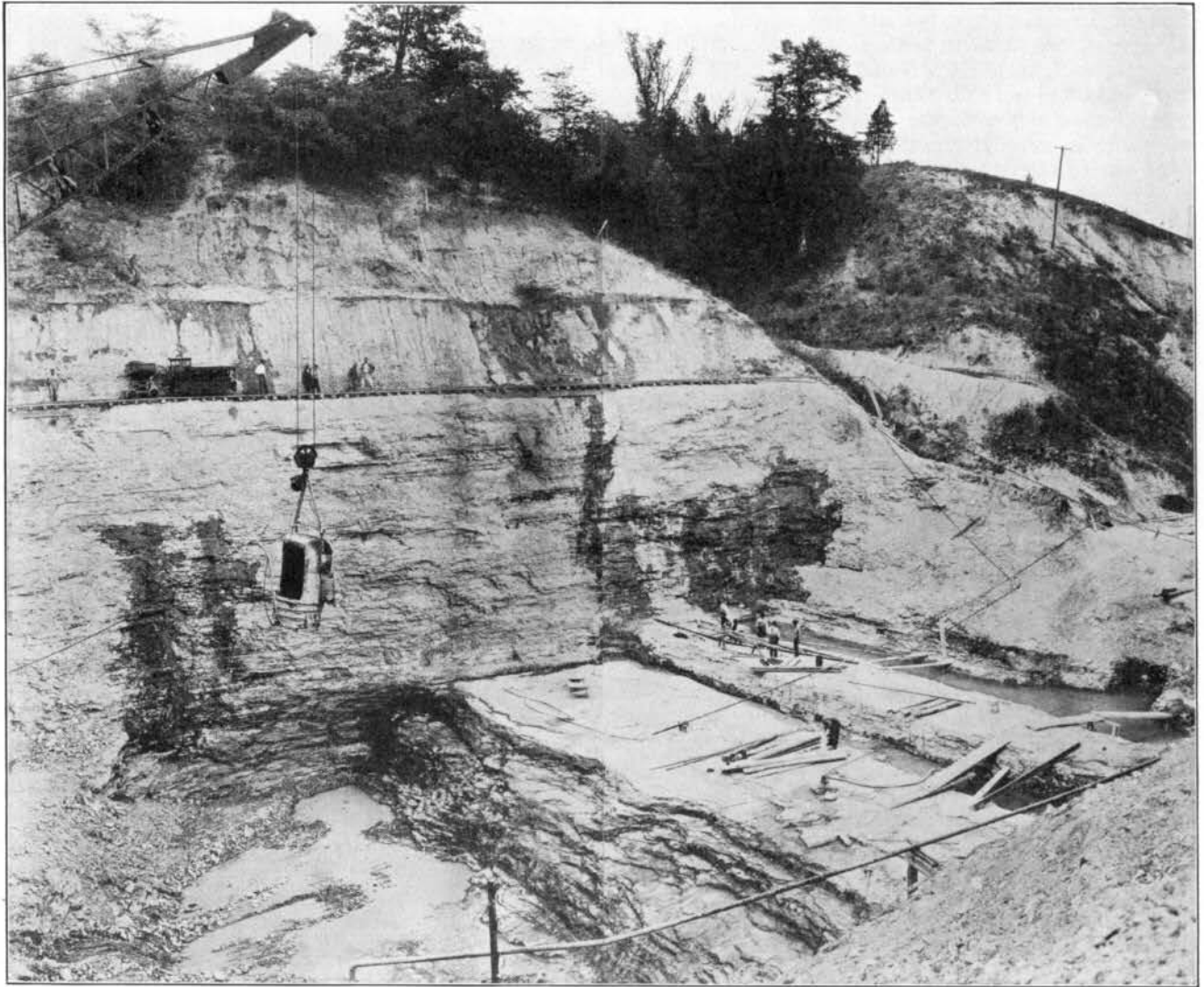


FIG. 58—EXCAVATION FOR OUTLET STRUCTURE AT GERMANTOWN DAM

The excavation is in rock on the further side to about the level of the men's heads who stand on the railway track. The pool of water at the left below is at the bottom of what will be the standing wave pool. The rock floor in the center will be just below the bottom of the lower pool. The excavation just beyond it is for the lower weir. The men are just beginning construction of the concrete forms. The concrete is now being brought in over the three-foot gage light railway track by the gasoline dinky and cars. Fig. 60 shows the same work three weeks later.

An interesting item, showing the importance of little things on a large job like that of the Conservancy District, was among the matters considered at the last meeting of the Conservancy Engineers. Empty cement sacks are now worth 25 cents apiece. It is customary to return these to the manufacturers and receive the credit on the account.

It is estimated that the total credit on the Conservancy work on this item will be \$500,000. There is always a loss of sacks, due to tearing and other causes, amounting to from 5 to 10 per cent. The difference between these two figures represents, on the Conservancy job, \$25,000, a snug little sum, which can be saved by care.

Beginning the Concrete Structure at Germantown

The work of pouring concrete for the outlet structure at Germantown was started on October 5. The function of this structure in the Conservancy Dams was explained in the September bulletin. The concrete shown in figure 60 will form the floor of the standing wave pool and of a second pool just below it which receives the water from the first. Part of both weirs connected with the pools is also shown. The location of the outlet is on the valley floor a little north of the present stream. The excavation here, as at the other dams, is carried down to solid rock in the Cincinnati shale. The structure is being built in "the dry," as at Lockington, and connection with the creek will be made after the work is completed, saving the cost of cofferdams. The entire structure will be 850 feet long and 105 feet in maximum width and will contain 17,900 cubic

yards of concrete. It does not include the spillway, which at Germantown is separate from the conduits. No difficulties have occurred in getting satisfactory foundation at the expected level. The gravel for the concrete occurs conveniently at the edge of the stream a few hundred yards above the work in progress, and at a level only a few feet below the valley floor. It makes a concrete of unusually satisfactory quality. The concrete is mixed in a 1-yard Smith mixer located at the gravel washing plant a few hundred yards up the valley, and is transported to the work in 1¼-yard hopper cars running on a 3-foot gage track laid on a shelf excavated on the north slope of the valley. (See figure 60). This permits the discharge of the mix through inclined chutes to the work below, obviating the use of hoists or derricks. (See also figure 58.)

How the Loan Went Through

With a running start, beginning four days before the actual date set for the drive, the figure at the end of the first day stood at \$33,000, the sums running, for the eight District centers, from \$2,000 to \$8,400. This represented the result of meetings at various centers, at which effective appeals were made, among others, by Mr. Carl Lentz, former prosecuting attorney for Montgomery County, by Mr. W. G. Pickrel, of Dayton, by Mr. Bernis Brien, Sales Director for Liberty Loan in Montgomery County, and by Mr. Morgan, Chief Engineer of the District. It represented also community team work in the way of flag-raising, children's choruses and music contributed by the good women of the camps. Behind it all was the hard, personal work of the Loan Committees, headed by Messrs. Matthes and Wilcock of the Dayton office.

It was an excellent start, but as is usual in such cases, the first days had skimmed the cream, and subscriptions fell away rapidly. Nevertheless, by Sunday, October 6, the figure stood at \$70,000, with two weeks yet to run. That the District would reach the mark set, \$100,000, with a large "factor of safety," was practically certain.

Quite naturally it fell asleep the second week. By Sunday, the 13th, it had only grown to \$81,500, an increment for the six-day working period of \$11,450, a little more than one-seventh of the amount gained the week before.

But in spite of this, four-fifths of the sum set had been subscribed and in two-thirds of the working time. The District was well ahead of the nation, and with an effort could be pushed far over the top. The leaders determined to put it there. There had been plenty of wholesome rivalry between the various camps. All it needed was stimulation. The regular meeting of the Conservancy Engineers for the discussion of construction problems came the middle of the last week. The first order of business was turned into a Liberty Loan experience meeting, with exhortations to the lagging brethren, the latter di-

rected principally, truth compels us to say, toward Englewood, while the virtuous chuckled. It worked perfectly. Englewood, unaccustomed to a rear pew, went home with blood in its eye, and took its place among the redeemed the next day at a special noon meeting, by adding \$14,000 to its previous figure inside of an hour. The rest of the District was hard at work at the same time, so that the subscriptions ran to \$42,350 for the one day, making the grand total over \$140,000. The last two days of the campaign were spent in rounding up the stragglers, bringing the figure to its final mark—\$147,600.

Following are the contributions of the various divisions of the Conservancy work. The first five are the dams, ranked according to the amount of bonds bought per dollar of payroll, the only fair comparison, the standings being given in the last column. The last three divisions cannot well be compared, owing to differences in conditions.

Lockington	\$ 16,450	100
Huffman	11,750	67
Germantown	15,450	56
Englewood	22,350	50
Taylorville	14,450	47
R. R. Relocation.....	30,650	
Hamilton	9,100	
Dayton	27,400	
Grand total	\$147,600	

It will be seen that Lockington once more is far in the lead. She took \$150 in bonds for every man on her working payroll, and \$1.50 for every dollar she earned during the three weeks of the drive. To Messrs. Jones and Shea and to Smith, the "ace of Lockington," who sold \$4,400 alone, special credit is due. Englewood must be given special mention also for its \$14,000 per hour, the speed record of the drive.

Seen and Heard at the Camps

SURPRISE PARTY AT LOCKINGTON

A Pleasant Time Is Had by All.

On Tuesday, October 8, a prominent young lady at the Lockington camp awoke with a violent tooth ache, which obliged her to seek the services of a dentist in Piqua. Arriving in Piqua she told the chauffeur that his services were no longer needed, as she would return by the electric car. She failed to appear, however, nor was anything further heard of her until a telegram was received in the camp by her parents that evening, announcing her marriage the same day at Newport, Kentucky, to one of the Lockington young men. That was on Tuesday. On Wednesday, the young couple returned, received the parental blessing, and on Thursday, October 9, settled down to happiness and housekeeping in one of the camp cottages. The young lady was Miss Maude Bolton, daughter of Mr. and Mrs. J. W. Bolton. Mr. Bolton is superintendent of the work at the Lockington Dam. The young man was Mr. Frank Morrin, who is assistant stock keeper on the work. The Bulletin extends congratulations. For speed and pep this leaves Englewood far in the rear.

STILL THEY COME

The tide of population at Taylorsville continues to rise. A son was born on September 30 to Mr. and Mrs. William Daniels. A boy was born to Mr. and Mrs. T. D. Berryman October 1. Dayton contributed its quota in the person of a girl baby, born to Mr. and Mrs. R. B. Clement, on October 14. Mr.

Clement is Office Engineer on the Dayton River improvement work.

Continuing the subjects of infants, we understand that Hamilton is somewhat peeved because the Bulletin passed over their boy, who arrived several months ago at the home of Mr. and Mrs. R. B. McWhorter. It is a remarkable child, as we can testify from personal inspection, but we submit that we cannot announce even the most remarkable infant until its arrival has been reported to us. The Bulletin congratulates all the parents.

Following the above comes Huffman, announcing the birth, at the Miami Valley Hospital, of a girl baby to Mr. and Mrs. J. S. Gena. Mr. Gena is Office Engineer at the Huffman Dam. Again the Bulletin congratulates. Between weddings and babies the Seen and Heard column is becoming just one congratulation after another.

An ice cream social was given by the Woman's Club of Taylorsville Dam on October 8. The proceeds are to be used for the Red Cross work. The sum of \$39.00 was cleared above expenses, to which \$30.00 was added by a subscription taken by Miss Lucy Mante among the men. The efficiency of the Taylorsville Woman's Club may be gaged by the fact that for one cake they got \$6.50, the victim being Superintendent Sherwood. Special acknowledgment is due Mr. and Mrs. Mitchell for their work, and to Orin I. Carmin, the efficient auctioneer. Everybody turned out for a good time, and got it. The program ended with a dance.

War Service Notes

Kenneth C. Grant writes under date of October 22 that he has been placed in charge of construction at Camp Grant, Rockford, Ill., as Major, Q. M. C., Construction Division. The Camp is to be enlarged to take care of an additional 24,000 men.

Robert F. Eastman has written us an interesting letter about his work in the Coast Artillery Training Camp. He is now at Ft. Monroe, Va., having been transferred to this camp among the first ten men to pass the examination successfully.

A letter from J. F. Burkin, who is now a Sergeant in Battery F, 34th Field Artillery, Camp McClellan, (near Anniston, Ala.) indicated that he was as full of pep as ever, and anxious to get at the Hun. We hope he will have the opportunity, as we believe he would create a particularly hot environment for Huns in his vicinity.

L. Dubois has received a letter from Charles Altfillisch, who is now an instructor overseas among our boys, and doing good work. He writes of meeting James W. Cullen, another former Conservancy boy, and now a sergeant, on top of a mountain in France (probably in Alsace.)

The death was announced at Camp Sherman of John Layman on October 6, of influenza. He had been a worker on the Lockington Dam, and was not selected for the army until September 3. His father, Frank Layman, is also one of the Conservancy workers at Lockington. Mr. Layman's is the first name on the Conservancy Honor Roll to receive the gold star. The Bulletin extends its sympathy to the parents in their loss.

Lieut. K. B. Bragg, U. S. N., formerly with the Conservancy, and heretofore stationed at Pensacola, Florida, is now with the Bureau of Yards and Docks, Navy Department, Washington, D. C.

The following is from a letter written some time since by H. W. Wesle, now engaged in engineering work at Camp Jackson, S. C. (Artillery Corps.)

"A living man who never writes his friends is like a dead man without a tomb stone. . . . Therefore this letter.

"I am now in the motor school. There we dug ditches, made roads, drilled, built fences, (fatigue work and rightly named), for a few weeks, and were then assigned to the special work for which we were fitted—cycle, truck, or auto driving, etc.



FIG. 59—TESTING THE HIGH PRESSURE PUMPS FOR THE HYDRAULIC FILL AT TAYLORSVILLE
The same "giant" (at the left) which will tear down the earth to make the fill. (See page 57.)



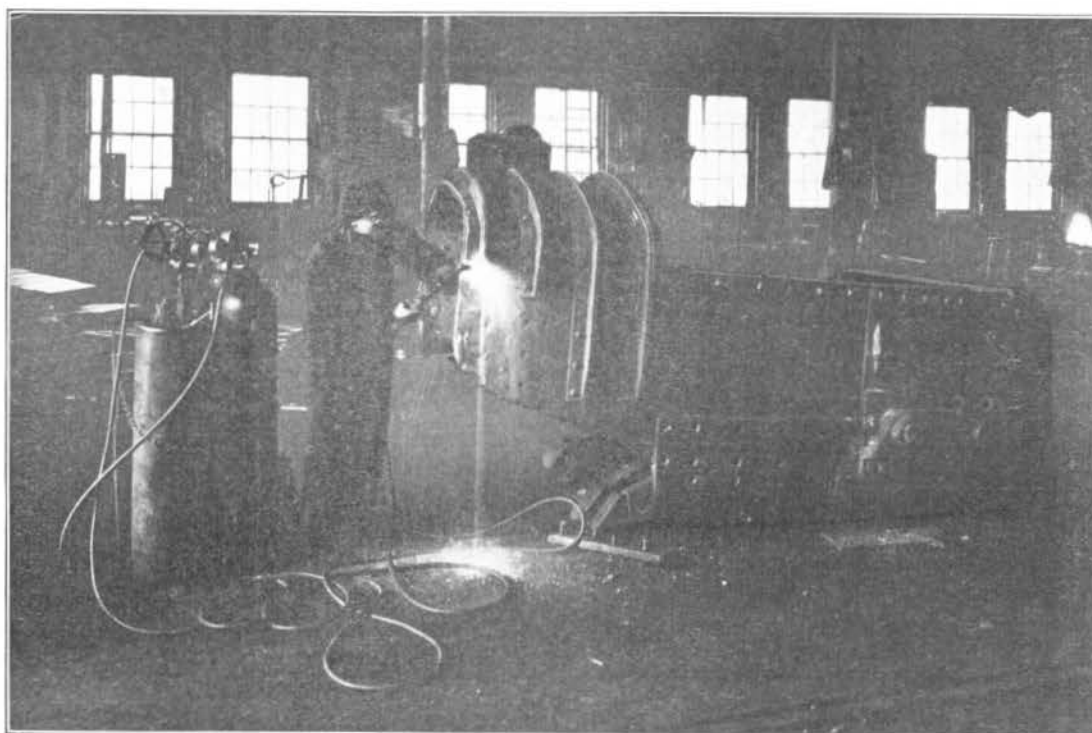
FIG. 60—CONCRETING THE OUTLET STRUCTURE AT GERMANTOWN

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THE MIAMI CONSERVANCY BULLETIN

December 1918



CUTTING OFF A RIVET HEAD WITH AN OXY-ACETYLENE APPARATUS.



FIG. 62.—VIEW FROM TOP OF GRAVEL WASHING PLANT, ENGLEWOOD.

The view is down stream. The excavation for the outlet conduit is seen between the river and the railway track. All of this excavation here shown is now floored with concrete. The forms for the side walls appear in the foreground of the picture and the completed walls will be noted just beyond. Still further down, the forms for the arched tops of the conduits appear, the conduits being double. What look like bridges across the excavation are two timber trusses for supporting the concrete chutes, which differ only in detail from those described in Figure 68. The concrete is carried in cars along the top of the bank and discharged directly into the chutes. This arrangement has advantages here over the use of concreting towers and chutes.



FIG. 63.—THE NEW MIAMI RIVER LEVEE AT HAMILTON

The levee is being built of materials taken from the river by the Class 24 Bucyrus dragline seen at the left. The top of the old river bank, on which the new material has been piled, can be clearly distinguished. The river is running in its lowered channel, about 6 ft. below its former level. It is planned later to build a highway on the top of the levee.

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THE MIAMI CONSERVANCY BULLETIN

PUBLISHED BY THE MIAMI CONSERVANCY DISTRICT

DAYTON, OHIO

Volume 1

December 1918

Number 5

The Effect of the Armistice

The signing of the Armistice, marking as it does the practical end of the war, has already had its effect on the District in reducing some of the difficulties in the way of carrying on the work. With the removal of priorities, materials and equipment are easier to obtain. The load of the government on the railways being lightened, shipments can be more prompt. The same causes will of course later lead to lower prices.

More than in either of these directions the improvement appears in the easing up of the labor

situation. This has been perhaps specially noticeable in an industrial region like southwestern Ohio where many war materials have been manufactured. Many men, released from such work for other industries have already become available. With the competition for jobs thus reintroduced, the efficiency of labor is being increased; less efficient men, it is possible now to replace with others. The work of the District, which has moved steadily forward in spite of all these difficulties, can be confidently expected to reap the benefits of the better times ahead.

Paying for Liberty Loan Bonds

A word of praise is not amiss here for the manner in which those who subscribed for Liberty Loan bonds during the recent campaign, are completing their payments. Many who paid down the usual 10 per cent at the start have since paid up in full, and are now in possession of their bonds, although according to the government schedule, the last installment need not be paid until January 30 next. Their wisdom in paying up promptly is obvious, as the interest on deferred payments, while not a big item, is worth saving. The next installment is due

in the United States Treasury December 19. It should therefore reach the banks not much later than December 16. Those who complete their payments between now and December 19 will have to pay 26 cents interest in case of a \$50 bond, and 52 cents in case of a \$100 bond. After that date the interest will be more. Some Dayton banks are now able to deliver bonds immediately upon completion of payments. Others can do so only at intervals. It is this latter fact which explains why some of us have had to wait for bonds even after paying for them in full.

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Subscription to the Bulletin is 75 cents per year. At news stands 10 cents per copy. Business letters should be sent to L. F. Wilcock, Assistant Engineer, Miami Conservancy District, Dayton, Ohio. Matter for publication should be sent to G. L. Teeple, Miami Conservancy District, Dayton, Ohio.

The Conservancy Shop

Why It Was Considered Advisable to Have the Work Done by the District's Own Men.

A number of reasons determined the authorities of the District to have a shop manned and managed by the District's own men. On any job of construction, there is always much work in repair and rebuilding of machinery. This work might be done by outsiders, but not so well. Dayton shops were swamped with government work, and such private work as the government permitted. To get a repair job rushed, as it ought to be rushed, would be difficult, at times impossible. A Conservancy shop could throw its whole force, if necessary, into the emergency. Many types of machines to be used on the Conservancy work, such as steam shovels, draglines, rock drills, etc., were such as an ordinary shop would not be accustomed to handle. Again, during

when the entire work was completed. With a shop of its own, the District could set these same men at work putting the entire equipment in first-class shape, so that it would fetch the highest possible price in the market. Such a procedure would pay for its cost many times over. All these considerations pointed to a Conservancy shop.

The property on Kiser Street at the head of Protzman Avenue, formerly occupied by the Dayton Rubber Manufacturing Co., was leased in the spring of the present season, and machinery gathered together to equip it. The property includes a large brick shop building, 75 by 200 feet in dimensions, with attached foundry. This is used as the machine and blacksmith shop and garage. There is also a

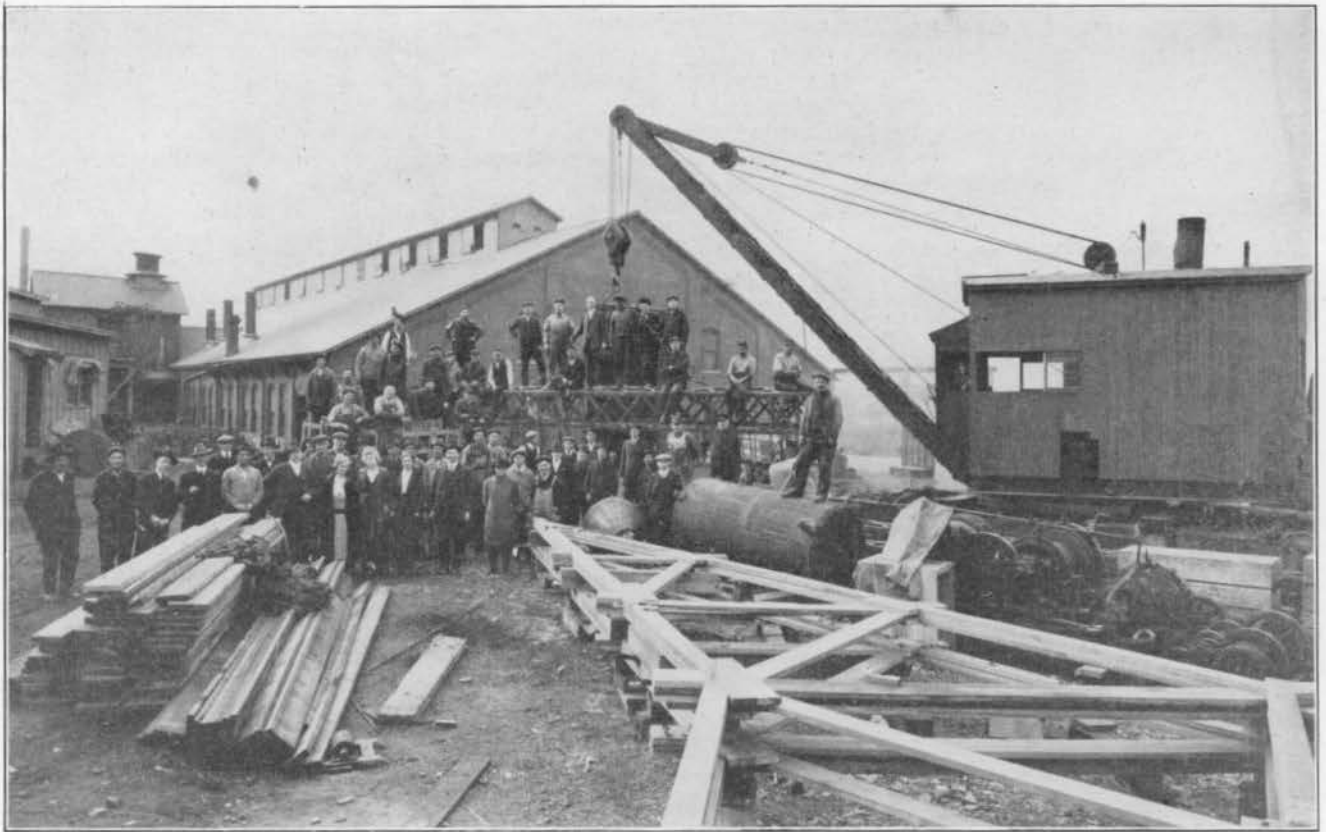


FIG. 64—EXTERIOR OF CONSERVANCY SHOP.

The view is taken from the shop yard. A concreting truss for the Germantown dam appears in the immediate foreground. The 15-ton locomotive crane at the right acts as switch engine, derrick, and coal unloader. The shop is 75 by 200 ft. in size. The warehouse office appears on the extreme left.

the winter, for several seasons, little work on the dams could be done. The dragline, dinkey and steam shovel runners, and other similarly skilled men would be idle. They might seek work elsewhere, and their places would be difficult to properly fill. If the Conservancy had a shop of its own, these men could be used through the winter in helping to make extra repair parts, against future breakage, and in putting the whole construction equipment into first-class shape for the coming season's run. Finally, there was the important question of salvage

long frame building, which is utilized as a warehouse. Both the buildings are connected by spur tracks with the Baltimore & Ohio railway leading north out of Dayton. The property has thus become the headquarters of the entire machinery, equipment, automobile, truck, and supply departments of the District. Wood work alone is not provided for. This class of work is being handled by a local firm.

The equipment includes considerable special machinery. A $9\frac{1}{2}'' \times 12''$ Worthington air compressor runs a Green pneumatic riveter, air drills, the tire

tank in the garage and an 800-pound pneumatic hammer in the blacksmith shop. The lathes include two Le Blonde machines, 18"x10', and for the heavy work, an American lathe, 42"x16'. For flat work, there is a shaper and a 72"x30" Hughes & Phillips planer. A power punch and shears handles heavy cutting in the blacksmith shop. An oxy-acetylene welding and cutting outfit is of great service in quick repair of heavy pieces, like dragline buckets, etc. A special 15-ton locomotive crane does all-round service, acting as a switch engine about the yard, as a clamshell coal unloader, and derrick for loading and unloading heavy equipment to and from trucks and cars. A spur from the service track runs into the shop building, enabling dinkies or dump cars to be run on their own wheels directly to and from the point of repair.

The work includes not only repairs and re-building, but also the building of machinery and equipment which is new.

having in its Master Mechanic, William McIntosh, a man big enough to fill it. His work in relation to the machinery of the District is, as has been well said, much like that of a physician and surgeon among human kind. He is liable to be called in any of a dozen directions at almost any time, and when he arrives he must be ready to act at once. A passenger in the Master Mechanic's car, hitting the high spots of a country road at 45 to 50 miles an hour, on the way to the "bedside" of a disabled machine, gets a vivid impression of his host's energetic interest in these emergency cases. (The writer can testify, as he has himself hit the roof of the said car). An additional advantage is that Mr. McIntosh has worked for years with C. H. Locher, the Construction Manager, so that the two are able to give the District the benefit of team work developed over a long period of time.

As an instance of emergency work, the erection of the big Class 24 dragline at Hamilton, newly ship-

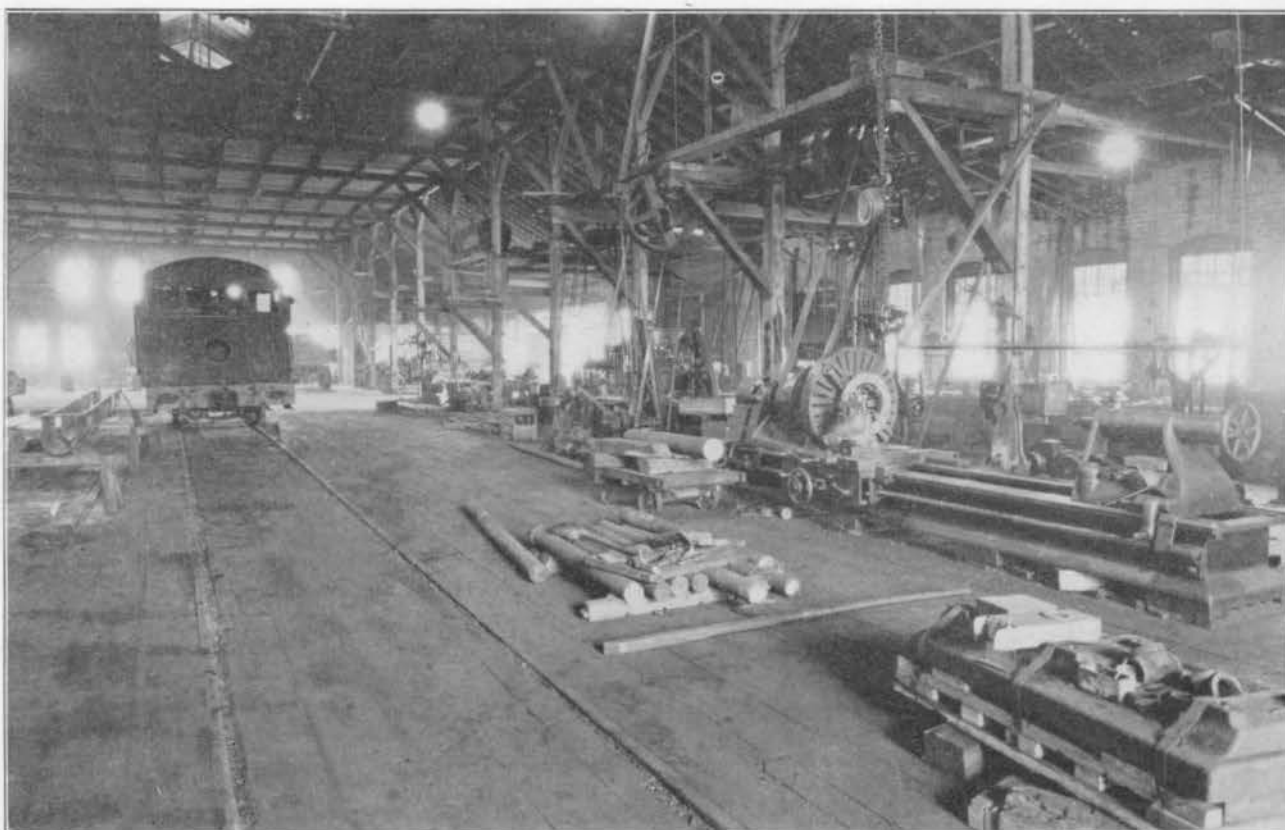


FIG. 65—INTERIOR OF CONSERVANCY SHOP.

The heavy lathe in the foreground is for use on dragline axles and similar heavy pieces, some of which appear in the foreground. The standard gauge locomotive at the left is about to be overhauled for use at one of the dams.

The repair work is perhaps as important as any of the three. The breakdown of a powerful steam shovel or dragline may seriously delay not only its own work, but important work dependent upon it. There are 18 steam shovels and draglines at work in the District, besides pumps, dinkies, dump cars, steam rollers, air compressors, derricks, concrete mixers, locomotive cranes, etc., totaling several hundred machines. There are 121 dinky locomotives and dump cars alone. To handle the repairs on all this machinery, under heavy service as much of it is, is a man's size job, and the District is fortunate in

ped to the District "knock-down" from a Mississippi swamp, with its erecting gang of some 18 men, came to a standstill last summer due to misfit, by error or accident, of the heavy angle plates at the top of the "A" frame. The local foreman, competent, but unaccustomed to heavy dragline work, found himself absolutely "up against it" and sent in an S. O. S. to headquarters for help. The Master Mechanic made the distance to Hamilton, some 40 miles, in an hour and fifteen minutes. Two hours later the misfit plates had been rebent and connected up and the work of erection was in smooth swing again.

An important feature has been the re-building of machinery to modified and improved designs. It was not always possible, in the rush of war work, to secure equipment entirely adapted to Conservancy needs. Also, experience with machinery always suggests ways of improvement. An instance covering both cases is that of the gravel washing plants. These were modified in several important particulars. Changes in the relative positions of the bins, special measuring boxes for the coarse and fine aggregates, and additional contrivances to get rid of water coming through the sand separator, were all found necessary; and the improvement is still proceeding. Another interesting instance is the modification of the big dragline, now at work in the Miami at Dayton, to adapt it to its work when mounted upon a scow. It must load into scows moored close beside it. An ordinary dragline loads its bucket by pulling the bucket toward the machine and unloads by hoisting it to the end of the boom, swinging it and dumping. To load the gravel

scows, this will need to be changed so that the bucket will be loaded while being pulled away from the machine, and dumped after being drawn in close to the dragline platform. The necessary modifications in the design are now being worked out and the work will be done in the Conservancy shop. There is also considerable work that is entirely new, like the construction of the traveling trusses, which carry the concrete chutes for the outlet conduits at Germantown and Englewood. A list of such new features would include the stern wheel steamboat which will haul the gravel scows up and down the Miami River, together with the scows themselves. The design of all these new and modified features is in charge of A. S. Robinson, the District's Mechanical Engineer. Like Mr. McIntosh, he has been associated with Mr. Locher during many years on construction jobs like that the District, and furnishes the third element, no less essential though less in evidence, in the shop team-work which is producing the results.

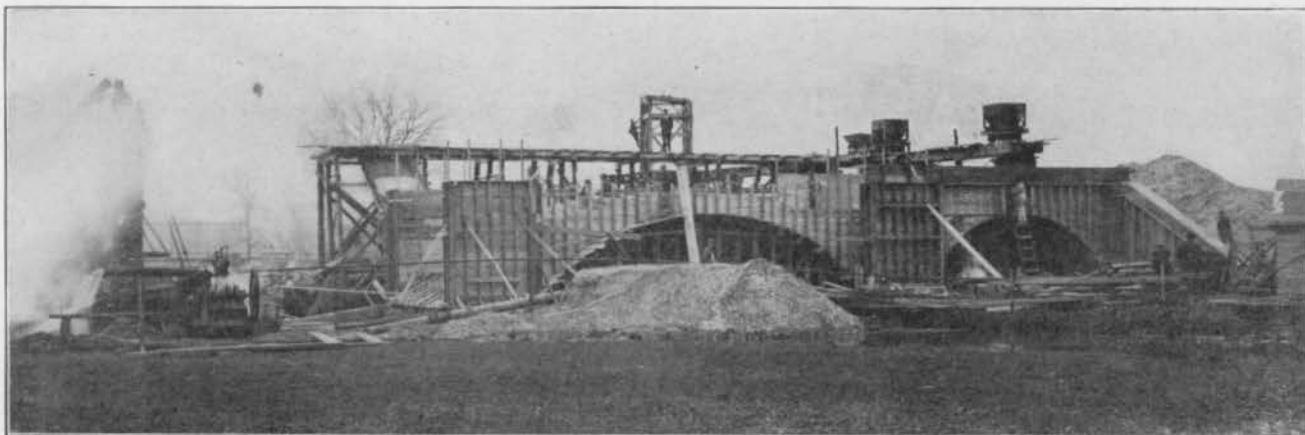


FIG. 66—CONCRETE FORMS FOR BIG FOUR BRIDGE AT MUD RUN.

This shows the forms for two of the arches ready for the concrete. It will be a three-arch bridge, with a 40 ft. center span and 25 ft. end spans. The nearer arch is the center span. The forms for the third arch have not yet been erected. A similar bridge will carry the Erie Railway just beyond this, the two single tracks being 60 ft. apart.

New Technical Report Off the Press

The fourth volume of the Technical Report series, entitled "Calculation of Flow in Open Channels," is off the press. It was written by Ivan E. Houk, hydrographer and flood forecaster for the District, and is devoted primarily to a description of the methods used by the Morgan Engineering Co. in determining the maximum flow of the Miami River and its tributaries during the flood of March, 1913, from data taken several months afterwards. One chapter deals with the calculation of that flood flow where it passed through contractions in the channel, as for instance at bridge piers. This method is accurate and was utilized extensively. The narrow river section near Taylorsville, formed by the masonry abutments of the old State canal aqueduct, between which the entire flood flow passed, is cited as a typical example.

A large section of the volume is devoted to a discussion and comparison of different formulas, many of them of foreign origin, used in the computation of river flow.

The volume as a whole is the most complete treatise presenting the present state of knowledge relative to the calculation of flow of water in open channels that has yet appeared, collecting and comparing as it does data obtained through observation and experiment by widely scattered authorities both in the United States and in Europe during a long period of time. In this respect the volume fills an urgent want.

The book contains 283 pages, 79 illustrations and 48 tables. It may be obtained upon application to the Office Engineer at the headquarters office, Dayton. The price is 75 cents.

G. H. Matthes.



FIG. 67—RAILROAD CUT AT HUFFMAN HILL, NOVEMBER 8, 1918.

The total excavation will amount to 683,000 cubic yards. The excavation to date is 325,000 cubic yards. The maximum depth of the cut will be 120.4 ft., of which about 85 ft. is already removed. The total length will be 4800 ft. Most of this cut is in rock.

November Progress on the Work

GERMANTOWN

On November 5 one month had elapsed since concreting was started. During this period 2,800 cubic yards had been placed, the maximum run for any one day being 194 cubic yards. All of the outlet floor, the weirs, 90 feet of the partition wall and 145 feet of the temporary floor in the conduits have been completed. At the present time, November 18, a total of 3,500 cubic yards are in place.

Track for the travelling crane for the concrete work has been laid and one of the cranes erected. Carpenters have completed putting together the lower portion of the movable forms and it is now being erected in place.

Excavation for the outlet and conduits has progressed very satisfactorily. At the present time approximately 70 per cent of the total excavation for the conduits and the concrete structures at the inlet and outlet has been completed.

On October 21, Conley's team force started stripping on the south side of the river. This work was continued until November 8, when Conley's force was transferred to Dayton.

The influenza epidemic affected this camp to the extent of 18 cases, with one death, during a period of four weeks. At the present time, there are no new cases, and the old ones are improving very rapidly.

A. L. Pauls, Division Engineer.

ENGLEWOOD

The large Bucyrus dragline has finished the excavation for the outlet conduit. This marks the completion of a most important step in the progress of construction. Following this, the dragline is now proceeding down the river bed and across the dam-site, removing gravel, boulders, stumps, muck and all material unsuited for the foundation of an earth dam. This will be piled in a windrow along the east bank of the river, to be later placed in cars by a subsequent operation of the dragline and hauled to the waste bank.

Concreting of the outlet conduits is progressing favorably. The inverts, or floors, will be finished to the upstream portal before the month is out. The sidewalls of the lower portion of the conduits are well past the center line of the dam; in other words, they are more than half finished. A beginning has been made upon the arches, which is the final step in concreting the conduits. Specimens of the concrete as actually placed, made into cylinders and tested, show unusually high strength. Steam coils have been installed in the material bins at the gravel washing plant to heat the sand and gravel while concreting in freezing weather.

Work on the cross dam, to enable the hydraulic fill to commence east of the river, is progressing favorably. In addition to excavation from the regular borrow pit, material for this embankment is

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FIG. 68—THE WORK AT GERM

The excavating and concreting for the outlet conduits at the Germantown dam are proceeding at the same time. The excavation is done by the Class K Lidgerwood dragline excavator seen in the picture at the left, which digs the material ahead of the concreting and loads it into 12-yard dump cars, two of which may be seen. The dump car trains are hauled by 40-ton standard gauge dinkey locomotives, two of which may be seen at the extreme left.

The concrete is mixed in the gravel washing plant seen in the distance beyond the dragline excavator. It is carried to the work in $1\frac{1}{4}$ -yard hopper cars on a 3-foot gauge track laid on the rock shelf which appears cut in the hillside above the excavation. It is dumped from the cars into inclined chutes, several of which may be seen, which carry it down the hill into the forms by gravity. Several of these chutes, for the outlet works at the right, are supported on scaffolding, but for the conduits they will be hung from travelling trusses which span the rock

excavation. One of these trusses appears in the picture with its hanging chute. The truss runs on tracks laid on narrow shelves cut on each side of the rock excavation. To fit the excavation these tracks are laid at different levels on the two sides. The timber supporting the further rail may be seen just over the vault-shaped forms for the conduit arches. The truss is carried by two "A" frames, supported on two-wheeled trucks running on the rails. The same device is in use for the concreting at the Englewood dam. The track is extended as the excavation proceeds, enabling the trusses and chutes to discharge concrete anywhere into the excavation.

The concrete structure, which is for the purpose of carrying the water of Loramie Creek through the base of the dam after completion, consists of three main portions; an open channel leading the water to the dam itself, a pair of tunnels or conduits piercing the base of the dam, and another open outlet channel leading the water from the lower toe of the dam into the valley below. This outlet channel is



ANTOWN, NOVEMBER 29, 1918.

to be of special construction to absorb the energy of the water rushing out of the conduits in times of flood, and has been already described in the September Bulletin. In the picture the work both on the conduits and the outlet structure is shown. The near ends of the arched concrete forms which appear mark the position of the downstream ends of the conduits, the view being upstream with Twin Creek out of the picture a little to the left. The conduits as built will be two-storied. The walls of the lower story may be seen beneath the arched forms. This lower story will be filled with gravel, after the dam is completed, and floored over at the top, being then no longer necessary. It is necessary during construction in order to provide ample conduit capacity to guard against possible harm to the partly built dam embankment during floods.

The concrete work to the right of the arched forms is part of the outlet channel. The water of the creek, after the dam is completed, will issue from the conduits and flow down the concrete stairway,

which appears in the picture, and on into the pool basin which lies just beyond the left hand cross-wall, or "weir;" then on over the weir into the second pool basin, between the two cross walls; then on over the right hand cross wall to the concrete floor or apron at the right, whence it discharges into the valley below. The outlet is at present blocked by the valley bottom at the extreme right, which will be excavated later. The longitudinal wall in the center of the picture, when finished, will run up to and connect with the dividing wall between the two arched conduits. Its purpose is to prevent violent cross eddies in the water issuing from the conduits at times of extreme flood.

The little house at the left shelters the electric motor of a centrifugal pump which keeps the excavation from filling with ground water. The transformer station which supplies electric power for this and various other purposes at the dam is within the little fenced inclosure seen in the picture at the top of the hill.

being taken from the spillway excavation about 1,400 feet west of the river. This latter operation produces double results; it furnishes embankment material as a by-product from a necessary excavation.

Foundations for the monitor pump house are being graded and concrete bases installed for the 10-inch pumps which will supply the high pressure streams for excavating the embankment material.

The camp schoolhouse, adapted to the purpose from one of the summer bungalows acquired by the District, is ready for occupancy and admirably suits the purpose. In addition to the regular studies, a manual training class is being conducted under the guidance of the carpenter superintendent, H. H. Rupe, and one of his assistants, John Cypherd. The boys are being taught the handling of tools and incidental to their class work are making articles of practical use in the camp and on the work.

H. S. R. McCurdy, Division Engineer.

LOCKINGTON

Favorable weather has permitted the concreting to be carried on at a good rate during the month. The floor of the outlet works has been completed from the north end to a point about 95 feet south of the center line of the dam. The retaining walls of the same have been completed to their full height from the north end of the structure southward for a distance of 125 feet, and are partially completed still further south as far as the finished part of the floor above mentioned. The maximum height of these

walls so far attained is about 50 feet. The total amount of concrete placed up to November 15 is 11,150 cubic yards. The best day's run during the past month was on November 5, amounting to 330 cubic yards. Four 27-foot sections of richer concrete for the lining of the conduit have also been poured.

Drilling and blasting of the bed rock for the hydraulic jump pool is being carried on. The pumps supplying water to the gravel washing plant have been moved to a sump in this excavation. Drilling for the grouting and drainage of the foundation rock is also in progress.

The erection of the Class B Lidgerwood dragline has been completed and the machine will begin this week loading gravel from the storage pile east of the channel excavation into the cars which carry it to the gravel washing plant. Several changes have been made in this plant to obtain a drier sand, and also to retain the finer particles so that they may be used in the concrete. Equipment is being installed to heat the concrete aggregates by means of steam pipes, so that concreting may be carried on as long as possible into the cold weather. Clearing the trees and brush from four or five hundred feet of the outlet channel site leading to Loramie Creek from the damsite has been done.

The repairs on the Port Jefferson dam, now being made by Price Bros., will be completed in about ten days. The rock fill is now being placed in the timber cribs. One layer of the old decking of the dam is being replaced by new plank.



FIG. 69—EXCAVATION FOR CONCRETE STRUCTURE AT THE HUFFMAN DAM.

The temporary track carrying the Big Four Railway around the proposed outlet works appears at the left. This temporary track, about 7,000 ft. in length, had to be finished and ready for traffic before the excavation could be begun. The old track ran just beyond the gravel washer seen at the right. The excavation is being done by the dragline excavator, the material being used to build railway embankment between the dam and Dayton. The old bed of Mad River is a few rods to the right of the dragline, the stream being diverted several hundred feet to the east at this point.

Excellent progress is being made on Road No. 9, which connects the road at Lockington with the Infirmary Pike, and taking the place of the former road across the damsite, now abandoned. The teams are now working on a fill near the north end of this road.

Materials are now on the ground to connect the substation at Piqua, now being used as source of electric power, with the new transmission line to Piqua of the Dayton Power & Light Co. The connecting line will be erected in the near future.

Boxing in of the pipes at the camp, and of the cottage foundations, has been nearly completed. The camp and mess gardens have been plowed.

B. M. Jones, Division Engineer.

HAMILTON

Work has begun on the east levee embankment south of the Columbia Bridge by the Class 14 Bucyrus dragline, the material for the levee being taken out of the proposed channel cut.

Pascal and Marshall Avenues have been surfaced with gravel to form a detour, taking the place of Peck Avenue, which has been shut off by the railroad embankment. This work was done with two 5-ton trucks loaded by the Class 14 dragline.

The large dragline is continuing the work of excavating the low water channel and building the levee. A surfacing of loam is being placed by the dragline on the river side of the levee, on the berm, and on the channel slope.

The railway grade extending along the river from the south waste bank north to the Columbia bridge, has been completed, the work being done by the small dragline excavator. A gang of men is now surfacing and aligning track. Material excavated from the river will be hauled to the waste bank along this grade.

The Buckeye Street sewer has been completed for a distance of 475 feet, the excavation being about 60 feet ahead of the concrete work. Gravel and sand for the concrete are being obtained from the trench. No clay is being encountered at present.

The portable saw mill for sawing up the timber on the west side of the river is in place and a considerable amount of logging has been done.

C. H. Eiffert, Division Engineer.

TAYLORSVILLE

Road No. 12, extending from the west end of the damsite to the Brown Schoolhouse road, is completed. A contract has been let and work started November 12 on Road No. 13, extending some 4,000 feet from the east end of the damsite to the Taylorsville Pike. A temporary road 1,750 feet long has been constructed from the west end of trestle No. 1 over the Miami River to Road No. 13, making a road across the Miami River at the damsite and providing a more direct route to Huffman dam and other points east.

The earthen cofferdam, 30 feet high and extending about 500 feet along the east bank of the Miami River, to protect the outlet works excavation from high water, has been completed by the big dragline. A large part of the base of this has been placed in water from 4 to 20 feet deep. The first effect of the

weight of this embankment was to thrust the silt and mud of the river bed out into the stream, upheaving the river bed in places above the surface of the water. This continued until the material under water had reached a slope of 4 or 5 to 1, flat enough to counteract the thrust.

Not much has been done on the end dam of the hydraulic fill pool on the west bank of the river, due in part to diverting earth from it to the cofferdam on the other bank, but principally to breakdowns of the steam shovel.

Sluicing for the hydraulic fill began October 17. A number of necessary adjustments have since been made on the water pumps. Progress was also slowed down, at first, due to the shallow covering of surface earth above the Cincinnati rock, making shifts of pipe lines necessary. On November 5, 1,000 cubic yards were moved in about 8 hours. The plant has been shut down since, awaiting the completion of excavation for the cofferdam.

Three double houses and one special No. 8 cottage are under construction at the camp. The shop and warehouse on the east river bank are completed and the machinery installed. Gravel walks have been laid from all cottages and buildings to the streets.

O. N. Floyd, Division Engineer.

DAYTON DIVISION

Excavation amounting to 206,300 cubic yards has been removed from the river channel between Island Park Dam and the mouth of Mad River by the two large dragline excavators. A considerable amount of this material was moved more than once in order to place it in final position in levee, spoil bank or channel fill, making a total yardage of 313,500 handled by the two machines to date.

Dragline Excavator No. 789 is building a cofferdam for the purpose of lowering the 12-inch water main in the river channel opposite Linwood Avenue.

On the construction of the enlarged levee along the east bank of the Miami River north of Dayton, (Contract No. 41) a total of 33,000 cubic yards of embankment has been placed by the Monhigan Walking Dragline, of the McWilliams Northern Dredging Co. Team work has been started on the lower end of the Contract opposite Island Park, where a section of the work 1,400 feet long will be constructed by hauling with wagons. The old levee is being raised about five feet.

Sunset Avenue Dam has been completed except for a closure section of 96 feet, which will be left open until the Sunset Avenue Drydock is completed. Work has just been started on the drydock.

A Class 9½ Bucyrus dragline excavator has been received and is being erected at Herman Avenue Bridge. This machine will be used with a 60-foot boom and one-yard bucket.

Fair progress is being made on the construction of the steam tug. It will probably be ready for launching about the end of the year.

Price Brothers have graded the site of the concrete block factory and the factory building is under construction. The concrete blocks will be used for paving the lower slopes and bed of the improved channel around bends where caving might occur on an unprotected bank.

C. A. Bock, Division Engineer.



FIG. 70—LOWERING A 12" WATER PIPE IN THE MIAMI RIVER AT DAYTON.

The pipe, which carries the city water supply underneath the river, had to be lowered from $2\frac{1}{2}$ to 3 feet to accommodate the deepening for the improved channel. The dragline first built an earthen cofferdam around the portion to be lowered, out of material excavated from the river bed. It then excavated a trench along each side of the pipe, from which the water was pumped by a centrifugal pump driven by an electric motor in the little house at the left, the discharge water from the pump showing clearly in the picture. Men with shovels then carefully lowered the pipe by digging the material from beneath it. The water supply carried by the pipe was not stopped at any time during this operation, although the water pressure was somewhat lowered by partially closing the supply valve as a precaution.

HUFFMAN

The delivery and placing of the gravel ballast for the temporary relocation of the Big Four main track around the site of the concrete structure for the outlet works of the dam, was completed on October 28. Big Four traffic was diverted to this new location at 11:00 a. m. October 29, and at 1:00 p. m. the same date, the large electric dragline began tracking into position to commence the excavation for the outlet works. The excavation will be started at the upper end and proceed down stream. This will enable the placing of concrete to follow up the excavation while the latter is in progress. The concrete plant is so situated as to make this program most feasible.

Preliminary investigations seemed to show that the seepage water from the river side of the excavation could be handled by pumping. To be sure of the exact conditions, excavation was made along the side that is out in the old bed of the Mad River, by means of the dragline excavator while it was being tracked to the upper end, the excavated material being used for railway embankment. The results have been gratifying. Almost impervious clay and rock material were found up to the ground surface, without water bearing gravel on top. Fifty-five hundred cubic yards had been excavated with this dragline prior to November 16. The material is being placed

in the fill for the relocation of the Big Four and Erie Railroads from Dayton to the damsite, thus utilizing material that otherwise would have had to be wasted.

After the smaller steam dragline had completed the excavation of the ballast gravel, it was taken across Mad River and completed the remaining 1,000 cubic yards at the entrance of the diversion channel. Then, on November 12, it began excavating the cut-off trench along the axis of the dam, across the valley to the Erie Railroad. Five thousand cubic yards of this had been excavated up to November 16.

The second story of a barn in camp has been remodeled for community service. With comparatively little work or expense, an unwelcome building has been converted into an attractive and commodious hall, which will be a center for the social activities of the employees and their families.

C. C. Chambers, Division Engineer.

RAILROAD RELOCATION

Erie and Big Four. The grading of nearly $3\frac{1}{2}$ miles of the relocation from Enon west is almost completed. Twenty-three car-loads of rails have been unloaded at Enon. The team outfit of Condon & Kolterman, subcontractors under the Walsh Con-

struction Co., is at work grading the roadbed south of Fairfield.

Drilling and blasting are being continued in the big cut at Huffman Hill. The steam shovel there is working two ten-hour shifts per day. It has moved an average of about 1,350 cubic yards per day during the month. The material excavated is used for building the two levees east of the cut and also for railroad embankment on the relocation west of same toward Dayton. Material excavated for the conduit and outlet works of the Huffman Dam will also be utilized as railroad embankment west of Huffman Hill.

Preparations are being made for the Mad River channel change immediately above the Dayton Hydraulic Company's head gates.

Contractor J. C. McCann, who was awarded the contract for the paving of nearly two miles of the relocation of the Dayton and Springfield Pike, is making excellent progress. He expects to get the bottom course all on before bad weather, so that the subgrade will not get soft and stop his work later.

Frank Hill Smith, Inc., has completed two concrete bridges at the west end of the relocation between Dayton and Huffman. Good progress is being made on his contract for two other culverts and for a retaining wall at Huffman. Three concrete bridges have been completed during the past month

and three others are under construction under the direction of Mr. Sprague, who is superintendent in charge of the District forces. Good progress is being made on the bridge at Mud Run, and piers are being driven for the Smith ditch bridge west of Enon.

Baltimore & Ohio. Kahl Bros.' shovels are still working in cuts south of Johnson and are making fair progress. La Boiteaux Co. has completed the 12-foot arch north of Dayton and is making arrangements to work on the numerous head walls for culvert pipes from the Taylorsville dam south to Miami River bridge. The Vang Construction Co. is working one shovel in side hill cuts along the Miami River at a point about 2½ miles north of Dayton, and is making fair progress. The other shovel, working in the 135,000-yard cut south of Poplar Creek, is moving about 1,000 yards per day. The 30-foot concrete arch at Poplar Creek is about 90 per cent complete. The Condon & Smith shovel has about half finished the 97,000-yard cut north of Taylorsville. Miller Bros. have made considerable progress in head walls for culvert pipes. The 26-foot arch at Picayune Creek is about 90 per cent complete. D. H. Condon has completed his contract, and arrangements have been made to load his equipment at Tadmor.

Albert Larsen, Division Engineer.

The Conservancy Athletic Association

The first meeting of this association was held in the headquarters office on November 12 and an organization was effected. The Executive Committee consists of Walter M. Smith, Chairman; Miss V. M. Richmond, Secretary; E. C. Chandler; L. F. Wilcock. It was agreed to organize a Basket Ball Team, of which L. C. Bernard was elected Manager and C. S. Bennett, Treasurer. Arrangements have been made for practice games, two of which have already been played. The following men have appeared on the floor as candidates for the team: Maltby, Everhard, Floyd, Heier, Sylvester, Sullivan, Hall, Shea, Kuboski, Johnson, Lehman, and Huffman. This is good material, but more is wanted. If you like any athletic game, come out to the practice. Announcements of dates, etc., will be posted on the

Bulletin Board in the lower hall of the headquarters office. Watch it. Games will be arranged with rival organizations. If you can't play, be a fan. A "barage" of noise helps. A special, high-explosive, Conservancy yell, a "Jack Johnson" of its kind, is under consideration. The organization of Bowling Teams is proposed. There was good fun on the alleys last winter and better may be looked for the coming season. A Basket Ball Team is planned also among the young women. All this is as it should be. Athletics can be made of real benefit in any industrial organization large enough to furnish the necessary material. This is the case with us, and the Bulletin hopes and expects to see the new organizations prosper. It will be glad to extend its aid.

The Liberty Day Celebration

"Liberty Day" was celebrated by the men of the District as it was by workers all over the country. Whistles and bells at two o'clock in the morning had proclaimed the tremendous news of peace. Employees gathered in their accustomed places, but not to work. Work was out of the question; it was a spontaneous holiday. The headquarters office at Dayton broke loose about nine o'clock. Main street had been an uproar of parading people from the railway tracks to the river, on foot and in wagons, automobiles, and motor trucks, since early in the morning. The maelstrom was irresistible and when about nine o'clock a two-ton truck from the garage

drove up, the entire headquarters office "piled in," overflowed into touring cars and "flivvers," and joined the procession. There must have been fifty people in the big truck alone, packed like herrings, the Chief Engineer in the center, rolling down Main Street amid the uproar. Now and then the truck would stop or start with a jerk, bringing the human mass up—bang!—against the front or rear bulwark. But no one was hurt, and as each shock passed, the crowd would catch its breath and yell like a high-school gang. Strange sights were seen. The writer will never forget one glad dignitary of the District, jammed along the truck "side line," with a joint of

8" stove pipe in one hand and a brick in the other, banging the two together like the loud timbrels of Holy Writ, while the big truck careened and lurched down Main Street; and every now and then, when his improvisations on his remarkable instrument could no longer express his feelings, emitting joyous yells.

A Conservancy girl, who stood in the truck just back of this gentleman, naturally did not recognize him. Perceiving a friend on the sidewalk and needing some means of salutation, in her excitement she snatched the hat from the dignitary's head in front of her, waved it frantically to her friend, then clapped it back in place again. She was a scared girl later, when she discovered whose hat she had waved.

We detail these little incidents, not simply because they are humorous, but because they illustrate exactly the sort of celebration it was. Not in a lifetime shall we see anything like it again.

Toward noon this part of the affair came to an end. The picture, figure —, taken at one of the pauses for breath near the headquarters office, shows

what our section of it looked like apart from the rest.

The more serious and formal part of the Dayton celebration occurred on Sunday, November 17, and in this the District likewise had its share. A float led the Conservancy section of the parade, showing transits, levels, current meters and other instruments as if in operation, with the motto "The Engineer's Job: Over There—Check the Huns; Over Here—Check the Floods." This was followed by marchers, representing the various sections of the work, the Headquarters Office, the Railway Relocation, the Englewood Division, the Dayton Division, etc., each marcher carrying a flag and an M. C. D. arm band, and each section carrying a sign of designation. The District was given a place about the middle of the parade, which, according to newspaper estimate, comprised some 18,000 people. The line of march began at Third and Ludlow Streets, went north on Ludlow to Monument, east to Main and south on Main to the Fair Ground, where it ended.

No one who took part in either of these celebrations will ever forget them.



FIG. 71—OUR PART OF THE "LIBERTY DAY" CELEBRATION.

The Jefferson Street end of the Conservancy Headquarters Building and Annex appears behind the celebrants. The log house in the background was once the old Newcom Tavern, the first log house in Dayton, built in 1796.

War Service Notes

THE CONSERVANCY RED CROSS DRIVE

The Conservancy Red Cross Drive ought to have the support of every person connected with the District. It is probably the last chance we shall have to help that very vital activity of the war, the work of the American Red Cross, which still has a

large job "over there" during the year which is likely to pass before the boys are all home again. The Red Cross, as is known, has been put on the basis of regular membership, with annual dues of \$1.00 to support the work. If you are not a member,

join. If you are, pay up cheerfully and thank God that your bit has been so much easier than pasturing trench "cooties" or stopping German shells. The work will be done by the women of the District, both at headquarters and on the various jobs. When they strike you, smile and dig up. The work is in charge of L. F. Wilcock and C. N. Phillips of the Headquarters Office. The drive will last during the week, November 16-23.

A letter to Dubois from Captain E. L. Stapleton of the Gas Defense Service, reports him as being in Army Base Hospital No. 1, New York City, down with the "flu," but apparently not seriously, as he expected to be back at work soon. He now has his family with him in New York.

A letter to Mr. Morgan from W. P. Watson tells, among other things, of his receiving a commission as major. He is also Director of a Tractor Artillery School near Paris. His address is A. P. O. No. 702, A. E. F., France. He wishes to be remembered to all his friends of the Miami Conservancy District. We are sure they are all proud of the record he is making.

Roy Jackson reports from Camp Humphrey, Virginia, that the army seems to agree with him, as he has gained 16 pounds and a lieutenant's bars since he joined it. He received his commission October 25. He bewailed the probability (now a certainty) that he would never get across.

A. A. Ort, Ensign U. S. N., engineer in charge of transportation at the Hog Island Ship Building Yard, near Philadelphia, paid his Conservancy friends a brief visit recently. There has been no drop in the ship building activities at Hog Island since the Armistice, nor any signs there will be in the near future.

resume his former occupation with the District. His work will be to prepare and publish the technical reports on the works being built by the District, and on the results of special studies made by its engineering staff. The Bulletin, which feels indebted to both these men for generous help extended, takes the occasion to wish them both well in the work ahead of them.

Seen and Heard at the Camps

TESTIMONIAL TO MR. FOEHR



We take pleasure in presenting our readers with the above reproduction of a medal recently presented by the Paymaster's Department to Mr. Chris. Foehr, Field Clerk at the Germantown Dam, as a testimonial to his prompt and efficient co-operation with the head office. We regret that the engraver's art can but feebly portray the beauty and finish of the original. The design, by our own staff artist, Mr. Louis R. Dubois, represents Mr. Foehr himself, somewhat in diminished in amplitude by the perspective, coming down the homestretch with a payroll in his hand. His competitors from the other camps may be noticed, out of sight in the distance. The inscription on the obverse side tells its own story of Mr. Foehr's merits. The original is $3\frac{3}{4}$ inches in diameter, done in American Morocco, hand-tooled. The material alone, at the present price of war-leather, makes the testimonial precious, and we have no doubt it will be treasured in Mr. Foehr's family as an heirloom.

C. N. Phillips has succeeded G. H. Matthes as Office Engineer at the headquarters office. Mr. Phillips' previous work, which has brought him into contact with almost every department of Conservancy work, has qualified him particularly well for his new position. Mr. Matthes, who held that strenuous job for nearly a year, and who brought it through the trying period of organization for construction work to its present orderly system, will

N. E. Messner, who has been at the hospital in Hamilton for about seven weeks with a bad case of appendicitis, is about again, but has not yet returned to work.

Arrangements were made not long since for putting the Bulletin regularly on sale at all the news stands in Hamilton. Similar arrangements have been in effect for some time in Dayton, and it is hoped to extend such service farther as time goes on.

C. N. Phillips, Office Engineer, celebrated an unusually jubilant Thanksgiving due to the arrival of his first born, an eight-pound girl, at the Miami Valley Hospital early in the morning on that day. Babe and mother are prospering.

At Germantown: On Tuesday, November 26, an illustrated lecture on "Picturesque Ireland" was given by District Camp Inspector, C. W. Porter-Shirley and Miss May Turner, teacher. During the evening Irish songs were rendered by Mrs. Hulings and appreciated by the audience. A collection was taken at this gathering to obtain a flag for the school.

At Huffman: A fine hall has been made out of a barn on the campsite at Huffman. It was formally opened on Friday, November 22, by a Camp-Family gathering. A program was arranged by Miss Goss, teacher at the Camp. Solos, duets, readings and folk dancing were rendered by the school children. Speeches were delivered by Mr. Morgan, Mr. Chambers and Mr. Porter-Shirley.



FIG. 73—COFFER DAM AND OUTLET CONDUIT EXCAVATION AT TAYLORSVILLE.

The conduit structure, over 100 ft. wide, will be built in the excavation in the middle of the picture. The earth embankment at the right, technically a "cofferdam,"

is built to keep the river, seen at the extreme right, out of the excavation during the work. For the outlet works the maximum excavation will be over 200 ft. wide.

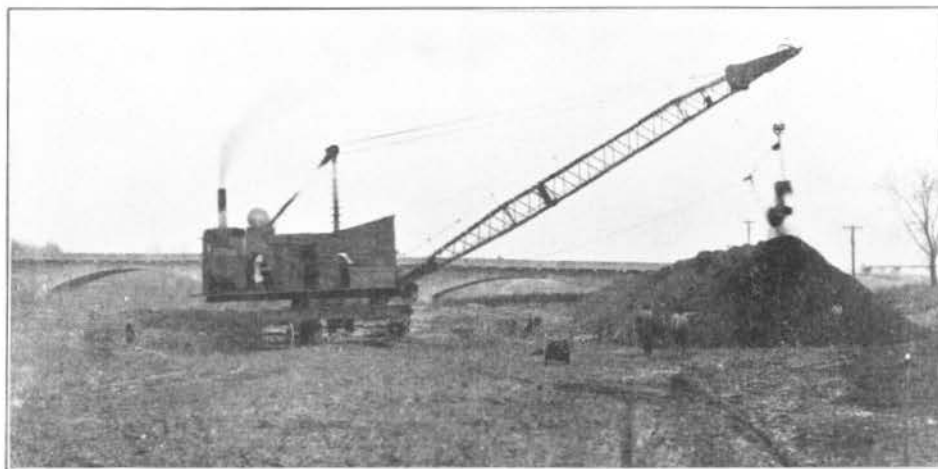


FIG. 74—BEGINNING THE NEW LEVEE AT HAMILTON.

Columbia bridge across the Miami is in the distance. The small brick dome-like structure at the left is a cistern, unearthed by the flood of 1913. The house was swept away.

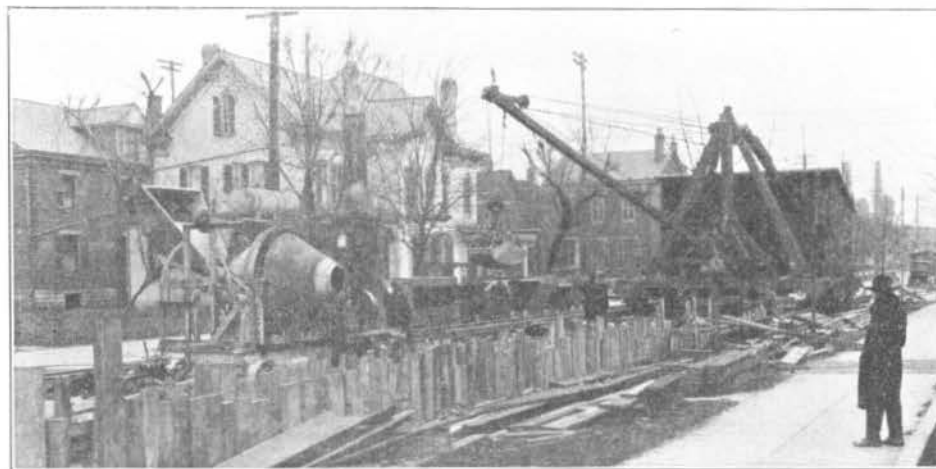
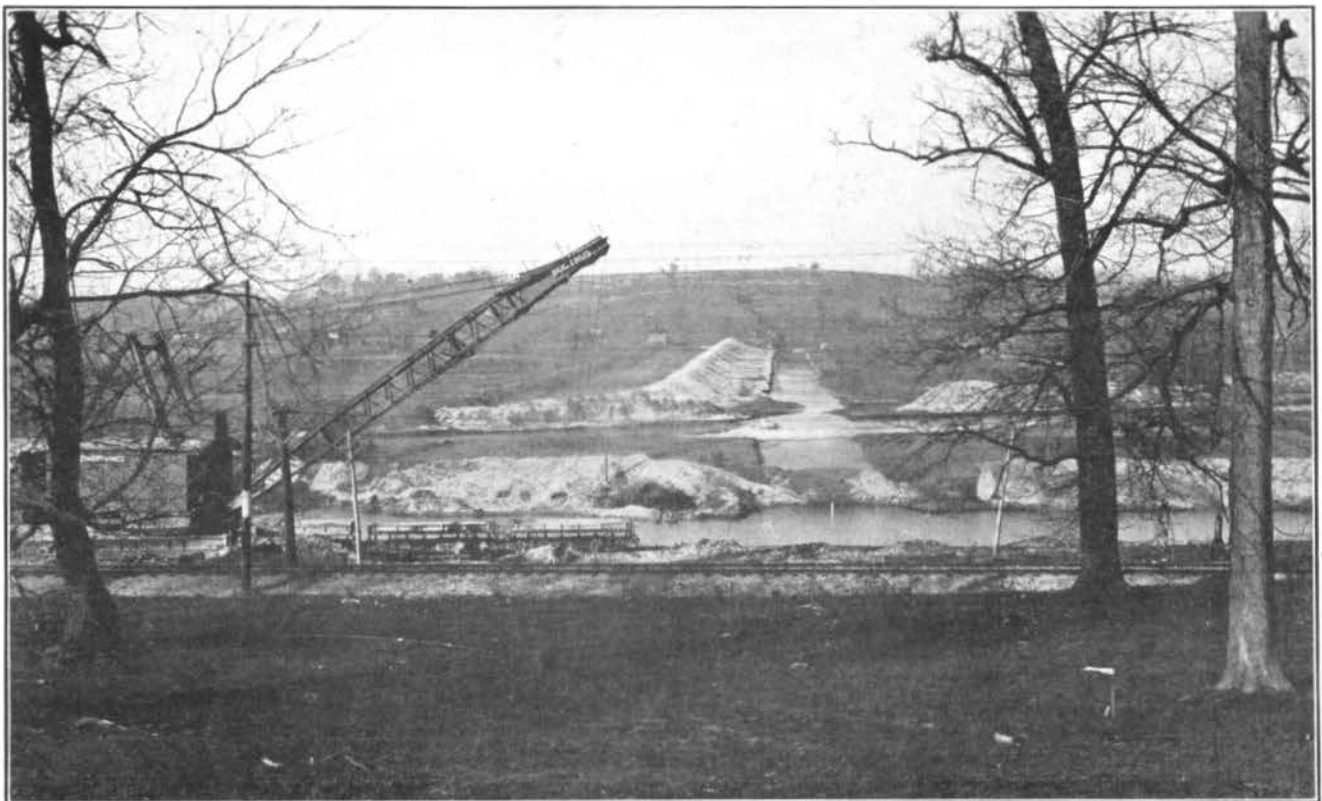


FIG. 75—BUILDING THE BUCKEYE STREET SEWER, HAMILTON.

The sewer is of concrete 5½ ft. in diameter, and about 25 ft. below the surface. The trench is dug by a clamshell excavator carried by a stiff-leg derrick seen at the right. Gravel for the concrete is dug from the trench.

THE MIAMI CONSERVANCY BULLETIN

JANUARY 1919



LOOKING NORTHWESTERLY ALONG THE CENTER LINE OF THE HUFFMAN DAMSITE



FIG. 77.—THE COMPLETED CAMP AT LOCKINGTON

This is the smallest camp at any damsite. The near vicinity of the village of Lockington made fewer houses necessary. It saved also the building of a school house, and of a special structure for a first aid hospital.

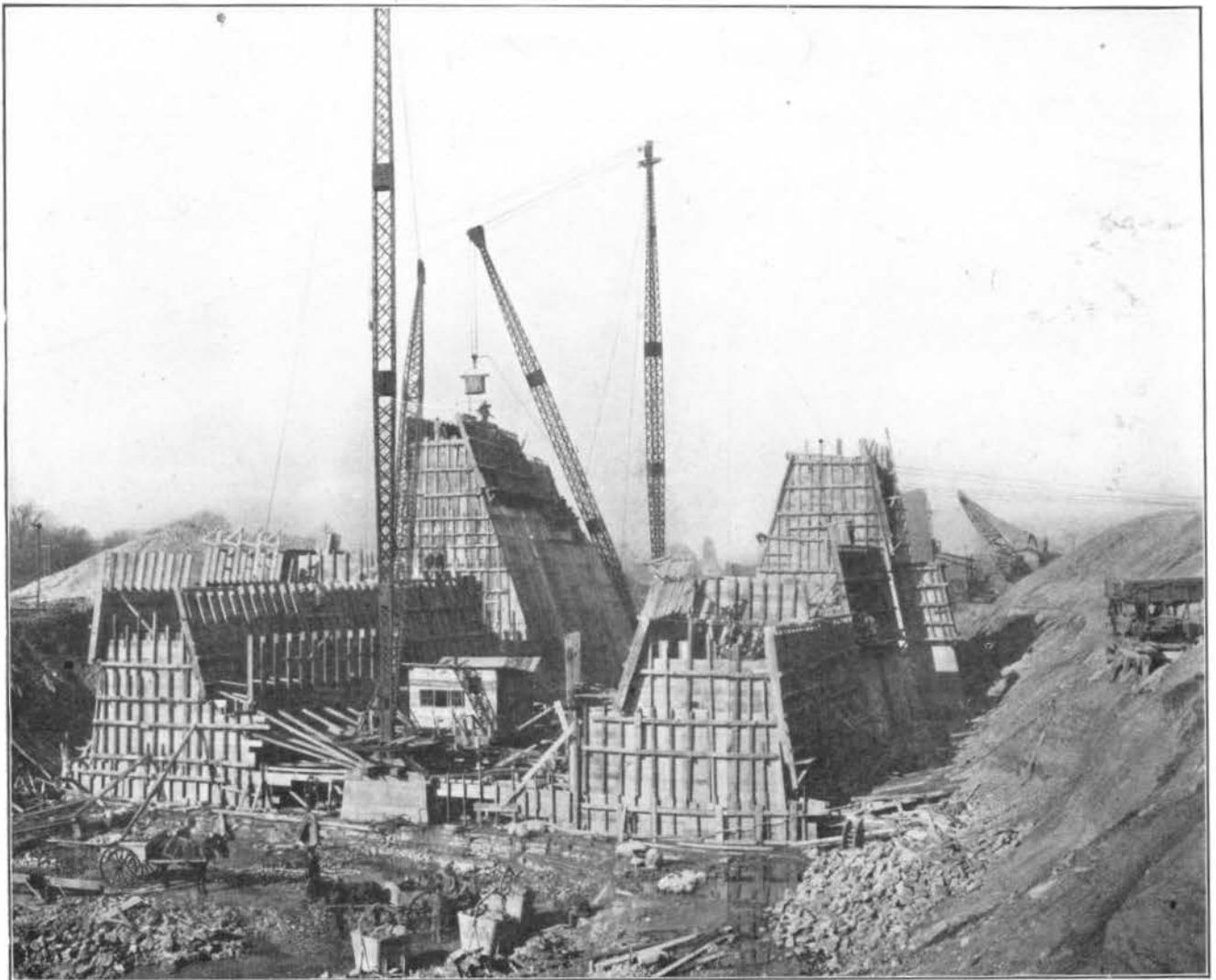


FIG. 78.—THE CONCRETE STRUCTURE AT LOCKINGTON

BOARD OF DIRECTORS
Edward A. Deeds, President
Henry M. Allen
Gordon S. Rentschler
Ezra M. Kuhns, Secretary

Arthur E. Morgan, Chief Engineer
Chas. H. Paul, Asst. Chief Engineer
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Oren Britt Brown, Attorney

THE MIAMI CONSERVANCY BULLETIN

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Subscription to the Bulletin is 75 cents per year. At news stands 10 cents per copy. Business letters should be sent to L. F. Wilcock, Assistant Engineer, Miami Conservancy District, Dayton, Ohio. Matter for publication should be sent to G. L. Teeple, Miami Conservancy District, Dayton, Ohio.

The Return of the Men from War Service

In the course of the war the District supplied for the service of the United States something over a hundred men from those in its employ. They went into nearly all the branches of the army service; many went also into government engineering and construction work. With the end of the war, the tide is turning; the men are coming back to us. A large number of these men, perhaps most of them, the District will be able to take once more into its employment. Toward many of them it feels itself under obligation, but it cannot, of course, undertake to furnish places again for all. The exigencies of carrying on the work made it necessary that the places of those who left be filled, and even with the expected expansion in the spring, it is scarcely likely that places can be found for all. Where places cannot be found for the men inside the Conservancy organization, the attempt will be made to secure employment for them elsewhere.

The United States Supreme Court Upholds the Conservancy Act

A recent opinion rendered by the U. S. Supreme Court confirms the constitutionality of the Conservancy Act. The action on which the court passed judgment, was brought by W. P. Orr of Piqua against the Miami Conservancy District directors, and was instituted in the form of an injunction to restrain the directors from collecting assessments against the property of the plaintiff and other persons in Piqua, who had been declared to be benefited

by the construction of the flood control works. The case had formerly been tried before the U. S. District Court of Southern Ohio, which decided the case against the plaintiff, who then carried it to the Supreme Court of the United States.

The opinion rendered, while specifically affirming the legality of taxation and expenditures for Conservancy purposes within the Miami River Valley District, also applies to similar taxation and expenditures made under the act in other districts.

This constitutes the final step in litigation which has extended over a period of about five years, and which has resulted almost uniformly in favor of the Conservancy District.

The Report of the Board of Directors

The first report of progress submitted by the Board of Directors of the District, was filed Tuesday, December 10, in the Common Pleas Court of Montgomery County, in printed form.

The report reviews the activities of the District since June 28, 1915, the date of its organization, and takes up in succession matters pertaining to official plan, appraisal roll, sale of bonds, purchase of farm lands, taxation, and the legal status of the District.

Two exhibits, or supplementary reports, accompany the report of the directors. The first is by Gilman & Ellis, of Chicago, certified public accountants, who were appointed by the Court to audit the books and financial transactions of the District. The second is by Arthur E. Morgan, Chief Engineer, reviewing the progress made in the construction of the

flood control works and giving detailed information as to the work done at each of the construction sites. It includes also lists of the principal items of equipment in use and the quantities of work performed.

In closing, the Board of Directors express the hope, in view of the cessation of the war, that it will be possible to complete the work according to schedule and within the estimated cost.

The Last Technical Report Elicits Favorable Comment

On account of their value to the engineering profession and the public, the technical reports on the investigations, made under the direction of the Chief Engineer of the District, regarding floods and flood prevention, have been sent to leading engineers throughout the country. The responses have been often highly appreciative. Concerning the report noted in our last issue, the "Calculation of Flow in Open Channels" by Ivan E. Houk, it may be of interest to quote one or two of the letters received. Such communications from leading engineers are not only gratifying to the engineering staff of the District, but have their value in confirming the validity of the deductions derived from the data. They should be helpful to the public also, as giving further assurance that the foundation on which the flood control work has been based is a sound one.

"It is an extremely valuable contribution to the engineering literature of this subject, and the author, his assistants and yourself (Mr. Morgan) are to be congratulated for the thoroughness with which the subject has been treated. The fact that you have confirmed the accuracy of the Kutter formula, and have, thereby, established its reliability more firmly in engineering literature, is an outcome of your investigation that practically all engineers will be gratified to learn."

Another engineer says: "The extreme care your staff has taken to secure data as to flood conditions and to collect, sift out and compile reliable data from other sources, both national and international, makes the work classic. The profession owes to you and your staff a deep debt of gratitude for your labors and for giving it the benefit thereof."

Camp Community Associations

We publish on another page an account of the organization of the Taylorsville Community Association, which is worth careful reading. Ordinarily a construction camp, outside of its connection with the contractor who employs the men, has no organized community feeling, much less a community government. The men segregate in knots or groups, when not at work, in a manner which is more or less haphazard. There is no concerted effort for a common object. Lacking a common center, the camp can scarcely be called a community. Whatever government or discipline exists is imposed from the outside by the contractor or men whom he puts in charge. There is practically no trace of that which constitutes democracy—self-government. Under such conditions, men do not live in a democracy but in a little autocracy, presided over by the employer, or by his representative.

The Taylorsville Community Association is a step in advance. The work lasting several years, the camp will have time to become a true self-governing community, and the association just formed

marks the determination to fulfill the possibility. The commission form of government which was adopted is now familiar by reason of the marked success it has had in various cities of the country, notably in Dayton. The central authority is vested in five elected commissioners. Each commissioner heads a committee placed in charge of one of the various camp interests and activities; such as Community Service, Social Service, Education, Record, and Finance, and Community Safety; the broad objects of all being self-government, self-help, and self-improvement. The plan described is not confined to Taylorsville, but is being adopted at the other Conservancy Camps.

The organization has decided advantages over that of an ordinary village in that it furnishes one clearing-house and center of energy for all the camp influences and activities. In many small communities, these energies are largely dissipated in turning the machinery of a multitude of organizations and duplicated plants. The Taylorsville community has no plant or organization which is not available to the entire body of people. The school can perfectly well serve at night for dances or lectures, and on Sundays for religious gatherings. In case of sickness or trouble, one public welfare committee can mobilize the neighborliness of the entire camp better than could half a dozen competing agencies. It is for these reasons that the new movement has unusual significance. It is the aim of the people at the Taylorsville Camp to get everybody pulling together—old and young, men and women, men with families and those without—sharing the common burdens and responsibilities, and helping to make the camp reflect the best purposes of its members. The Bulletin wishes the movement success and will be glad to co-operate in making it so.

River and Weather Reports

With this issue the Bulletin begins a series of monthly reports from the Conservancy Flood Warning Service, which will run through the winter and spring and perhaps longer. The season is beginning when the attention of the people of the valley and to some degree their apprehension turns toward the river. The reports ought therefore to prove timely. In the same connection the article describing the Conservancy Flood Warning Service, on page 93, will also be of interest, and will tend to give reassurance as to the thorough-going and careful watch which is kept by the District authorities on the valley waters.

The New Year

The Bulletin wishes its readers a Happy New Year. It feels that in the face of all the difficulties which the work of the District was facing a year ago, the record of the past twelve months has been distinctly encouraging. A great deal has already been done. The winter so far has been exceedingly favorable, so that work, for the most part, has gone on with little interruption from storm or cold weather, and almost everywhere is still in progress. The legal embarrassments, which from time to time have threatened, seem to have reached an end with the decision of the United States Supreme Court referred to in another editorial. With the war behind us and peace and stable conditions ahead, the end of the year which is coming should see the work of flood prevention far on its way.

The Proportioning of Conservancy Concrete

Sand and Gravel from Each Damsite Graded and Tested Before Using.
Maximum Economy Secured by Careful Proportioning.

The quantity of concrete to be placed in the flood prevention works of the District is large and its expense will be correspondingly high, probably about two million dollars. With so heavy an expenditure, questions of unit cost become important; as even a small saving per cubic yard will amount to a large sum. At the same time, the quality of the work must be as absolutely safeguarded as engineering science can make it. It must be the first consideration in every instance. The engineering question then becomes,—how to make a dollar go farthest in securing this absolute requisite of safety.

Concrete is best described as artificial stone. It consists of sand and pieces of broken stone, or gravel, the whole cemented into a mass by commercial cement. The resulting product, of course, can be no stronger than the materials of which it is made, and if either of these is faulty, the concrete is weakened correspondingly. Methods of mixing, placing, and "curing" the concrete, and the amount of water introduced into the mix, are also of vital importance, but this article will deal only with the very important, but often neglected, matter of the selection and proportioning of the sand, gravel and cement.

The cohesion of the particles of cement among themselves being more powerful than their adhesion to the surfaces of the sand and stone, it follows that

the greater the proportion of cement, the stronger will be the concrete. But since the cement is by far the most expensive of the three materials used, the cost of the concrete will be increased correspondingly. For economy, as little cement must be used as will give the strength required. Requirements vary. Concrete in bridges or arches is subjected to greater strains than that in foundations or heavy retaining walls, and obviously, should be of greater strength. It is the business of the engineer to adapt the proportion of cement to the loads to be carried. To use 15 per cent of cement in a foundation concrete where 10 per cent will do as well is throwing away money.

Of the three materials, the cement is the one which can be most certainly depended upon. Its manufacture has been reduced nearly to an exact science. All the standard brands are tested at the mills, both by the makers and by independent experts who make the testing of engineering materials their business, and who are paid by those who desire to purchase guaranteed products. No important job now accepts cement which has not passed both such tests, so that the quality of cement can usually be relied upon with great assurance.

The same is by no means true of either sand, stone or gravel. Given any standard cement, mixed in suitable proportion with these coarser materials,



FIG. 79—THE CONDUITS AT ENGLEWOOD, DECEMBER 26, 1918.

The walls and floor of the lower half of the conduit structure appear practically completed. The section of arch form in the near distance is for the upper half. A frame for another section appears in the air at the left, suspended from the boom of the locomotive crane, and about to be swung and lowered into place.

and the mixture properly placed and cured, the quality of the resulting concrete will depend upon the character of the sand and gravel; and since the cost of transportation of sand and gravel for any distance is expensive, it always pays, in an undertaking of great magnitude, to explore the region nearby, to see if suitable deposits of such materials are available.

Such explorations, very carefully made, were carried out in the vicinity of each of the five dams of the District. They were made mainly in two ways; either by digging "test pits" by hand, with pick and shovel, or by the use of a so-called "sand pump." For exploration below ground water level, the latter method is the quicker and cheaper, and since the investigation was extensive, it was frequently employed. The sand pump used was a suction pump of the simplest form, the pump barrel being of 6" wrought iron pipe 8 feet in length. The pit was first sunk with pick and shovel to the ground water level. An 8" iron pipe was then set upright in the bottom of the hole. The barrel of the sand pump was then slid down inside the 8" pipe into the sand and gravel at the bottom, and the pump plunger drawn up by short jerks by means of a portable gas engine, thus sucking the sand and gravel up the pump barrel. The 8" pipe, at the same time, would sink of its own weight into the hole left by the sucked-up sand. When the barrel of the sand pump was full, it was drawn up, and the contents emptied out. By adding short lengths to the outer pipe, test holes were sunk by this process as deep as 20 feet.

Samples were thus taken at a number of points in the vicinity of each dam, the points being carefully located by survey. The samples were placed in 100-pound sacks, marked to indicate the hole from which they came, and sent to the laboratory for testing.

The tests of the samples covered the following points: density, gradation in size of grains and pebbles, percentage of "voids" or spaces between the grains and pebbles, percentage of silt contained, and character of material. The density of a sample gives some indication of its strength, denser grains and pebbles being usually stronger. Silt is the very fine material which, when shaken up in water, remains suspended and makes the water turbid or muddy. It may contain considerable organic matter, in which case it injures the sand by introducing a weak ingredient. The percentage of voids and the grading in size of grains and pebbles are interconnected, and affect the amount of cement which must be used to make a concrete of desired strength. They thus affect the cost.

The effect of the "voids" on the cost of the concrete is easily seen. Suppose a gravel is made up of rounded stones of uniform size, say 1" in diameter. There will evidently be large void spaces between the stones. Tests show that in such gravel the voids occupy about 55 per cent, or more than half of the total volume. If concrete were made with gravel of only that size, it would require the mix to be more than half cement, and would thus be extremely expensive. If the spaces between the 1" stones are filled with smaller pebbles and the spaces between these with sand, leaving only the spaces between the sand grains to be filled with cement, a concrete may be obtained which will be as strong as the first, but which, since it contains much less cement, will

be correspondingly cheaper. What is known as the "proportioning of concrete" is the using of graded sand and gravel with cement in such proportions as will produce the desired strength at the least cost. The tests for percentage of voids and grading of grains and pebbles for sand and gravel are invaluable as a first aid in securing correct proportions.

In getting the correct proportions, the sand, gravel and cement are taken separately. The gravel as obtained from the bank, "run of bank gravel" as it is called, may consist of all sizes from extremely fine sand to stones of many pounds in weight. For most concrete, the largest size stone permitted is about 4" in diameter; in many cases, the maximum is no larger than 1½" or 2". From the maximum size down to ¼", the material is known as "coarse aggregate" and from ¼" down to the finest grains, it is known as "fine aggregate," or sand. In investigating any gravel, the amounts of the various sizes always should be determined. This is done by passing the material through one screen after another, proceeding from coarse to fine. For the coarse aggregate, the wires in the screens may be successively 2½", 2", 1½", 1", ¾", ½" and ¼" apart, and for the sand, 4, 8, 14, 48, 100 and 200 meshes to the linear inch. Just what proportions of the various sizes must be re-combined to produce the cheapest concrete of the desired strength is a matter of somewhat elaborate theory, combined with sound judgment based on experience under working conditions. It cannot be enlarged upon here. It ought to be added that the strength demanded of concrete, as of other building materials, is always far in excess of any strain expected to come upon it. A common value is to make it five times as great.

Since the fine grains of sand will fill the spaces between the coarser grains, leaving the cement only to fill the spaces between these finer grains, it is evident that the amount of cement required to produce a concrete of given strength will depend upon the gradations in the sand grains as well as upon the ratio of sand to gravel. It is for this reason that mechanical analyses of sand to determine the proportions of the various size grains contained in it are necessary. The mortar; that is, the mixture of cement and sand, is indeed, the important factor in the making of concrete. If the mortar is right, the concrete will be good, though the coarse aggregate vary within wide limits; if the mortar is not right, the concrete will be correspondingly poor. This is why, in investigating materials for the Conservancy dams, the tests of the sands, and of the strength of the concrete mortars which were made from them, were carried through with special care.

The conclusive tests, those to determine the actual breaking or crushing strength of the mortars from Conservancy sands, were made by standard methods. The mortars were made into "briquettes" and 2-inch cubes. A "briquette" is a flat block, shaped like a dumbbell, 1" wide at its narrowest part. It is so shaped in order that it may be clasped at the ends by the fingers of a testing machine (a standard Fairbanks shot machine), and pulled in two, the force required being measured in pounds by a pair of scales, thus giving directly the breaking strength of the material per square inch. The 2" cubes were crushed in a compression testing machine. Several specimens were broken representing each sample of

sand, to insure against misleading results. The figures obtained were compared with those of similar tests made from the same cement mixed with Ottawa sand, a very uniform sand found at Ottawa, Illinois, universally used as a standard in engineering tests. The results are shown in Table 1 below, an average sand being shown from each of the five damsites of the District. It will be seen that typical sands from each of the damsites gave a stronger

mortar than the standard sand. The table shows that the strengths of all of the Conservancy cement mortars were up to, or above first-class standards of engineering practice.

To make assurance still more sure, tests were made by crushing cylinders of concrete, 6 inches in diameter and 6 inches high, made from the sands and gravels from the various damsites. The results, shown in Table 2, were also up to the best engineering standards.

In applying the results of these investigations to the securing of the best concrete in the dams, such modifications are made as are suggested by the long practical experience of the engineers in charge. The various operations of washing, screening, storing, measuring and mixing of the gravel, sand and cement are under continual watchful supervision. The coarse aggregate, divided and stored in two portions, is measured into each batch of concrete through specially designed boxes, one for the coarser portion, larger than 1 inch, the other for the finer, the 1 inch to $\frac{1}{4}$ inch. The sand is measured in a similar box, and all the boxes admit slight variations in capacity to suit changes in the materials as they come from different portions of the gravel pits. The consistency of the fresh concrete is also carefully guarded, this being as necessary to secure good results as is the proper proportioning of the ingredients.

The concrete is mixed in batches, each batch amounting to slightly more than one cubic yard of concrete in place. For convenience in handling, the sand and gravel boxes are adjusted so that an integral number of bags of cement may be used, 5 or 6 or 7 bags to the batch, depend-

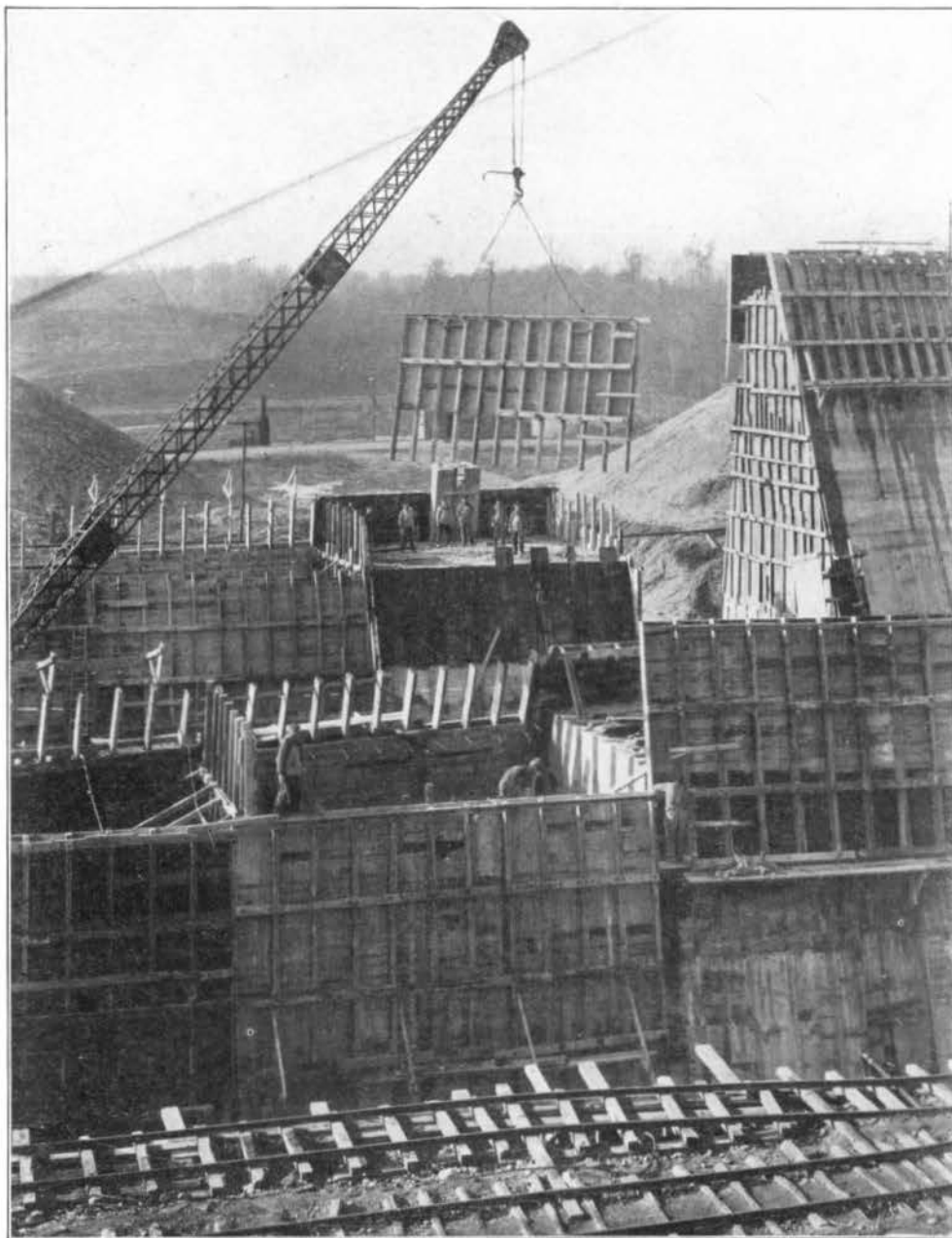


FIG. 80—REMOVING A SECTION FROM THE CONCRETE FORMS AT LOCK-INGTON, DECEMBER 16, 1918.

The section is seen hanging from the end of the 105-foot derrick boom. It has just been removed from the finished face of the retaining wall a little below it. The men below it are standing on the unfinished top of the wall. The sections are 16x27 feet in size, built of 2x12-inch studding faced with 2x10-inch planks and braced by 4x6-inch "wales" bolted to the back as shown. The lower part of the form, when in position, is bolted to cast-iron nuts imbedded in the concrete already poured, the upper part projecting to receive the fresh concrete, as may be seen immediately behind the men on top of the wall. What look like tall boxes back of the two center men are forms for the "keyways" which will lock this section of the wall into the embankment of the finished dam. The top of the unfinished wall at the right still lacks over 20 feet of reaching its full height.

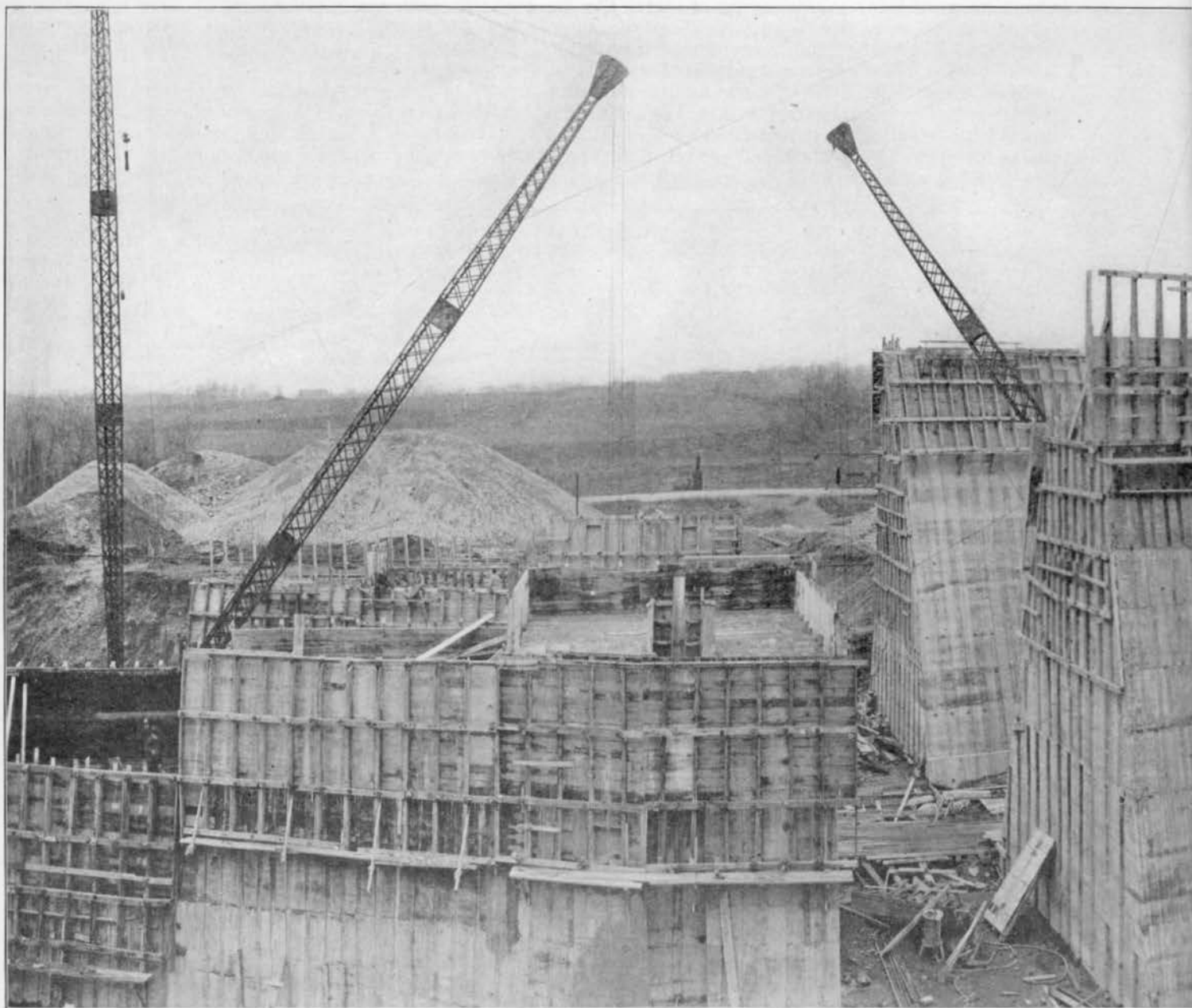


FIG. 81—THE CONCRETE STRUCTURE AT LOCKINGTON DAM

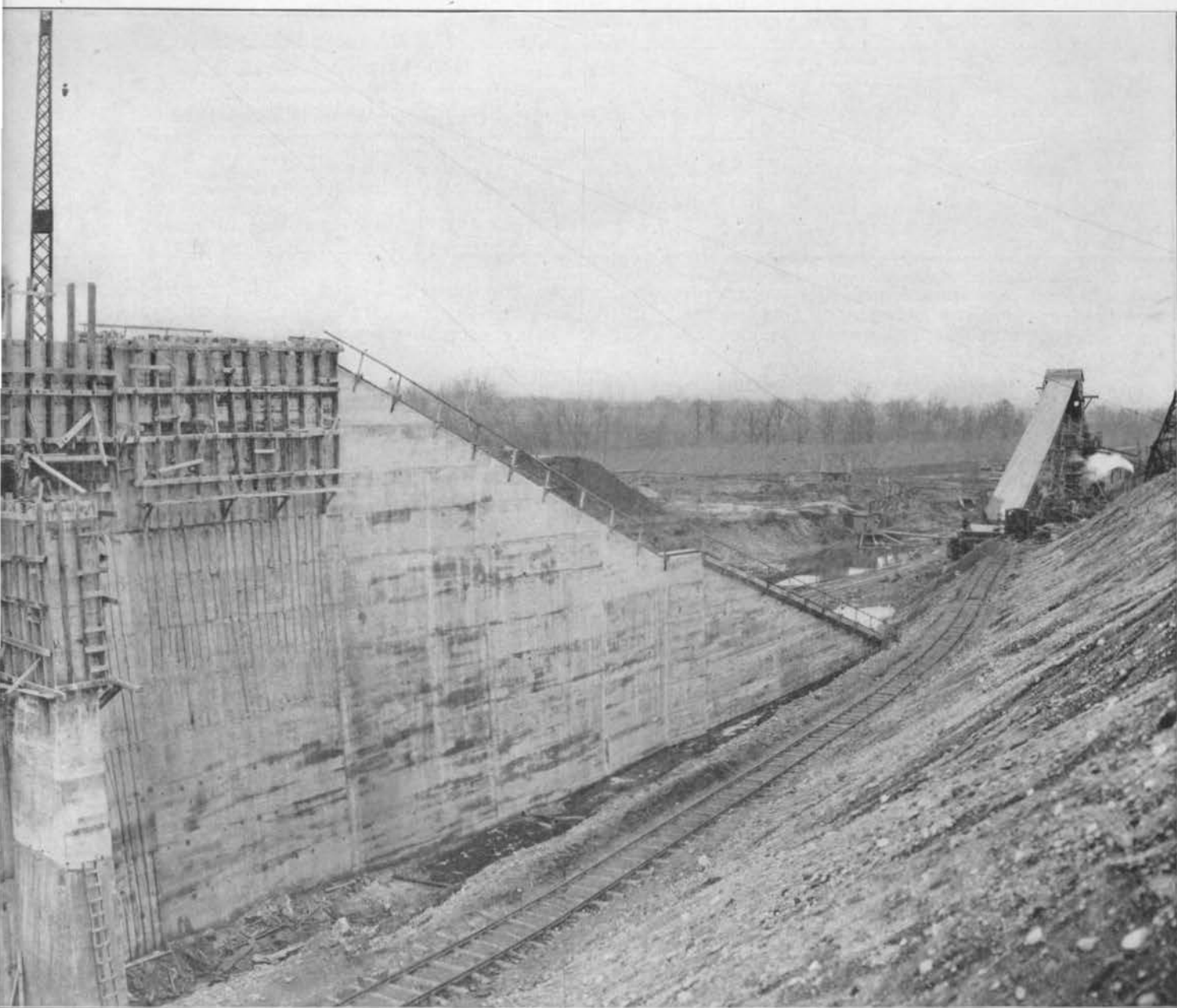
ing upon the strength of concrete required, and also upon the character of the particular sand being used at the time. The proportioning of sand to ce-

ment is carefully adjusted to give the requisite strength to the mortar. The final adjustment of the amount of coarse aggregate is determined prac-

TESTS OF MIAMI CONSERVANCY DISTRICT SAND MORTARS, ONE PART CEMENT
TO THREE OF SAND, MADE INTO 2-INCH CUBES

Location	Breaking Strength Under Compression, lbs. per sq. in.									
	7 days	%*	28 days	%*	3 months	%*	6 months	%*	1 year	%*
Germantown Dam.....	1380	129	2480	138	2790	124	2720	122	2910	125
Englewood Dam.....	2220	148	3620	132	4090	133	.....	.....	.....	.....
Lockington Dam.....	1900	140	2940	126	4160	130	3250	147	.....	.....
Taylorville Dam.....	1890	144	2530	124	3360	125	3130	116	3480	125
Huffman Dam.....	2010	140	3370	163	4210	138	4220	.....	.....	.....

* The % columns above give the relative strength of the Conservancy Mortar expressed as a per cent of the strength of Ottawa standard sand mortar containing the same proportions of cement.



LOCKINGTON, DECEMBER 23, 1918. SEE PAGE 92.

tically by the behavior of the fresh concrete in the forms. With too much coarse aggregate, the spreading and spading in the forms is difficult, and therefore not economical. With too little coarse aggregate, the spading and spreading are easy, but the concrete is unnecessarily rich in cement, and therefore unduly expensive.

At the three dams, Lockington, Englewood and Germantown, where concrete is now being placed, the sands and gravels differ to a considerable degree. At Germantown, the sand is nearly ideal, being well graded in size, with a correspondingly small percentage of voids. At Lockington, there is a deficiency of fine sand, and an excess of the medium, the so-called "grape seed" size. This increases the proportion of voids, and the deficiency must be supplied by cement; the Lockington mix, compared with that at Germantown for the same strength, being somewhat richer in cement. Meth-

ods are being worked out at Lockington to get rid of the excess of the "grape seed" size, giving a better grading and thus a saving in cement amounting to as much as \$.75 per cubic yard, or, at the rate at which concrete is being placed, about \$200 per day. At Englewood there is great variation in the pit gravel as it is taken out from day to day and even from hour to hour, so that the material receives unusually careful watching. Mechanical analyses of the sand are made daily, and compared with those of the sands which had proved of standard quality under breaking tests. Regular determinations of silt are also made there.

The preliminary tests and investigations of the Conservancy sand and gravel, referred to above, were carried out under the supervision of H. S. R. McCurdy, now Division Engineer in charge at the Englewood Dam. General supervision of all the concrete work of the District is exercised by Mr.

TESTS OF MIAMI CONSERVANCY DISTRICT GRAVEL CONCRETES
MADE INTO 6-INCH x 6-INCH CYLINDERS

Location	Proportions by volume of cement, sand and gravel	Breaking Strength under Compression, lbs. per sq. in.	
		At End of 28 Days	At End of Three Months
Germantown Dam.....	1 : 1.8 : 4.2	2630	2880
Englewood Dam.....	1 : 1.9 : 3.9	2720	3310
Lockington Dam.....	1 : 1.8 : 4.1	1900	2150
Taylorville Dam.....	1 : 1.8 : 4.0	2330	2640
Huffman Dam.....	1 : 1.9 : 3.9	2460	2960

Chas. H. Paul, Assistant Chief Engineer, whose long experience in charge of important concrete construction, notably at the Arrowrock Dam, gives as-

urance that the theoretical considerations, outlined in the foregoing, will be carried out in accordance with the best conservative practice.

Portfolio of Conservancy Pictures

The double page picture of the work at German-town, published in the December Bulletin, has attracted so much favorable comment that it has been determined to put copies of the picture, printed on special paper, on s.a.e. There will be a number of similar, double-page pictures in the Bulletin from time to time, and inasmuch as it is thought many would be glad to have a complete collection, it has been decided to print them all separately, as they come out, on paper uniform in size and quality with

the first. Arrangements are also under way to have a cover or portfolio made, of attractive design and inexpensive in price, in which the pictures can all be gathered together and preserved. Until further notice, orders may be placed with the Division Engineers in charge of the various features of the work, or directly with the Bulletin office at Headquarters. The price of the pictures will be 10 cents each. The price of the cover will be announced later.



FIG. 82—FINISHED SECTION OF CONDUITS, ENGLEWOOD, DECEMBER 26, 1918.

The Stillwater River, which is a little to the right out of the picture, will, after the Englewood dam is finished, flow through the two arched openings, which at the center will be buried over a hundred feet deep in the earth of the dam. The wing of concrete at the right projects and locks into the rock wall of the excavation. This prevents the end thrust of the water behind the dam, during floods, from displacing the conduit structure. There are a number of such projecting collars along the conduit.

December Progress on the Work

GERMANTOWN

Concrete has been placed at a satisfactory rate during the month. Temporary floor of conduit will be finished to center collar wall before the month is out, 237 feet having been completed to date. The weirs, 90 feet of partition wall, 180 feet of the lower half of the conduits, and 61 feet of the north wall of the outlet works have likewise been finished. A 95-foot section of the north wall of the outlet is 70 per cent complete. The total amount of concrete placed up to December 15th is 5100 cubic yards.

Excavation for the conduits is progressing satisfactorily. It has now been completed for somewhat more than half of the conduits proper.

The large dragline engaged in this work was temporarily moved in order to excavate a trench to remove a layer of gravel which gave trouble by permitting seepage from the river. The gravel was removed, the trench refilled, and approximately 75 per cent of the seepage was eliminated.

The erection of the arch forms at the lower end of the conduits has been completed. These arches will be poured within a few days.

Equipment is being installed at the mixing plant to heat the sand and gravel bins by means of steam pipes, so that concreting may be carried on into the cold weather as far as possible.

The bunk houses are being lined with wall board to insure against cold weather.

Arthur L. Pauls, Division Engineer.

December 15, 1918.

ENGLEWOOD

The concrete floor of the outlet conduits has been completed for its entire length, the apron at the inlet and a portion of the apron at the outlet remaining to be done. The lower sidewalls are finished except five 30-foot sections at north end. The westerly sidewall of the outlet and the forms for the easterly sidewall, next the river, have been started. The total quantity of concrete poured to date is 8,300 cubic yards.

The dragline which made the conduit excavation has worked down the river, stripping from the bottom all objectionable material, and doing most of the work in the channel crossing the damsite which was necessary in preparing for the dam embankment. The excavated material has been piled in a windrow along the east bank. The dragline will now proceed along this bank and load the excavated material into cars. The rock portion, suitable for the outside of a dam, will be placed in the down-stream toe. The earth portion will be stored just outside the toe to be later spread upon the graded slopes and sown to grass.

The cross dam along the east river bank is proceeding rapidly. This is essentially an earth retaining wall, extending across the damsite, and constructed in all respects as a part of the permanent embankment, for the purpose of enabling the hydraulic fill east of the river to proceed without waiting for the completion of the outlet conduits and the consequent diversion of the streamflow. Material for this work is being excavated by a large electric dragline from a pit about a thousand feet upstream from the dam, and just east of the river. Loaded into dump cars, it is then transported to the dam, where it is placed in final position in the cross dam by means of another electric dragline.

Work is in progress on the grading and the placing of concrete foundations for the pumping plants, to be used in the building of the dam embankment by hydraulic fill.

The labor situation is responding to the new conditions brought about by the cessation of the war, and an embarrassing factor in the prosecution of the work bids fair thus to rectify itself.

H. S. R. McCurdy, Division Engineer.

December 15, 1918.

LOCKINGTON

Work on retaining walls and floor of concrete structure has progressed steadily, total yardage poured to date being 14,500. The walls have reached a maximum height of 60 feet.

About 1000 cubic yards of rock have been excavated from

the hydraulic jump pool section south of the unfinished concrete work. Part of this material has been used as "plums" in the concrete, and part stored for later use as "riprap."

The large dragline (2½-yard bucket) has begun excavation for the outlet channel, south of the dam, into Loramie Creek. Immediately south of the site of the concrete structure, the material is being left in place to help form a natural cofferdam around the work during construction. About 80,000 cubic yards have been excavated from the new channel.

The small dragline (1-yard bucket) is loading gravel from storage pile into cars which take it to the gravel washing plant.

Over one mile of grading on Road No. 9 has been completed. Clearing and grubbing are now in progress along the south part of the road right-of-way.

Price Bros. contract for repairs to Port Jefferson dam is nearly completed. Materials for planking the dam are now on the ground. This work will be done by the District.

Channel improvement of the Miami & Erie canal, from the feeder at Lockington north to borrow pits at the dam, will be done during the winter.

Work on the transmission line from Dayton is progressing favorably and will be completed soon after the beginning of the new year.

About 20 cases of influenza developed at the camp. One death resulted, that of Mrs. John W. Bolton, the wife of Superintendent Bolton. At present there are no cases of the disease in camp.

Barton M. Jones, Division Engineer.

December 16, 1918.

TAYLORSVILLE

The gravel washing plant is now practically complete, except for dumping hopper and installation of machinery. The slight change in location of the concrete outlet work, made necessary by seepage of river water through a bed of gravel discovered in the course of excavation, has now been approved by the chief engineer, and the new cross sections have been taken and platted. The north end is not moved, but the south end is swung 50 feet east. Excavation for the outlet works is being done both by the Lidgerwood dragline and the sluicing plant for the hydraulic fill. To December 1, 73,000 cubic yards had been taken out, and the progress since has been very satisfactory. The material excavated by the dragline is being dumped upon the upstream side of the embankment that was built from material taken from the cut-off trench, whence it will be sluiced to the upper toe of the dam by the method of semi-hydraulic fill. About 30,000 cubic yards will be thus placed and later covered with a blanket of Cincinnati rock.

Three additional double houses have been completed at the camp. Lumber for the camp coal houses has arrived, and a number of these are under construction.

There is now one case of pneumonia in camp; otherwise, the health of the community is excellent.

O. N. Floyd, Division Engineer.

December 16, 1918.

HUFFMAN

Excavation for the outlet works has been continued during the past month. A total of about 20,000 cubic yards of rock and clay has been removed and placed in the fill on the relocation of the Big Four and Erie railways. Holes for blasting out the rock in this excavation are drilled by an ordinary well drill, a wagon drill and by tripod air drills. For trimming the slopes of the excavation, Jap drills are used.

The steam dragline has completed the excavation of the cut-off trench across the valley to the Erie Railway, and has started back, distributing the material excavated from the trench to its proper place in the permanent embankment of the dam.

A large shed has been built adjacent to the concrete mixing plant, for storing cement to be used in the various concrete structures in the dam.

C. C. Chambers, Division Engineer.

December 20, 1918

DAYTON

The two large dragline excavators have removed to date 235,000 cubic yards of channel excavation. Including the material moved more than once, a total yardage of 354,000 has been handled by these machines.

McWilliams Northern Dredging Co. has placed 43,000 cubic yards of levee embankment in the levee enlargement along the Miami River northward from Island Park (Contract 41). Team work on the lower end of this contract is progressing slowly.

The 12-inch water main crossing the river channel opposite Linwood Avenue has been lowered to its final grade. A temporary sewer extension has been installed for a 22-inch sewer outlet at the east end of Van Cleve Park.

Little progress has been made on the Sunset Avenue dry dock on account of continued high water.

C. A. Bock, Division Engineer.

December 16, 1918.

HAMILTON

Both draglines are working in "pay dirt" now, excavating from the channel and placing material in the levees. Good progress is being made.

Two scows purchased from the A. J. Yawger Co. have been repaired and are ready to be launched.

A water tank for supplying the locomotives has been erected.

An 18-inch pipe has been laid through the Miami & Erie canal levee. This will discharge into Crawford's Run a sufficient amount of water to supply the Ohio Electric Power Station with condensing water.

Work has been begun on the relocation of Black Street. This involves taking up and relaying 12-inch and 16-inch water mains, laying new gas mains, storm water sewer, brick paving and sidewalks. The 12-inch storm sewer has been laid, and brick are being removed from the old street. F. C. Williams, Superintendent on the Buckeye Street sewer, is looking after this work.

The concrete sewer in Buckeye Street has been completed for a distance of 745 feet. The excavation is 50 per cent completed.

Three of the houses in Peck's Addition taken over by the District have been wired for electric lights.

C. H. Eiffert, Division Engineer.

December 14, 1918.

RAILROAD RELOCATION

Erie and Big Four. The Walsh Construction Company, general contractors, with subcontractors Condon & Kolterman and Condon & Ward, have completed to date 60 per cent of the excavation. One steam shovel and two grading excavators have been used. Condon & Kolterman and Condon & Ward have suspended operations for the winter on account of weather conditions.

The masonry work being done by F. H. Sprague and Frank Hill Smith, Inc., working for the District, is 80 per cent completed. The underpass at Huffman Hill, built by the Walsh Construction Company, was completed several months ago and now the Bethlehem Steel Company is erecting the steel superstructure.

Excavation for Mad River channel change just above Dayton Hydraulic Company's head gates has been started.

Grading for the Springfield Pike at Fairfield is completed and Contractor McCann has completed about 50 per cent of the gravel surfacing.

Baltimore & Ohio. General contractors, Grant Smith and H. C. Kahl, and subcontractors, Condon & Smith, Vang Construction Co. and Kahl Bros. Construction Co., have in all five steam shovels and one grading excavator in operation, and have excavated to date 45 per cent of the grading.

Work has been started on levees alongside the new B. & O. R. R. roadbed, which will connect with Taylorsville Dam. All other grading is for the formation of the railway roadbed.

Masonry subcontractors, Vang Construction Co., G. L. La Boiteaux, and Kahl Construction Co., have completed the concrete bridges at Poplar Creek, Johnson Station, Picayune Creek and the one about one mile south of Johnson Station. Work is in progress on the 8-foot culvert at Taylorsville Dam, which is 300 feet long and extends under the roadbed and the two railroad levees. The masonry work is 90 per cent completed.

Albert Larsen, Division Engineer.

December 15, 1918.

Change in Camp and School Administration

The Conservancy District owes a great deal to C. W. Porter-Shirley who, for several months past, has filled two jobs, those of Camp Inspector and Employment Manager. As Camp Inspector he has been responsible for sanitary, health, social and working conditions at the camps, directing the work of the camp overseers. As employment manager he has been called upon to keep the work of the district supplied with the necessary labor. During the past six months the number of men employed each week has ranged from 110 to 280.

Mr. Porter-Shirley received complaints of all sorts: from superintendents and foremen if the supply of labor was not abundant or satisfactory; from workmen he brought to the job because he introduced them to superintendents and foremen who sometimes used impolite language in insisting that said workmen do a reasonable day's work; from occupants of the cottages if the chimneys smoked; from the district school teachers because the

necessary supplies did not arrive; from the ladies because the job did not furnish the proper accommodations for the Red Cross meetings; and from the Chief Engineer and the Division Engineers for all the shortcomings, whether real or imaginary, of the camp administration. Through it all, he has worked hard and patiently, gradually bringing about results which are none the less substantial because they have been secured with so little noise that they seemed to happen of themselves.

It has never been the intention to require Mr. Porter-Shirley permanently to hold down two jobs, but until now, a suitable associate has not been available. We are much gratified, therefore, at having secured the services of Sergeant Arthur A. Hauck, whom many of us knew before his enlistment because of his admirable work as a teacher at the Moraine Park School. Sergeant Hauck will take over a part of Mr. Porter-Shirley's work, especially that relating to camp affairs and schools. We wish success to both the men.

The Lockington Work

The retaining walls at Lockington (see figures 78 and 81) are now (December 15) about 60 feet above the bottom of the foundations, and still lack 22 feet of their full height (82 feet). Their total length will be about 500 feet. The concrete floor between them

will be the future bed of Loramie Creek. The section (figure 81) not yet constructed is on the center line of the dam. A heavy cross wall will be built across from one retaining wall to the other, pierced by two conduits which will carry the creek water.

The Conservancy Weather and Flood Warning Service

Many New River and Weather Stations Added—Vigilant Watch Kept on Flood Conditions.

During the construction of the flood prevention works it is of vital necessity that the District be informed as much in advance as possible of even slight flood stages in the river. There is much construction equipment, such as draglines, railway tracks, locomotives, pumps and motors which must be used in or near the river bottoms, and failure to protect it from floods would mean very serious loss and delays. It also is desirable that the people of the valley should receive all possible advance notice of any floods which may occur before the flood prevention works are completed, so that they might never again be taken unawares as in 1898 or 1913.

Perceiving the necessity of this, the Conservancy District in 1913 established a flood warning service, under the direction of Mr. Ivan E. Houk. There were before that time only fifteen stations in the Miami watershed where accurate measures of rain fall were made, and only three where careful measures of the river stages were taken. Steps were at once taken to increase the number of these stations, in cooperation with the United States Weather Bureau service. The Government and the District together established four new combined rainfall and river stations, the District alone established eight combined stations and thirteen new river stations, and the Weather Bureau alone established ten new rainfall stations. Thus the river stations were increased in all from three to twenty-five and the rainfall stations from fifteen to thirty-seven. These are scattered throughout the Miami Valley. Daily observations are made at all these stations, keeping thus a close and careful watch on river stages and rainfall. In ordinary weather, these observations are transmitted weekly to the District Forecaster, but in times of storm, or impending flood, they are sent in by telephone or telegraph as often as is necessary. The Forecaster may have to get up at midnight or at one or two o'clock in the morning to receive them and to arouse in turn the Conservancy engineers, and other people whose property may be threatened.

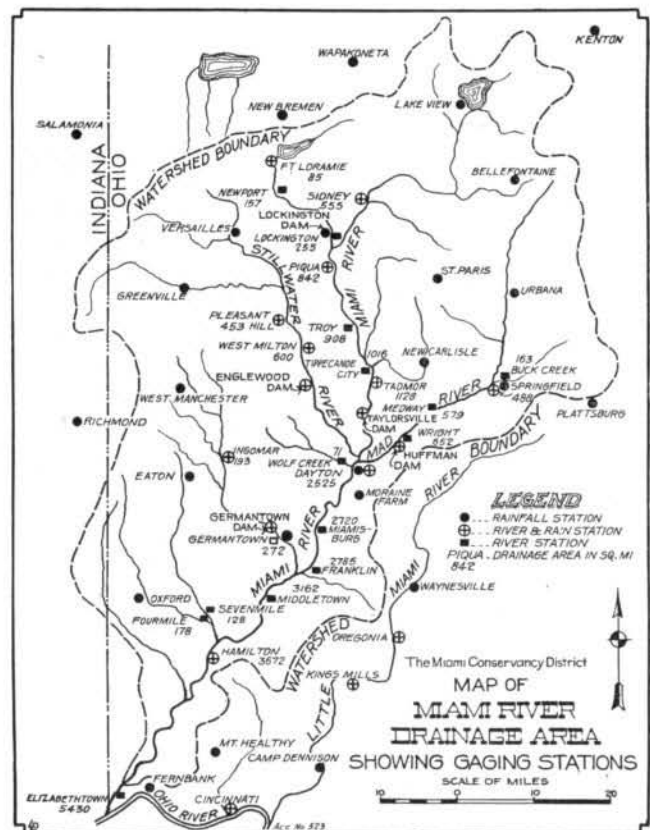
The flood warning service is as valuable in preventing unnecessary expense and alarm as it is in giving alarm when danger really impends. The memory of the 1913 flood is still fresh in people's minds. On January 31 and March 27, 1916, for instance, when the weather and river conditions seemed ominous, many would have moved out of their houses, farmers would have moved their live stock, construction companies their equipment, and merchants their stocks of goods, if they had not been assured that such steps were unnecessary. On the first of these dates two of the Conservancy engineers devoted their entire time all through the day and following night to answering telephone calls regarding river conditions. Two men of the United States weather bureau were also on duty from early morning until late at night answering such calls, totalling about 1600 in number. These inquiries came from all parts of the valley, from Piqua on the north to Hamilton on the south. At the same time an engineer experienced in flood fighting was sent to each of the cities where conditions seemed

dangerous, to work with the officials in taking such steps as might be necessary.

An instance of the value of such service in property conservation is the case of the Esterline Company of Lafayette, Indiana. This company had only four or five hours' notice in 1913 of the flood, but in that time it moved from its buildings about \$100,000 worth of merchandise, and all of its records, office furniture and fixtures. The belting was removed from the machinery, which was then heavily coated with grease. By these precautions, the Company saved an estimated loss of \$60,000.

It is evident that such a service may well be the means of saving life as well as property, by warning people who live on low ground to move when dangerous flood impends.

The apparatus necessary to equip the flood warning bureau is simple and inexpensive, and the observers at the outlying stations are people engaged in other occupations, who give the flood warning work but a small fraction of their time. They must be intelligent and reliable, but need no special training or special skill. The instruments used are the rain gage and the river gage. The rain gage consists essentially of a brass cylinder open at the top,



MAP SHOWING RIVER AND RAIN GAGING STATIONS IN THE MIAMI RIVER DRAINAGE AREA

The round dots are rainfall stations; the square dots are river gaging stations; and the encircled crosses are stations having both river and rain gages. All these stations report regularly to the Conservancy headquarters at Dayton.

eight inches in diameter and carried on an iron tripod. It is placed in an open space well away from trees or houses. The cylinder quickly contracts into a funnel. Rain falling into the open top of the cylinder runs down the funnel into the smaller cylinder. Thus if an inch of rain falls into the open top of the instrument, it will stand ten inches high in the tube. Its depth is measured by a wooden scale. This measure, divided by ten, will give the rainfall in inches. The only use of the small tube is to magnify the scale so that the rainfall can be more accurately measured.

The river gage is even simpler. It consists of a

long board painted white and divided into feet and tenths of feet by black cross-marks. This board is fastened vertically to a bridge pier or similar support, with its lower end below low water level in the river. The mark on the board at the water surface gives the stage of the river.

It will be clear from what has been said that the service of the flood warning bureau is of great value, both to the Conservancy District in its work and to the people of the valley, and that compared with the value of this service, it is very inexpensive. A considerable part of this expense, moreover, that of running the Weather Bureau stations is borne by the Federal Government.

River and Weather Conditions in November

During the month of November the river and weather conditions were comparatively favorable for construction progress. The total precipitation during the month at the eight stations maintained by the District varied from 1.73 inches at Huffman to 2.62 inches at Taylorsville. The normal precipitation for November as determined by the U. S. Weather Bureau for the Dayton station is 2.89 inches. The total number of days on which the precipitation exceeded 0.01 inch varied from 4 to 6 at the different stations.

Although small rises of from $\frac{1}{2}$ to 2 feet occurred in some of the streams of the valley on the 18th and

28th, the days on which the precipitation was most intense, the stages were comparatively low during the entire month.

At the Dayton Weather Bureau station the average temperature for the month was 43.2° above normal, the lowest recorded being 23° on the 25th and the highest, 66° on the 17th. The maximum wind velocity for five minutes was 51 miles per hour, from the west on the 28th; and the average wind velocity was 10.7 miles per hour, the prevailing direction also being from the west.

Ivan E. Houk, District Forecaster.

December 15, 1918.

The Taylorsville Community Association

The Camp Becomes a Self-Governing Body. Commission Form of Government Adopted.

Taylorsville has taken the lead in self-government. The residents at Taylorsville got together and organized the Taylorsville Community Association on November 29, 1918, having held a preliminary meeting a week previous. The attached Constitution and By-laws were adopted.

The present Officers are D. D. Rogers, Chairman and Commissioner of Social Service; E. P. Come, Commissioner of Education; F. A. Meyer, Commissioner of Community Safety; B. H. Petty, Commissioner of Community Service.

Committees are appointed by the Commission to assist in carrying out the work allotted to each Commissioner. Committees report to the Commissioners and they report to the Association at the regular meetings, which are held at least once a month.

Since the organization of the Association, we have started a Sunday school, which meets every Sunday morning. On December 13th we had a picture show, which included a lecture on Ireland. December 18th, a dance was held in the School House. It was a very successful affair with a large attendance. We have arranged to have a Community Christmas tree and entertainment for the benefit of the little folks. Santa Claus will visit us on this occasion and leave a package for every child in the camp, consisting of nuts, oranges, candies, etc. The school children have arranged a program as an entertainment feature of this occasion. On New Year's Eve we will hold a Watch Party and dance the old year out and

the new one in. We are arranging to have two picture shows weekly. We also expect to have dances, card parties, lectures and other entertainments as often as the Association may desire them. Arrangements are under way to hold Union Church Services at least every other Sunday afternoon.

The Association, under the direction of the Commissioners, expect to handle all the activities of the Community, committees having been appointed to assist in carrying out the work; a great deal of work has been outlined for the New Year. The Committees are as follows:

Day School	Manual Training
Miss Elizabeth Dungan	Mr. J. Benedict
Mrs. G. E. Warburton	Mr. E. B. Chase
Mr. Clarence Kerr	Mr. C. Lucas
Night School	Library
Mr. H. L. Fruend	Mrs. Hutzelman
Mr. Ben Petty	Mrs. Tizzard
Mr. N. L. Hinton	Mr. O. N. Floyd
Mr. H. R. Daubenspeck	

The above committees are under the supervision of the Commissioner of Education, Mr. E. P. Come.

Entertainment	
Mr. B. F. Kincaid	Mr. A. O. Aulabaugh
Mrs. Paul Moken	Mrs. Ben Petty
	Miss Elizabeth Dungan

The Entertainment Committee will be under the supervision of Mr. W. D. Rogers, Chairman of the Commission.

Fire Prevention

Mr. C. Z. Miller
Mr. C. Farmer
Mr. D. Holahan

The above committees will be under the supervision of Commissioner Roy Hutzelman.

Community Service

Mr. G. E. Warburton
Mr. O. N. Floyd
Mr. D. Holahan

Transportation

Mr. R. L. Rogers
Mr. A. O. Aulabaugh
Mr. T. D. Berryman

Law and Order

Mr. J. F. Smith
Mr. Ed. Wolverson
Mr. Paul Moker

Health and Sanitation

Mrs. Kerr
Mr. E. B. Chase
Mr. N. L. Hinton

Religious Activities

Mr. J. W. Benedict
Mrs. W. W. Cole
Mrs. E. P. Come

Relief

Mrs. E. B. Chase
Mrs. N. L. Hinton
Mrs. Daniel Holahan

Individual Gardens

Mr. B. Larkin
Mr. H. W. Tizzard
Mr. Otis Winget

The above committees are under the supervision of Commissioner B. H. Petty.

The Organization has 67 Charter Members. Commissioner F. A. Meyer will conduct a campaign to secure additional members.

Residents of the Camp are very much interested in the Night Schools. We now have five classes, including English for foreigners, as follows:

Class	Enrolled	Instructor
Mechanical Drawing	13	H. L. Fruend
Business and Industrial		
Arithmetic	11	N. L. Hinton
Trigonometry	4	H. R. Daubenspeck
Geometry, Algebra and other Mathematics	4	B. H. Petty

Mr. Lange of the Dayton Y. M. C. A. and Mr. Hinton are arranging for the class in English for foreigners.

The Individual Gardens, Landscape Work and Camp Improvements are receiving attention and plans are being formulated now for next Spring.

The Constitution of the Taylorsville Community Association**Article 1**

The name of this organization shall be the TAYLORSVILLE COMMUNITY ASSOCIATION.

Article 2

Its object shall be to promote the Social, Physical, and Intellectual Development of the residents at the Taylorsville Dam Site, of the Miami Conservancy District.

Article 3**Eligibility for Membership**

Section 1—All persons of good character, who are employees of the Miami Conservancy District, Project No. 4, and members of their families who are over sixteen (16) years of age, may become members, by making application to the Commissioners here-in-after provided, and being elected to membership in open meeting of the Association, except Charter members, who shall sign the By-Laws and Constitution and be appointed by the Commission within two weeks after November 29, 1918. Elections shall be by secret ballot.

Section 2—All persons elected to membership shall become members upon paying in advance

an entrance fee of 50 cents and signing the Constitution and By-Laws.

Section 3—The annual dues shall be \$1.00 payable quarterly in advance, beginning January 1, 1919.

Article 4

Section 1—The officers of this Association shall be five Commissioners, who shall be members of this Association in good standing and who shall have been residents at the Taylorsville Dam Site for at least three months, prior to the date of election. They shall serve six months or until their successors are elected and installed.

Section 2—The Commissioner receiving the largest number of votes shall become the Chairman. He shall designate the heads of the following departments from the Commissioners elected:

Community Service,
Social Service,
Education,
Records and Finance,
Community Safety.

Section 3—The Commission shall appoint all Committees, which shall work under the direction of the various Commissioners.

Section 4—The Committees shall carry out all the work under the direction of the Commissioners.

Article 5

Section 1—The Association shall hold at least one meeting each month.

Section 2—The Commission shall meet as often as necessary to transact business of importance promptly.

Gift of Adam Schantz "Lily Water" Plant Site

The right-hand upper picture on the back cover shows what is the largest building in Dayton which must be demolished to provide a wider and better channel for the Miami River through the city of Dayton. It is the Lily Water Plant of the Adam Schantz estate on the north bank of the river just below Dayton View bridge, the end of which appears at the right of the picture. The building is now being torn down. It is of further interest, since the northern half of the property, which is not necessary for the construction of the new levee and channel improvement, has just been bought by the Adam Schantz estate from the District in order to make of it a gift to the city of Dayton in the shape of a public park between River Street and the river. Upon this site stood the original home of the elder Schantz, who erected the buildings later used as a brewery. The act of presentation is a graceful one which will be appreciated by the people of Dayton. It is hoped at some future time to acquire the entire group of buildings seen in the picture along the river bank as far up as the bridge and to make of the property a riverside park. The matter is under consideration by the Dayton View Improvement Association.

On December 3 Lockington entertained forty members of the Piqua Rotary Club at luncheon at the mess hall. Messrs. Paul and Locher attended from the headquarters office. After the luncheon, Mr. Paul outlined the main features of the Lockington work, after which the club adjourned to the damsite to inspect the construction of the outlet works.



FIG. 84—HYDRAULIC FILL POOL, TAYLORSVILLE, DECEMBER 16, 1918.

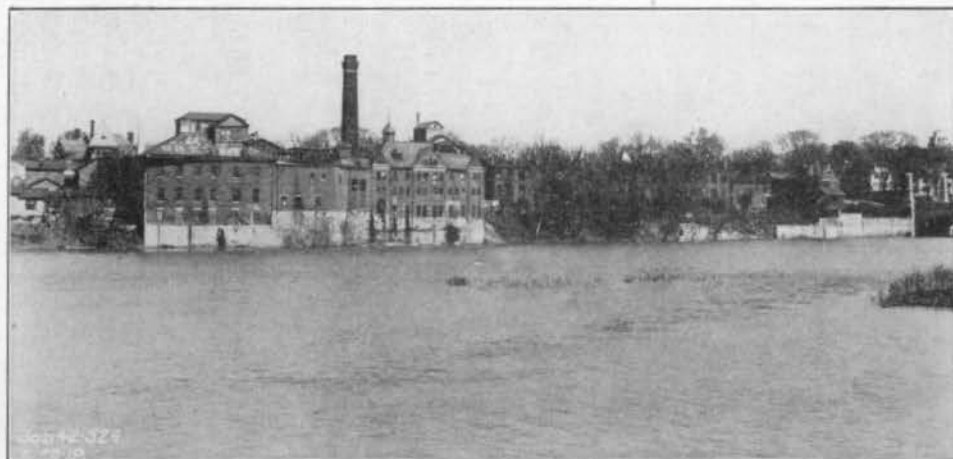


FIG. 85—THE ADAM SCHANTZ "LILY WATER" PLANT, APRIL 20, 1918.



FIG. 86—THE HYDRAULIC FILL BORROW PIT, TAYLORSVILLE, DECEMBER 23, 1918.

On the hillside just east of the Miami River. The pit in the foreground has been already excavated and deposited in the bottom of the pool, which can be seen in the distance across the river at the left. The remaining bank is in process of excavation. A powerful jet of water ($2\frac{1}{2}$ " diam., under a pressure of about 115 lbs. per sq. in.) is directed from the "giant" or "monitor" in the foreground against the base of the bank, which is thus undermined and drops off in chunks into the pit beneath the "sluicing water" from the pipe on the top of the bank. The chunks are then knocked to pieces by the jet and washed by the sluicing water down the pit bottom to the "sump," or pump pit (not seen), from which the muddy water (containing also cobble stones up to 5" diam.) is pumped through a pipe to the pool on the damsite, where the earth is deposited.

THE MIAMI CONSERVANCY BULLETIN

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EXCAVATING FOR OUTLET CHANNEL, HUFFMAN DAM, JAN. 16, 1919. SEE PAGE 108.



FIG. 88—CONSTRUCTION TRESTLE FOR THE FILL AT PICAYUNE CREEK, B. & O. R. R., JAN. 15, 1919



FIG. 89—SUNSET AVENUE DAM, DAYTON, DEC. 11, 1918.

The embankment to be seen at the right will become a part of the permanent levee. The blanket of stone "rip-rap" is to prevent wash by the river. The row of piles extends across the stream. It is faced most of the way with 2-inch planking on the upstream side, and braced by a second row of piles, and has a plank apron. The dam is built to raise the water in the Miami River sufficiently to float the scows which will transport the material excavated to make the deepened and improved new channel. This material will be used to build levees further upstream. Such a temporary dam should not be built in the same costly manner as a permanent structure. It is better and cheaper to run the risk of losing a section of the dam now and then by high water, and to replace the washed out section.

BOARD OF DIRECTORS
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Arthur E. Morgan, Chief Engineer
Chas. H. Paul, Asst. Chief Engineer
C. H. Locher, Construction Manager
Oren Britt Brown, Attorney

THE MIAMI CONSERVANCY BULLETIN

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DAYTON, OHIO

Volume 1

February 1919

Number 7

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Subscription to the Bulletin is 50 cents per year. At news stands 5 cents per copy. Business letters should be sent to L. F. Wilcock, Assistant Engineer, Miami Conservancy District, Dayton, Ohio. Matter for publication should be sent to G. L. Teeple, Miami Conservancy District, Dayton, Ohio.

Bonds for \$5,000,000 Sold

The Board of Directors has just disposed of another five million dollars of The Miami Conservancy District bonds. These bonds, which are in denominations of \$1000 each, were sold at \$103.898, which is a very fair premium.

This is part of the original issue of December 1, 1917, and there still remains an additional allotment which will not be sold until further financing is necessary. The bonds were disposed of to the syndicate that bought the \$10,000,000 first put on the market, consisting of The National City Company, The Guaranty Trust Company, and Harris, Forbes and Company, all of New York. They report that the bonds were re-sold to investors within an hour after subscriptions were opened.

The Miami Conservancy District's credit is excellent. Its bonds enjoy as favorable a reputation as any municipals, and are very widely held by investors in all parts of the country.

Winter Concrete

In view of popular exaggeration of the difficulties involved in the carrying on of concrete work during the winter season, we are glad to print the article on that subject on page 105. There can be no doubt, considering the importance of pushing the work of flood prevention, that the moderate additional expense of winter concreting as carried on at the various damsites where concrete work has been started, is a matter of small moment relative to the advantages gained. Also there is little doubt that

with the vigilant care exercised in protecting it, the concrete will be as sound as any. On important structures, where time is a consideration, winter concreting has become a standardized operation, the results of which, with due care, are well assured.

The Conservancy Farm and Forest Lands

A great project like that of flood prevention in the Miami Valley has many aspects and presents many problems. Among them is the farm land problem. In the five retarding basins of the District lie several hundred farms, comprising tens of thousands of acres, which the District has been compelled to buy outright or to acquire the right to control.

The Bulletin is planning to publish several articles on the various questions relating to these farm lands. The first, published in the present issue, relates to the disposition of the forest lands, and of the timber growing upon them. It is written by J. W. Calland, Secretary of the Ohio Forestry Association, formerly with the United States Forestry Service on reforestation projects in Colorado. Since 1913 he has been with the Ohio Forestry Department as assistant forester in charge of utilization and marketing studies in the state. He has been granted leave of absence by the Ohio Forestry Department in order that he may act as forester for the District. We believe the article will be of timely value, not only to the general public, but especially to the farmers of the Miami Valley.

A brief introduction to the articles on the Conservancy farm land policy, including the forestry problem referred to, precedes Mr. Calland's paper. It is written by Mr. Graham Smith, who has all the Conservancy farm lands in charge.

What is an Engineer?

We are glad to quote the following taken from a circular sent us by the U. S. Employment Service, Division of Engineering.

"Very interesting, as one of the by-products of the war, is a new definition of the engineer which has been written by A. H. Krom, Director of Engineering, United States Employment Service, Chicago. The definition comes as the result of the many queries that have originated through a confusion of engineering terms and standards now in general use. After serious study and consultation with eminent authorities, Mr. Krom prepared the following definition:

"An engineer is one who economically directs man power and, by scientific design, utilizes the forces and materials of nature for the benefit of mankind."

"In writing this definition, Mr. Krom hopes to offer a practical, workable statement that will be of real value to technical men, and to employers of technical men. The definition will doubtless be useful in clarifying popular misconceptions. Students of engineering and prominent scientific authorities declare that Mr. Krom's definition is representative of the highest engineering ideals and that it covers all classes of engineering."

In view of the great and growing importance of the engineer in the world of today, this definition should be valuable, not only to technical men, but to the public also.

Death of W. R. Mounts

To his friends of the Conservancy District, the news of the death in France of W. R. Mounts, formerly of the Conservancy Engineering Staff, brought a sense of unusually keen regret. He had been in the employ of the District since 1916, so that he was well known. He had gone to Lockington as Office Engineer a year ago last March, whence he was called to the Army in July, in company with H. W. Wesie. They went together to Camp Jackson, South Carolina, and by what seemed to Mounts to be great good fortune, he was sent overseas within three weeks. The last word received from him by his friends of the Conservancy was a letter written on board ship on his way over. Then, after a long interval of silence, lasting two months or more, came the news of his death in a French hospital of cerebro-spinal meningitis, on October 26.

Mr. Mounts was a native of Blanchester, Ohio. He was a student in Civil Engineering at the Ohio State University, and came to the Conservancy in May of 1916. He was married on June 2, 1917, to Miss Helen O'Connor, of Blanchester. His wife, when he left for the Army, engaged in teaching at Batavia, Ohio, in which work she was still occupied at the time of his death. He was a young man who naturally made warm friends, and his early death leaves a gap which is deeply felt.

Appeals Against Appraisals for Benefits and Damages

Under the Conservancy law, the lands in the various retarding basins and along the rivers, affected by the flood protection plans, have been appraised as to the amount of damage or of benefit received. The law provides for appeal to the several county courts against the judgment of the board making the appraisal. There are of course a number of these appeals taken. Recently about thirty of the Osborn appeals were heard in Greene County. The amounts fixed by the jury differed very little from those set by the official appraisers. In Warren County there are only a few cases, and these are now being heard in Lebanon. In Montgomery County also the cases are few. In Butler County there is only one. The greater part of the appeals are in Miami County. In all the counties together, there are several hundred such cases. Many have been settled by amicable adjustment. All relate only to the amounts fixed by the Board of Appraisal for damages or for benefits.

Death of C. C. Williams

Mr. C. C. Williams, the Conservancy Camp Overseer at Englewood, died at the Miami Valley Hospital on January 27, following a severe surgical operation. He had been troubled for some time with what was supposed to be appendicitis, but which the operation proved to be a very serious case of intestinal cancer.

Mr. Williams was forty-four years of age and of English birth, coming to this country about ten years ago. He was a clergyman and joined the Conservancy forces on May 1st of the present year, drawn by his interest in the welfare of working men. The burial will be in Concord Cemetery at Englewood. He leaves behind him a wife and four children of school age, to whom his associates extend heartfelt sympathy in their loss.

Heifetz

At the Heifetz recital it was the fortune of the editor to sit on the rostrum along with the other distinguished citizens who had paid a dollar a head for the privilege. We were thus enabled to get a few close-ups on the famous phenomenon. We were near enough at times to have touched him. What struck us most was the way his job bored him. He went through it—"thundering plaudits" and all—like sawing wood; as if what mainly kept him at it was the high price he got per chord. (There was, we judged, about a \$4500 house, of which he probably got half.)

It set us thinking. Here was this young prince of fortune, with his marvellous gift, bored with it, and bored with the homage it brought him. He hadn't as much joy of his job as you and I have. Gold pieces rolling at him so thick he has to kick 'em out of the way, and yet not happy. For us, we would rather punch our typewriter and whistle.

Beginning with this issue, the price of the Miami Conservancy Bulletin will be reduced to 50 cents per year and 5 cents per copy. Persons who have subscribed for a year will have their subscriptions extended six months without extra charge.

The Conservancy Farm Land Policy

By S. Graham Smith

Many of the farm buildings in the retarding basins are located at such low elevations that they will be subject to submergence in times of heavy flood. They presented a problem for which there was no practicable solution without authority to remove the buildings to higher ground. This meant also a re-arrangement of the farm lands to adjust the cultivated lands to the new farmstead locations. There was no practicable way out of the difficulty but to buy the farms, so threatened with overflow, outright. Thus there has come into the possession of the District some 30,000 acres of farm land.

In the re-arrangement and re-adjustment of these lands, several broad ends were kept steadily in view. The first was that the farms must be so handled as to yield the maximum value in crops, not only after the re-arrangement, but during the period of transition; second, that the value of the re-arranged farms as an investment should suffer no injury and, if possible, be increased; third, that the re-arranged

farms with their re-located and reconstructed buildings should be sold so as to get them back into the hands of private owners at as early a date as practicable.

One of the problems in the re-arrangement of the farms was that presented by the woodlots and forest lands which lie in the various basins. A hundred and twenty woodlots are scattered through the District, containing millions of feet of standing timber, ripe and ready for market, to say nothing of the young and growing timber which is not yet economically marketable. How best to handle this timber, how much and what to sell, and how much and what to keep, constituted a great problem in itself. Evidently no one but an expert in forestry was properly fitted to handle the question. The person selected for the task was J. W. Calland, the writer of the following article. A note on Mr. Calland's experience will be found in the editorial column.

The Conservancy Timber and Its Management

Timber is a Crop and Should be Treated as Such. Growing Timber is Allowed to Stand. Ripe Timber is Cut and Removed.

By J. W. Calland

There are about 120 woodlots standing in the five basins of the District. They are generally distributed throughout the basins and contain approximately six million feet of merchantable timber. The size of the woodlots varies from less than an acre to over 100 acres in the largest. While there are no virgin stands of timber left in any of the woods within the District, there are some very fine individual trees of different species in many of them. The large number of woodlots in the basins, and the problems involved in their management, made a detailed survey of all the timber in the District advisable before formulating definite plans for handling them. Such a survey was carefully made in

each of the basins and from the results of these investigations a plan of management was determined upon.

The survey shows that over 80 per cent of the District's timber is oak, maple, ash, sycamore, beech and elm. The principal oaks are white, burr, chinquapin, red, black and swamp white oak. The varieties of ash include white, black, blue and green ash. The basins containing the greatest amount of timber are Huffman and Englewood; Germantown and Taylorsville rank next, and Lockington last. The per cent of the total stand of timber represented by the principal timber trees in the various basins and also for the entire District is as follows:

TABLE SHOWING RELATIVE NUMBER OF TREES OF DIFFERENT SPECIES OCCURRING IN THE VARIOUS BASINS OF THE MIAMI CONSERVANCY DISTRICT.

The figures show the number of each species expressed as a percentage of the entire tree population.

Kind	Germantown	Englewood	Lockington	Taylorsville	Huffman	Entire District
Oak	15	37	40	37	47	37
Ash	4	12	4	8	13	9
Beech	31	4	6	4	....	7
Sycamore	5	10	6	12	9	9
Elm	2	5	10	6	8	7
Hickory	5	4	4	3	7	5
Hackberry	1	3	2	4	4	3
Maple	30	15	23	14	4	14
Walnut	0	4	1	3	3	3
Basswood	2	2	1	2	2	3
Poplar	2	0	0	0	0	....
Cottonwood	0	1	2	2	1	1
Others	2	3	1	2	2	2

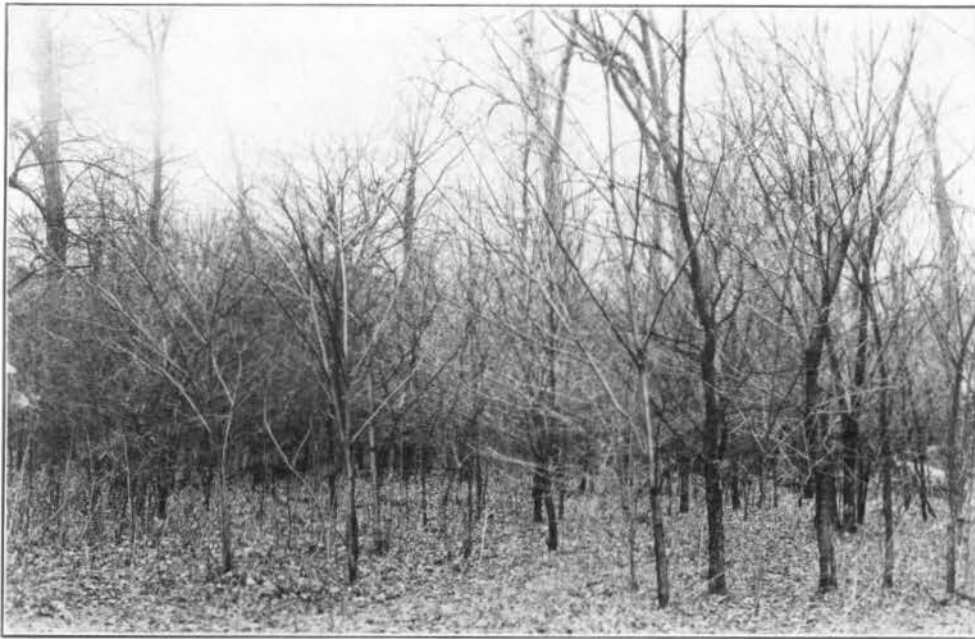


FIG. 90—WHAT NOT TO GROW

Forest undergrowth which will never make useful timber of any kind; hawthorn, ironwood, dogwood, etc. The larger trees should be sawed into lumber and the small brush into firewood. The occupation of this land by these "weed" trees is a loss to the owner and to the community. Taken in Huffman Basin, Jan. 7, 1919.

Timber in the farm woodlot is a farm crop. If properly cared for, a woodlot will furnish a supply of timber, posts, poles, fuel, etc., for use on the farm at all times, and also for marketing at intervals, but when it is neglected or misused the woodlot will deteriorate until the crop no longer pays. Eventually the lot is carried at a dead loss. The woodlot crop like any other must be judged by its quantity and quality. In order to produce timber of high quality the stand of trees in the woodlot must be crowded, so that the top of each individual tree may be in contact with its neighbor. The fallen dead leaves, constituting a leaf-mulch, must be maintained over the roots of the trees, and the sun and grass must be kept out. By these means trees are produced which have tall, straight trunks free from limbs and knots and with the minimum of insect injury and decay. In open, uncrowded woods just the opposite is true; the trees do not grow so high, the lower branches grow and form knots in the wood, and the trunks are much more tapering. Thus a crowded stand of trees produces not only a larger number, but a much greater proportion of high quality logs than an uncrowded woodlot of equal size. This is vitally important because the value of first quality logs is from one and one-half to two times as great as that of poor logs.

Grazing stock in the woodlot is one of the greatest causes of its deterioration. The woodlot will not serve as a pasture and grow a good crop of timber at the same time. Grass in the woodlot is a sign that the trees do not stand thick enough; the woodlot is not fully stocked, or is being mistreated. Grass will not thrive without having strong sunlight, and a woodlot in good condition permits very little sunlight to reach the forest floor. The browsing of stock will not only injure seedlings and young growth, but often destroys saplings of considerable size. The injury due to live stock in the woodlot is,

however, not confined to the young trees. As a result of the destruction of the underbrush the soil is exposed to the sun and winds. These, together with the tramping of the stock, cause the ground to become hard, dry and packed, and the rain instead of being absorbed and retained for the use of the trees runs off the surface carrying with it much valuable material. Serious injury occurs to shallow-rooted species by having their roots tramped and barked. What is called "stag-headedness" in a wood, the appearance due to dead tree tops, is often the result of this form of injury. Pasturing and timber production cannot therefore be practiced on the same area except to the disadvantage of each; a combination of the two will not pay the owner as well as the practice of either one separately. It must be admitted, however, that the value of shade to stock may in some cases more than offset the loss in timber growth caused by the practice of pasturing the woods, but if shade rather than forage is the object in pasturing the woodlot, it can usually be provided by allowing the stock to run in only a portion of the lot, the remainder being more profitably devoted to the production of wood alone.

An important consideration is the kind of land devoted to timber. As a rule those portions of a farm less suitable for other crops are the portions which should be wooded. The timber crop is not sufficiently valuable to compete with other produce. Thin-soiled hills, steep and rocky slopes, or low, wet lands may well be planted with suitable trees. In such areas trees, if properly cared for, will pay better than any other crop. These considerations are often violated. A number of farms of the District have timber standing on valuable land, while others have cleared poor lands which should be reforested.

Attention must be given to the kinds of trees in a wood. An area properly devoted to forests may contain the wrong kinds, known as "weed trees." Figure 90 is an excellent example of this. Such trees as honey-locust, hawthorn, ironwood, wild apple, etc., produce no crop worth while, and occupy land which should grow a crop of value. On uplands and hills oak, maple, ash, elm, walnut, hickory, beech and basswood all have value; on low ground, cottonwood, Norway poplar, basswood and elm are proper varieties. The weed trees, where they occur, should be cut out and the valuable varieties substituted. In Europe, where forests have been the object of great care for many decades, weed trees are rooted out of a wood as assiduously as weeds from a garden, to prevent their propagation

with the waste thereby involved. It is a sound policy for American farmers to follow.

In applying the principles just enunciated, it is unfortunately necessary to note that a very large percentage of the woodlots of the District are so situated or have been so thinned by cutting or grazing that they can no longer be left in woods at a profit. Each lot presents its own particular problem; nevertheless, the woodlots of the District may be divided into two general types, each of which requires a different method of handling. First, woodlots which are made up largely of scattered mature trees, with little or no undergrowth, severely pastured, and in many cases occupying valuable agricultural land; and second, woodlots which are characterized by a fairly well-stocked stand of thrifty growing timber.

In the first type pasturing has continued for so long, with the better trees being culled out, that the only course left is to clear off the remaining trees, leaving only such groups as may be desired for shade or for future building sites. What makes this still more advisable is that the old trees in these stands are very likely to be deteriorating in quality. It is a fundamental principle of forestry that, from the standpoint of strict business management, timber when mature should be cut just the same as corn or hay.

Of the second type of woodlot, above referred to, we find in the District several varieties. In one case, weed trees may predominate, crowding out the better kinds. In another case, trees of proper kinds

may be overcrowded to the point where they need thinning out. In still another case, so much cutting may have been done that the wood has been understocked to the point where it is not maintaining itself by reproduction. Considerable improvement may be brought about in some of these woodlots by the judicious removal of inferior material to be used for firewood, or simply as an "improvement cutting." Any such cutting must have for its object the removal of only such part of the inferior material as will not open up the woods too much for the best growth of the more desirable trees, as heretofore explained. It must be remembered also that the health and vigor of the trees is much influenced by the condition of the soil. The earth needs to be kept fresh, loose, soft, and free from grass. With field crops, this is attained by cultivation, but in the woods it must be secured by keeping the ground shaded. The leaf mulch is also an aid in this regard.

Woodlots standing in the lower ground in the various basins, particularly those at no great distance up-stream from the dams, will generally in any case be entirely cleared up, since a flood great enough to partly fill the basins with water would probably be sufficient to kill the majority of the trees in such woodlots if the water remained over them for a few days.

In addition to the woodlots now in existence, it is hoped that fresh plantings will be made in a number of localities in the District. Some of these will be undertaken at once by the Conservancy forces.



FIG. 91—THE RIGHT CROP FOR STEEP HILLSIDES

A steep hillside, such as is shown above, in most cases is more suitable for forest than for any other crop. Note complete absence of soil erosion; also, in spite of the scanty growth of timber in the foreground, the deep leaf mulch which covers the ground. Taken in Germantown Basin, Jan. 10, 1919.

These will be confined to limited areas, the species to be planted being mostly black locust or other fast-growing varieties suitable for posts. Locust groves now standing in the various basins have made a satisfactory growth and while some injury has been suffered from insect attacks, the general condition of these plantations is encouraging. Several thousand posts will be cut from them during the present winter. A great number of fence posts will always be needed in the basins, and the indications are that locust groves, if properly located and cared for, will prove to be quite profitable.

We have heretofore considered only the commercial aspects of the question, but there are other considerations. In some cases it may prove advisable to plant groups or groves of suitable trees for wind-breaks and shelterbelts to protect buildings located in exposed places, or to serve as shelter and shade for stock. Of at least equal importance is the esthetic value of trees. This is often connected with commercial considerations and will be more so as time goes on. Trees, attractively planted around a farmstead and in waste areas, unquestionably add to the value of the farm by the addition they make to its appearance. Groves of trees standing near the damsites will be left wherever practicable. Additional groups ought also to be planted where they will add to the beauty of the landscape at these points. The dams are great public works, built by the people of the Miami Valley in order that they and their descendants may dwell in peace and safety, and which will stand as monuments to

the present generation for centuries to come. As such they should present to the eye a beauty and dignity commensurate with their worth. Noble trees, rightly planted as a setting in places where they harmonize with the proper use of the dams, will make a distinct contribution to this end.

In conformity with the principles which have been heretofore enunciated, the cutting of Conservancy timber has already been carried on to a considerable extent. Perhaps the most important, as it was the earliest timber to be cut, was the black walnut, due to the demand for it during war time for the manufacture of gun stocks and airplane propeller blades. An inventory showed approximately 400 walnut trees in the Huffman, Taylorsville and Englewood basins, and also a few in the Lockington basin. Representatives of various walnut concerns operating under Government contract were requested to inspect the trees and submit bids on them. The walnut in Huffman, Englewood and Taylorsville basins was eventually sold to the Steele-Aldurfer Co. of Cuyahoga Falls, Ohio, and that in the Lockington basin to the Buckeye Churn Co. of Sidney, Ohio, the highest bidders.

Following the same plan, about 130,000 feet, comprising the bulk of the white and blue ash standing in the Huffman, Taylorsville and Englewood basins, was offered for sale, and in this case the highest bid was submitted by the American Fork & Hoe Co. of Ashtabula, Ohio. This ash will be cut and shipped in the log to Ashtabula, where it will be manufactured into handles. Various other



FIG. 92—CORRECT TREE GROWTH FOR A WOODLOT

Young trees of species that will make valuable timber some day. The stand is thick enough to grow tall and straight and maintain ground covering of dead leaves so beneficial to tree growth. Mature timber will be cut and used; young trees left to grow to maturity. Taken in Huffman Basin, Jan. 7, 1919.

sales have been made of standing timber, piling, clear logs, cordwood, etc.

A very important factor in planning the disposal of the Conservancy timber was the amount of material needed by the District itself for various forms of construction work in the different basins. Some of this material was of such a nature that it could be supplied from the nearby woodlots to better advantage than by shipping it in from outside sources. Arrangements were made with the Downey Bros. at Fairfield for sawing out such lumber as was needed in the Huffman basin, and a small mill was set up near the Taylorsville damsite for sawing material needed there. More than a quarter million feet of heavy timbers, plank dimension material, and boards have been supplied for construction work in this way. Oak timbers and building material have been furnished for erecting barns, cribs and other farm buildings. Over 50,000 linear feet of piling has gone into trestles and concrete foundations.

Special bills have been furnished on short notice for crossing plank, temporary ties, sheet piling for coffer dams, and timbers for boat construction. By this means several thousand dollars' worth of standing timber has been converted into material for use on the various Conservancy jobs. Care has been exercised in sawing this material, that good, clear logs are not manufactured into a cheap grade of material. Instead, the clear butt logs and some second logs have been reserved, and these will be sold in the log to companies equipped to make them into such high-grade products as veneer, quartered oak and finishing lumber.

The treetops left from logging operations, together with the crooked and defective trees, brush, etc., are not to be left scattered over the woodlots, but are being cleaned up and made into cordwood or burned so as to make the lots available for pasture and crop production. Firewood amounting to some 300 cords has already been cut from such material and is being sold.

Conservancy Concreting During the Winter

A great deal has been written on the dangers of concreting in cold weather. This has arisen largely because of failures of concrete structures due to premature removal of forms during cold weather; also, to a considerable extent, because of published tests made upon the effects of freezing weather on the setting of concrete made up into small test pieces. Upon such pieces or even upon thin sections in actual work, unless they are protected from the cold, the effects are undoubtedly bad, but practical considerations where concrete is placed in masses, like heavy walls or foundations, greatly modify these results.

Freshly deposited concrete takes a certain time for its initial set, and after this set, it continues to harden and strengthen for a long period. The effect of cold on both setting and hardening is to greatly retard them. Near the freezing point, the setting will take from four to eight times as long as at the usual temperature of a room. As the temperature is lowered this retardation increases. Below the freezing point, in small specimens, the water in the concrete may freeze before the concrete sets. In this case, no injury will result, provided alternate freezing and thawing

do not occur. When the temperature rises, the water thaws, and the concrete sets and hardens as usual. After the concrete has taken its initial set, however, the remaining water, when it freezes, by its expansion dislocates the initial set and weakens the concrete.

These facts regarding concrete in small test pieces, as has been said, are greatly modified when the material is in large masses. This is due in part to the fact that the setting of concrete is a chemical com-

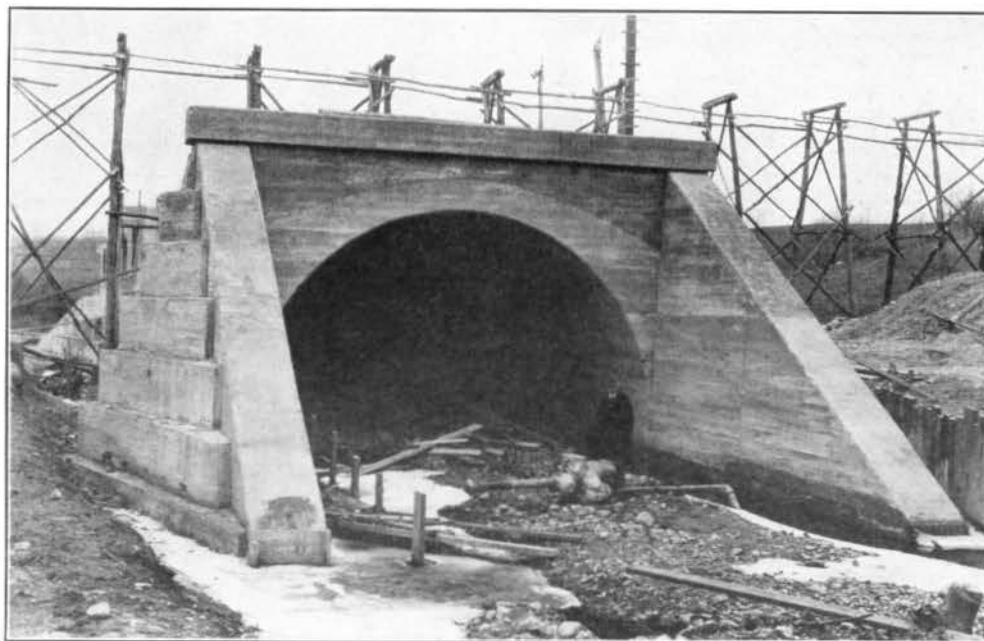


FIG. 93—BRIDGE AT PICAYUNE CREEK, B. & O. R. R.

This is a 26-foot, semi-circular, concrete arch. The barrel of the arch is 93.5 feet from end to end. The height of the fill above the bed of the stream is 40 feet, which is about 20 feet above the top of the arch. The structure contains 2300 cubic yards of concrete. The excavation was done with a clamshell and derrick. The concrete was handled by a derrick and 1-yard bucket. Piling was to have been driven under the abutments, but was found unnecessary, the subsoil being cemented gravel, and so hard that it was impossible to drive a test pile into it. Taken Jan. 15, 1919.

bination of water with the constituents of the cement, and as in most chemical combinations, the reaction produces heat. The mass of concrete will thus be raised in temperature from 20 to 40 degrees or even more, depending upon the temperature of the fresh concrete, the speed of setting, the speed of placing, the mass of the concrete, and the depth in the mass which is under consideration. As to the last, certain experiments by C. H. Paul and A. B. Mayhew at the Arrowrock Dam are significant. Electric thermometers, buried in the mass concrete of the dam, showed conclusively that with daily variations of 50 degrees in the temperature of the air, the temperature in the concrete one foot from the outside surface varied only 2 degrees, and at $3\frac{1}{2}$ feet from the surface varied only one degree. The experience of hundreds of contractors in the construction of massive concrete works points in the same direction.

The effect of the rise of temperature due to setting is thus evidently to counteract to a great degree the effect of the freezing temperature of the air. The bad effects are in fact usually limited to the surfaces of the concrete on which the air directly acts, and penetrate at most to a depth not much exceeding an inch. Where the surface is allowed to freeze, portions will usually scale off, leaving a rough and unsightly surface but affecting the strength of the remaining portion not at all. To protect the surfaces in cold weather, they are usually covered with tarpaulin, straw, or similar material. In still colder weather, "salamanders" are kept burning underneath a tarpaulin or other cover. A "salamander" is simply a cylindrical stove such as may be made, perhaps of a short section of steel smoke stack, open at the top and with a grating at the bottom, in which a fire is built. A steel wheelbarrow is often used instead.

It should not be inferred, from what has been said, that there is any wish to belittle the importance of protecting exposed surfaces, where appearance and resistance to weathering, or the action of the elements, are essential. Nor should the danger of too early removal of forms in cold weather, be overlooked. These ever present dangers must always be kept in mind in order that good results may be secured in winter concreting.

A source of greater real danger to the strength of concrete placed in cold weather is no doubt the freezing of the aggregates, before they are mixed. Such frozen masses introduced into the concrete may seriously affect its strength. To prevent this, the aggregate must be freed from frost before mixing, which may be done by either salamanders or steam coils, and by heating the water.

By protecting the surfaces and heating the aggregate in the manner indicated, concrete in cold weather, with proper care, can be made as sound as any, and in any particular case, it is largely a question of expense whether the concreting will be carried on into the winter or not. Until the temperature of the air gets as low as say 25 degrees, the con-

creting can be continued with very little such extra care and expense. The greater part of the extra cost lies below 20 degrees. On the Conservancy work therefore, until the thermometer drops below 20 degrees, the work through the cold season will usually be continued.

On the Conservancy work, on account of its magnitude and importance, an additional factor has to be considered; that of the organized force of men who are doing the work. The method of concreting was carefully planned far in advance of its carrying out, and a skilled organization was got together to do it, with the idea of pushing the work as rapidly as possible. It is worth some expense to keep the work going in the cold weather just to keep the men together. During a considerable part of the winter, if the weather remains reasonably open, concreting can be carried on without much additional trouble. During the cold snaps, it will be shut down, and the organization kept busy on other work which has been planned for it.

Concreting has been started at three of the dams; Englewood, Germantown, and Lockington. At all of these, provision has been made for heating the aggregates by means of steam coils which were placed in the bins before winter weather set in. At all of them means are provided for protecting the surfaces from freezing by tarpaulins and salamanders, or in a few cases, by steam coils, where steam was available on account of being used for other purposes. Care is also taken that no fresh concrete is placed on frozen foundations, and that the amount of water used in mixing is properly regulated. At Englewood and Germantown, the concreting is being done in trenches which have been excavated in earth and rock. These being protected from winds by their situation, the surfaces are much more easily cared for. At Lockington, where the walls rise high into the air, this protection is more difficult, and work at Lockington is therefore held up in cold weather during a greater part of the time than at the other two places.

A consideration which makes it more advisable to push the work at Englewood and Germantown lies in the fact that more of the concreting is being done there at low points in the excavation, where water gathering and freezing might result in disintegration of the rock at the bottom, thus necessitating additional expense in cleaning up the foundation later. It is cheaper to continue concreting the low places than to go to this expense of again cleaning up.

Summarizing the above, the underlying considerations as to concreting on Conservancy work through the winter may be briefly stated thus: to keep intact the working organization so that it may drive ahead as soon as may be at full speed in the spring; and also, by the employment of the means which have been mentioned, to keep the concrete work going through the more open weather of the winter as long as it can be done without unduly increasing the expense, to the end that the whole work may be pushed as rapidly as possible.

G. E. Warburton Goes to Lockington

G. E. Warburton, who succeeds Mr. Bolton in the superintendency of the work at Lockington, was transferred from the Taylorsville Dam December 26. Mr. Warburton has been connected

with the District since September 2. While at Taylorsville he erected the gravel washing and screening plant and the shop. His family will move to Lockington in the spring.

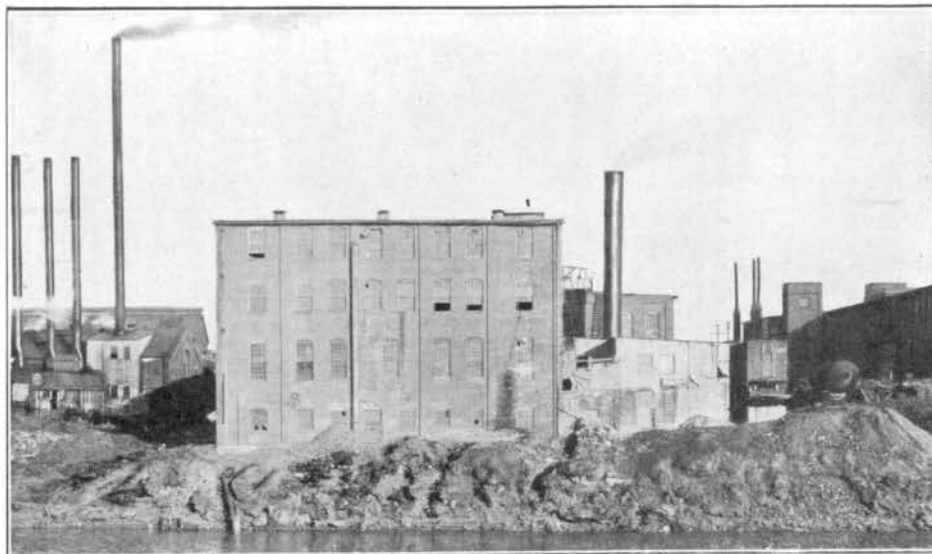


FIG. 94—STERLING PAPER MILL, HAMILTON, MARCH 28, 1918.

To the left, in Figure 94, appears also a part of the Niles Tool Works and to the right a part of the Black-Clawson Works. The central building will be entirely eliminated, together with portions of both the other plants to provide wider water-



FIG. 95—BLACKSMITH SHOP OF NILES TOOL WORKS, HAMILTON, way for the Miami River against floods. This necessitates also partial abandonment of Black Street and Second Street in this neighborhood. The building in Figure 95 will be wrecked. Taken April 23, 1918.



FIG. 96—B. & O. CROSSING, HYDRAULIC CANAL, HAMILTON, APR. 23, 1918.

The canal was built in 1840 for water power purposes and has supplied a dozen or more industries. It is to be eliminated here on account of its interference with the flood protection plans. The water power leases have been one by one abandoned

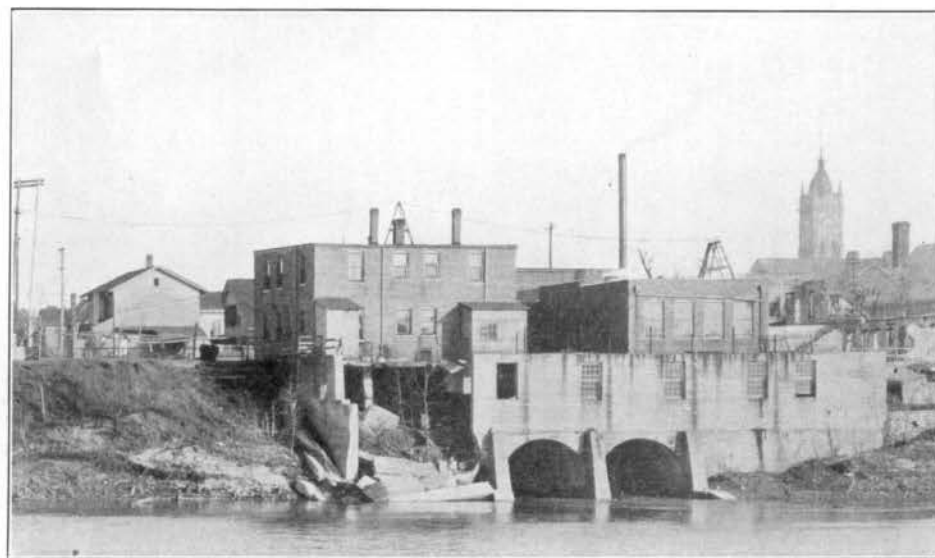


FIG. 97—HYDRAULIC POWER STATION, HAMILTON, MARCH 28, 1918. until now the Hydraulic Company's plant, Figure 97, is the only remaining consumer of power. This hydraulic plant will be wrecked to make room for the widened Miami River.

January Progress on the Work

GERMANTOWN

The placing of concrete during the past month has been confined principally to the conduits. Seven 30-foot sections of temporary floor, four 30-foot sections of center and side walls, and one 30-foot section of the conduit arch have been completed during the month. The pouring of arches is progressing as rapidly as practicable, this work being facilitated by the erection of a truss for moving the outside arch forms. The concreting has been continued throughout the cold weather with very little experience of the usual difficulties due to freezing of the sand and gravel bins or the conveying apparatus.

The dragline, which has just finished the excavation for the conduits, is continuing with the excavation of the inlet channel.

Clearing of the north bank of Twin Creek of all material except the stumps has been started. After the dragline has finished the excavation for the inlet channel it will work down stream clearing this bank of all stumps, and removing the logs in the creek.

An engine shed has been erected for the protection of the saddle tank engines from the cold weather.

The labor situation has improved greatly during the past month and bids fair to cause still less trouble.

There has been one death in camp during the month, that of Mrs. Reno, wife of Z. T. Reno, who has charge of the heating plant at the mess hall. It was due to heart failure. Otherwise the health of the camp is excellent.

A. L. Pauls, Division Engineer.

January 15, 1919.

ENGLEWOOD

The continuation of the moderate weather has enabled the concreting operations to proceed with undiminished rapidity. Regular provisions are made to safeguard against any frost entering the ingredients comprising the concrete and against freezing after the concrete is in place.

On January 13 the last section of the lower sidewalls in the conduits was placed. The following day the last floor section in the outlet of the conduit was poured. Two arch sections have been finished and a second set of arch forms, to enable concreting of the arch to proceed at two places, is about finished. The sidewalls of the outlet are going ahead satisfactorily.

The large steam dragline is continuing down the east bank of the river removing gravel, top soil, and other objectionable matter from the foundation of the dam. All rock and coarse gravel are placed in the downstream toe of the dam; all other material is dumped outside the toe.

The cross dam east of the river, described in previous Bulletins, is proceeding satisfactorily. The dragline is working at present in the gravel fill comprising the downstream third of the dam.

Concrete foundations have been placed for the two 10-inch sluice pumps and for the two 15-inch dredge pumps which will pump the hydraulic fill material into the dam, and the pumps have been set. Work on the pump houses is in progress. The "hog box" or bin, into which the material from the borrow pits is dumped preparatory to being pumped into the dam, is being graded to receive the timber lining.

Some extensions are being made to the camp roads to render more accessible certain outlying portions of the camp.

An ice house is being constructed to accommodate the winter surplus from the ice plant at Taylorsville.

H. S. R. McCurdy, Division Engineer.

January 15, 1919.

LOCKINGTON

Favorable weather conditions during the past month have made it possible to proceed with the rock and earth excavation and concrete work without material interruption. The earth excavation to date amounts to about 90,000 cubic yards. About 17,000 cubic yards of concrete has been poured. This amount represents more than half of the concrete to be placed before Loramie Creek is turned into its new channel next spring. A boiler has been set up so that steam pipes and tarpaulins may be used when necessary to protect fresh concrete from injury during cold weather.

The revised location of the outlet channel was approved during the month and a permit granted by the County

Commissioners to make the necessary road and bridge alterations. The site has been cleared, and clearing is now in progress for the entrance channel above the dam. Rip-rap is being placed on the east slope of the outlet channel. For this purpose rock from the excavation is dumped directly from the cars which are loaded by buckets handled by the south derrick.

A test pit sunk from the floor level of the pool for the hydraulic jump revealed a heavy layer of homogeneous and impervious rock (Niagara shale) within easy reach of the system of grouting holes. Grouting to this strata will insure a particularly good foundation and an effective cut-off under the concrete structure.

Price Brothers Company have completed their contract for repairs to the Port Jefferson State Dam, which will be used in connection with the Miami & Erie Canal for supplying the pumping water for placing the hydraulic earth fill. Redocking of the dam which was being done by the District forces, has also been completed.

The connecting link between Taylorsville Dam and Piqua will be completed January 26, enabling Lockington Dam to obtain the more reliable electric power service from Dayton over the new transmission line.

A house was recently erected over the pump for camp water supply.

There are no cases of sickness in the camp at the present time, the second wave of influenza having passed without serious results.

B. M. Jones, Division Engineer.

January 17, 1919.

TAYLORSVILLE

The Lidgerwood dragline is making good progress on the excavation for the outlet works above elevation 790. In a short time the well drills will be started drilling below this elevation.

The sluicing for the hydraulic fill was shut down December 31 in order to move the dredge pump to a new location. The new installation will be finished in about ten days. Two more 6-inch high pressure pumps have been installed so as to double the amount of water through the nozzle of the giant.

A night shift was started on December 30 for the Lidgerwood dragline, the two trains and the necessary track men.

The small Marion dragline is at work on the ground sluice to the new dredge pump location.

Two thousand feet of Road 13 has been completed.

An old barn 30 feet by 50 feet near the bakeshop, has been remodeled for a garage and manual training room on the first floor, and for an assembly hall on the second. Three fire stations and a number of coal houses have been constructed since last report.

O. N. Floyd, Division Engineer.

January 17, 1919.

HUFFMAN

Excavation for the outlet works has been progressing rapidly during the past month. All of the earth above bed rock, and the rock on the side of the excavation that had been previously drilled and blasted, have been removed. The dragline that is doing this work has been taken to the upper end of the cut, and is now digging downstream again, finishing and cleaning up the excavation to grade. Drilling and blasting of the rock in this excavation is kept completed some distance ahead of the dragline.

A smaller clay cofferdam has been built along the river side slope of the excavation to protect the work from ordinary low water. This reduces the area to be unwatered, and thus cuts the cost of pumping to a minimum. The higher cofferdam, farther back, will be left to protect the work from high water and floods.

Preparations are being made to erect the derricks that will distribute the concrete in the outlet works. Work has begun on the building of forms, and the placing of concrete is expected to commence early in the spring.

The gravel material that was excavated from the cut-off trench, and piled in a windrow across the valley, as shown in the picture on the cover of the January Bulletin, is now being spread on the downstream third of the dam. A small

levee is being built along the downstream toe and the balance of the material is placed to form a gentle slope from this levee toward the center of the dam. This forms an excellent foundation to start the hydraulic fill when the dredge pumps are started.

C. C. Chambers, Division Engineer.

January 16, 1919.

DAYTON

The total material excavated from the river channel to date by the two large dragline machines is 248,000 cubic yards. Including the material moved more than once, a total of 373,000 cubic yards has been handled by these machines. The main channel improvement between Herman Avenue and Island Park Dam has been completed except finishing the levees, by dragline excavator No. 790, which moved 74,000 cubic yards of channel excavation and has handled a total of 112,000 cubic yards of material on this work. The machine has been moved over the street at the west end of Herman Avenue bridge and will now work southward from this point toward Main Street Bridge, excavating the right side of the main channel. Machine No. 789 is beginning to cut out Mad River channel from a point opposite the Gas Plant to Webster Street Bridge.

On Contract No. 41 the McWilliams Northern Dredging Company has placed 48,000 cubic yards of levee embankment with its dragline machine, and 2,700 cubic yards with teams.

About 67 feet of 12-inch water main were laid in the river channel above Herman Avenue during the past month, making a total of 417 feet laid at this point.

The steam tug has been completed except for the installation of the machinery.

C. A. Bock, Division Engineer.

January 16, 1919.

HAMILTON

The levee between the Columbia bridge and the Crawford's Run sewer outlet, a length of about 2000 feet, has been completed by the Class 14 Bucyrus dragline. This machine after being repaired, will move to the north end of the city and build the levees for the proposed hydraulic canal.

The Class 24 electric dragline is nearing the end of the track where it will begin loading material on dump cars to be hauled into the "spoil bank," or earth embankment which will be built to fill the low ground, several hundred feet in width, each side of South Avenue.

The two scows purchased from the Yawger Co. have been launched in a "pocket" in the river bank, excavated by the dragline.

The building on North Monument Avenue, formerly oc-

cupied by the Miami Welding Co., has been wrecked and is being re-erected in the storage yard south of South Avenue. It will be used to house the locomotives and cars when in need of repairs during inclement weather.

A small gang is proceeding with the removal of brick pavement and water mains from Black Street. The materials will be used in the new street.

The concrete sewer in Buckeye Street has been completed for a distance of 1030 feet. The excavation has reached Third Street. The Street Railway Co. has agreed to discontinue its car service on this street during working hours.

C. H. Eiffert, Division Engineer.

January 15, 1919.

RAILROAD RELOCATION

Erie and Big Four Railroad. The Walsh Construction Company excavated 31,000 cubic yards of material during the month of December from the big cut at Huffman Hill. They are now excavating about 1500 cubic yards per day with one steam shovel working 10 hours per day. The excavation of the Mad River channel change at Harries is being done by a small clamshell excavator. Condon and Kolterman, sub-contractors, are hauling steel rails preparatory to putting two steam shovels on the work east of Fairfield. The Bethlehem Steel Company are erecting 320 tons of structural steel for the underpass just west of the Huffman Dam. This bridge is the only one on the Erie and Big Four that will require a steel superstructure.

Mr. Sprague is working on the three concrete bridges near Enon and during the cold weather he is wrecking the old buildings on the right-of-way at Harshman. The water for Harshman's mill race has been diverted through the new concrete arch bridge at this point. The Springfield Pike east of Huffman Hill and south of Fairfield has been practically covered with gravel, and a large portion of it is ready for the final rolling and finishing. This will not be done before spring.

Baltimore and Ohio Railroad. The general contractors, Grant Smith and H. C. Kahl, and the sub-contractors, Condon & Smith, Vang Construction Co. and Kahl Bros. Construction Co. have five steam shovels in operation. All of the grading outfits were shut down for about two weeks during the holiday season, but have resumed work again except that of the Vang Construction Co. The 8-foot concrete arch at the Taylorsville Dam, which extends under the roadbed and the two railroad levees, is about 90 per cent completed. After this structure is finished, there will only be a small amount of concrete work, consisting of the head walls for the concrete and cast iron pipe culverts, remaining to be done on the B. and O. R. R. work.

Albert Larsen, Division Engineer.

January 16, 1919.

River and Weather Conditions

In general the river and weather conditions during the month of December were not unfavorable to construction progress. While the small freshet that occurred about the middle of the month caused some minor delays in the channel improvement work, no serious damage occurred. The temperatures were not low enough to seriously interfere with the concrete work at any time.

The total precipitation during the month, at the District's stations, varied from 2.71 inches at Pleasant Hill to 3.36 inches at Germantown. The normal amount for the Dayton U. S. Weather Bureau station for this month is 2.62 inches. The total

January 15, 1919.

number of days on which the precipitation exceeded .01 inch varied from 11 to 14 at the various stations. The maximum precipitation during a 24-hour period varied from 0.76 to 0.97 inches.

At the Dayton U. S. Weather Bureau station the average temperature for the month was 41.3° F., or 8.5° above normal, the lowest recorded being 20° on the 26th and the highest, 63° on the 13th. The maximum wind velocity for five minutes was 37 miles per hour, from the southwest on the 24th; and the average wind velocity was 11.3 miles per hour, the prevailing direction also being from the southwest. There were 6 clear days, 4 partly cloudy days, and 21 cloudy days.

Ivan E. Houk, District Forecaster.

Honor to a Conservancy Engineer

A pleasing honor was conferred last June upon one of our designing engineers, and incidentally credit was reflected upon the work of the District, when Ross M. Riegel was awarded the Fuertes gold medal by Cornell University for his part in the in-

vestigation and publication of the action of the hydraulic jump described in Part III of the Technical Reports. The award is made annually to the Cornell alumnus who publishes the most important engineering paper during the preceding year.

Construction Notes

Improvements in Lockington Gravel Washer

Changes which have been made in the gravel washer at Lockington have improved it in several particulars. One of the difficulties early encountered was due to the fact that the sand, after being washed, carried too much water into the sand bin with it. The sand, mixed with considerable water, flows from the sand screen into a vertical hollow inverted cone, which it nearly fills. Most of the water overflows through a spout notched into the upper edge of the cone, while the sand is periodically discharged through a counter-weighted valve at the bottom. The discharged sand was still too wet. To remove this remaining water, the sand is now caught in an inclined cylindrical box in which works an Archimedeian screw. The screw conveys the sand up the inclined cylinder, from the top of which it falls into the sand bin. The water drains down the incline as the sand ascends, and overflows through openings provided at the bottom. The device, which is simple and inexpensive, has proved effective in accomplishing the object desired.

The other improvements had to do with fitting the washer for better handling the particular gravel found at Lockington. The material contains few stones larger than the $1\frac{1}{2}$ -inch size. As a result, the two upper of the three screens (the 3-inch and $1\frac{1}{2}$ -inch sizes) have very little work to do in sorting out these larger stones, probably over 90 per cent of the material dropping through them into the $\frac{3}{8}$ -inch screen, which crowds the latter to such a degree that until the trouble was corrected much of the sand was unable to reach the holes and was carried over into the gravel bin. To correct this difficulty, baffles of angle-iron were bolted to the inner face of this screen, retarding the flow of gravel

so that more of the sand could drop through. Also, additional water jets, directed from below into the mouth of the revolving screen, still further retard and scatter the contents, thus permitting the separation of the remaining sand.

As explained in an article in the January issue, the sand for use in concrete should be graded with reasonable uniformity from the fine to the coarsest, or $\frac{1}{4}$ -inch size. At Lockington the sand which is available for use contains an excess of the larger sized grains. This makes it uneconomical, as it results in a "gritty" concrete that is very hard to work in the forms. To get rid of this excess, additional stationary screens have been set up underneath the $\frac{3}{8}$ -inch revolving screen. These are two in number and may be of either 4 or 5 wires to the inch. Two of them are set up slant-wise, like ordinary sand screens, side by side, the sand dropping upon them from the revolving cone. Two $\frac{1}{4}$ -inch mesh screens, or two $1/5$ -inch mesh screens, may be thus used, or one of each, according to the run of gravel coming through the washer. These screens sort out considerable of the larger size, which is thrown away.

Some of the sand in the Lockington gravel is extremely fine, so fine that it is carried away with the water which flows from the lower end of the sand cone and is lost. This is, in effect, throwing away just so much cement, since these fine sand grains may properly take the place of cement in filling the voids between sand grains of larger size, as explained in the article referred to on concrete. To save this fine sand, the water that carries it is run into a settling tank, which permits the sand to drop to the bottom while the water runs away over a weir at the lower end. At intervals sand is shoveled from the bottom of this tank into the sand bin.

By thus getting rid of the excess sand of large grain and saving the fine sand, the amount of cement used in a batch of "lean" concrete at Lockington has been reduced from 6 bags to 5, a saving of $16\frac{2}{3}$ per cent in cost of cement. In the richer concrete the saving in cement is about proportional.

The result of this study in screening and grading the sand is saving the District more than \$100 a day through the more economical use of cement which is made possible. The public generally does not realize the importance of the exactness and care which is being exercised in the design and construction of these works.



FIG. 98—STEAM TUG FOR LEVEE CONSTRUCTION, MIAMI RIVER

A steam tug of the Mississippi River type, built to "run in a heavy dew." She is 70 feet long, 20 feet beam, and 3 feet depth, with double engines with 8-inch by 42-inch cylinders, of about 100 horse power. Boiler carries 175 pounds pressure. The tug will draw nine or ten inches of water, and will push scows up and down the Miami River. The scows are 40 feet by 120 feet in size, and will carry the material excavated from the river bottom, to be deposited in the levees and spoil banks. Taken Dec. 24, 1918.

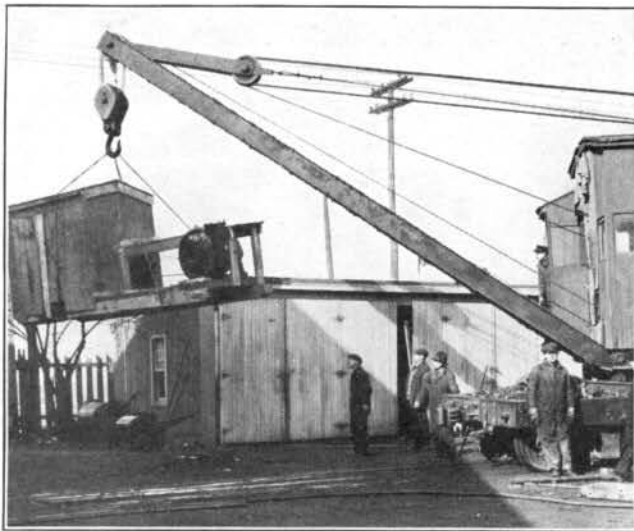


FIG. 99—PORTABLE PUMPING OUTFIT USED ON CONSERVANCY WORK

Shown at the right in action, at the left suspended from the boom of a derrick while being shifted from the Conservancy Shop to a motor truck which will transport it to the work. The little house is weather-proof, and contains the electric motor which is connected by a belt to the centrifugal pump mounted on the same platform outside. Electric power is used because available almost everywhere in the District on the Conservancy work. In action, the apparatus is shown taking water from the excavation at the left through the slanting suction pipe, and discharging it through the horizontal pipe above into the Miami River. The gate valve shown at the right-hand end of the discharge pipe serves two purposes. Shut tight at the end of a run, it maintains water in the horizontal pipe to prime the pump when it is next started. Partially shut, it can be adjusted to the rate of flow of the water which percolates into the excavation so that the pump can be kept steadily running while maintaining the water in the excavation at any level required by the exigencies of the work; otherwise, it would soon pump the excavation dry, after which it would pump air and require to be primed before it could again operate. For transportation the suction and discharge pipes are, of course, unscrewed. The pump is handily lifted by derrick or dragline to or from cars, motor trucks, or work. Right hand view taken Jan. 8, 1919; left hand view taken Jan. 20, 1919.

E. N. Floyd Goes to the Big Four

The Bulletin notes with especial regret the departure of E. N. Floyd, formerly in charge of the Conservancy railway relocation. Mr. Floyd will go to Cincinnati as the superintendent in charge of the new Fire Prevention Bureau of the Big Four Railway, under the immediate direction of the Chief Engineer of that railway, C. A. Paquette. He will supervise also the same work on the Cincinnati Northern, the D. T. & I., the Central Indiana, the Louisville & Jefferson Bridge Co., the Central Union Station at Cincinnati, and the Chesapeake & Ohio R. R. of Indiana. His work will be new and interesting. The annual fire loss on American railways is estimated at three hundred millions per year or twenty-seven dollars per mile. In view of this fact

and of evident present neglect of it, the railway administration has ordered the roads to discontinue paying fire insurance and to organize fire protection for themselves in conformity with general plans adapted to all the railways of the country. This is the work which Mr. Floyd is going to take part in on the railways mentioned. It is a real job, and we wish him every success in tackling it.

Mr. Floyd joined the Conservancy forces in March, 1914, and since that time has been connected with various features of the work. Until recently, he has been in charge of the railway relocation in the Huffman and Taylorsville basins. He will go to his new work about February 1; his family will remain in Dayton probably until spring.

John W. Bolton Goes to North Carolina

John W. Bolton, Superintendent at Lockington, resigned December 19, to accept a position with the Southern Power Company at Bridgewater, North Carolina. For a number of years Mr. Bolton was connected with the Reinhardt-Dennie Company on the construction of the New York Subways. Later, for about a year, he was connected with the Hardway Construction Company on work for the Southern Power Company on the Catawba River near Bridgewater, North Carolina. There he was Superintendent on the Paddy Creek dam, a semi-hydraulic

fill structure. This dam was the only one of the group completed according to schedule. Mr. Bolton's work at Lockington for the Conservancy comprised the construction of the gravel washing plant, the opening of the excavation for the concrete outlet structure, and the building of the foundations of the same, together with a very considerable section of the walls. He carried through this work with energy and ability, and it is with regret that his colleagues note his departure. We wish him success in his new field of labor.

The Camp Community Association idea, noted in our last issue, continues to find fertile soil. Engle-

wood is organizing, following rather closely the simple scheme of organization of the city of Dayton.



FIG. 100—A BIG DRAGLINE CLIMBING OVER THE PIKE

This is a Class 175 Bucyrus machine, weighing about 175 tons. The boom is 135 feet long, enabling the machine, by swinging a half circle, to deposit material 170 feet or more from the point of excavation. The bucket will hold $3\frac{1}{2}$ cubic yards—about 4 ordinary wagon loads—of earth. The boom reaches 80 feet above the track level, and the bucket will dig effectively 75 feet below that level.

The machine has just climbed an incline leading from the bed of the Miami river in Dayton to the west end of Herman Avenue bridge, 20 feet higher, building its own roadway and climbing by its own power. After crossing the avenue, it built another incline down to the river bed below the bridge, which it then descended. The crossing was done during the night shift, the street being closed to traffic only from 8 p. m. until 3 a. m.. The machine had just completed the channel excavation between Herman Avenue and Island Park dam, and instead of dismantling it and moving it under the bridge, the above better procedure was adopted. Taken Jan. 8, 1919.



FIG. 101—WHAT NOT TO DO WITH A HILLSIDE. (GERMANTOWN, JAN. 10, 1919.)

This shows what happens when the timber is cleared from a hillside. The gullies are due to wash by rains.

THE MIAMI CONSERVANCY BULLETIN SUPPLEMENT

"The News Letter"

To Promote the Conservancy Spirit on the Work

February, 1919

Taylorville

Taylorville Community Association held a very enthusiastic meeting on the evening of January 10. Several new members were elected to membership and special committees appointed to see all those that are eligible and interest them in the Association. After the meeting adjourned, tables were arranged for a euchre party, which was enjoyed by many until a late hour.

On January 16 a surprise party was held as a farewell reception to Miss Elizabeth Dungan, the school teacher, who has accepted a position in the War Department at Washington. The surprise was held in the school house, and when Miss Dungan arrived, Mr. Rogers, Chairman of the Association, after making a short talk and announcing the purpose of the meeting, presented Miss Dungan with a set of silverware in behalf of the residents of the Community, as a remembrance of their friendship and esteem. Miss Dungan accepted the gift with appropriate remarks, thanked the Community for the kindness and co-operation extended her, and expressed the regret she felt in not being able to remain longer. Arrangements had been made for dancing and it was in order for the remainder of the evening. Miss Dungan has had charge of the school for only about three months, but during that short period she has gained the friendship of the entire Community. Her work in the school has been most satisfactory to all concerned, and her leaving at this time is regretted by all. Miss Dungan will report in Washington about February 1.

Sunday, the 19th, was a record-breaker for the Sunday School. Fifty-seven were present, and outside of the regular collection, \$16.00 was raised for the Armenian and Syrian Relief Fund. The Ladies' Club donated \$50.00 to the same fund. Sunday afternoon, at 2:30, church services were held in the school house. Rev. Zimmerman from the U. B. Church, Vandalia, conducted the services and delivered a very interesting sermon. Arrangements are being made to have undenominational services at least every other Sunday.

A Manual Training class has been started and arrangements are under way to organize a Boys' Club and give them military training. When spring comes we shall also expect to have them procure wild flowers, shrubbery and small trees for beautifying the camp. To encourage this work Mr. Hauck, the Camp Inspector, has kindly consented to take the boys out one Saturday each month to select and secure plants, flowers, etc. Prizes will be awarded to the boys showing the best results.

Another activity which will receive a great deal of attention and be encouraged very strongly is the individual gardens, both for the children and the grown-ups. Prizes that are worth while will be awarded for the best gardens and a great deal of friendly rivalry is expected to develop along that line. The slogan is, "Everyone raise his own vegetables this year."

Arrangements are being made to have an illustrated lecture in the near future on the construction and operation of the Panama Canal. More than 100 pictures will be shown and the lecture will be given by a man who served more than eight years on the construction work.

An old barn is being remodeled and made into a garage and community hall, the second floor being reserved for the hall. It will have a seating capacity of about 200 and will be used for all amusement purposes. It will soon be formally opened with a banquet and ball. Invitations are to be extended to the residents at the other dams.

Meantime, keep your eye on Taylorville.

Germantown

On Thursday evening, January 2, Mr. and Mrs. Harry Kern entertained Mr. and Mrs. Pauls, Mr. and Mrs. Shively and Miss May Turner at a card party at their home in Germantown.

The Serbians in camp observed their Christmas on January 7. Mr. and Mrs. Steve Vulich entertained Superintendent and Mrs. Armstrong at a Christmas dinner. The home was decorated like a Serbian home in the old country and an elaborate Greek dinner was served.

Monday morning, January 13, Mrs. Taylor Reno passed away after a lingering illness. The body was taken to Louisville, Ky., for burial. The heartfelt sympathy of those in Camp goes out to Mr. Reno in the loss of his wife.

The Red Cross organization met at the home of Mrs. Roy Schaffer on Wednesday afternoon, January 15. This was the first meeting since the holidays. Fifteen pairs of bed socks were finished.

P. W. McGinnis, the popular walking foreman of the Germantown Dam, and only son of R. E. Reynolds, made a trip recently to Omaha, Neb., to see his old "flame." His friends are all disappointed that he did not bring her back with him. However, the "flame" has put him on probation and if Mickey Westol discontinues teaching him to smoke cigarettes and leading him astray in other ways, she will come.



The Germantown Twins

We think we can do no better for a first picture for the "Conservancy News" than the likeness shown above of the "Germantown Twins," nicknamed on the job, of course, "Mutt and Jeff." The picture pretty nearly tells its own story. The shorter man of the two, Lewis Graham, is four feet, six inches high; the taller, John Ryle, six feet, six; just two feet higher. Graham, who is a rodman with the engineering party, holds up the tool of his trade, a leveling rod, the face of which, where the feet are marked in large figures, tells its own story of the height of the two men. Ryle is one of the carpenters, as the picture also shows. They are two of the most popular men on the Germantown job.

Englewood

Englewood watched the Old Year out and the New Year in by gathering at the Mess Hall and enjoying a short well-rendered program, dancing, and refreshments served by the ladies, until 1919 was properly ushered in. An "among those present" is unnecessary, as few were missing.

Mrs. Tanner is about after an attack of bronchial pneumonia.

A meeting of the men was held January 13 to provide amusement during the winter and spring months. Committees were appointed who promise a dance in the near future, accompanied with refreshments which surely will not lack the "punch." An entertainment and supper will follow closely, it is hoped, the committee being on a still hunt for the musicians and entertainers.

Englewood was favored with a visit on the 14th by the Misses McGraw, Sullivan and Walcott of the Dayton office. They had an interesting trip over the

works, made still more so by experience with Englewood mud.

Mr. Williams, our Camp Overseer, who has been seriously ailing, was accompanied to Dayton by Dr. Smalley on Tuesday, January 14, where he submitted to an operation. We wish him a complete and early recovery.

The organization of Englewood Camp along self-governing lines, is contemplated. It is expected through this agency that camp maintenance and improvements will be aggressively carried out.

Huffman

We regret to announce that Mrs. B. A. McMillan died at her home in Huffman Camp Dec. 27, 1918, after a long illness. We all wish to extend our sincerest sympathy to Mr. McMillan and family.

Huffman Campites celebrated New Year's Eve in a new and novel way. Everyone in camp was called upon to contribute something toward the making of doughnuts, sandwiches, and coffee. The women took their electric grills, percolators, and all the necessary articles up to the Community Hall and got busy frying doughnuts and hamburger steak for sandwiches. They deserve high praise for the good results. Besides the delicious lunch, there was dancing and card-playing. At twelve o'clock a New Year gun was fired and all sang the Star Spangled Banner. The party broke up at the unholy hour of one-thirty a. m.

Sure proof that no one wishes to be called a "back-number" is displayed by the excellent attendance at dancing school every Monday evening. We expect before long to turn out a few professional fox-trotters.

We extend a cordial welcome to Corp. Ben H. Rogers who returned to our office January 15, 1919, to take up his former position as Field Clerk. He was drafted September 23, 1918, and served in the Infantry, Co. 5, 2nd Battalion, 153rd Depot Brigade, receiving his promotion November 16, 1918. He was discharged from the army December 28, 1918. Mr. Gena, who has very capably been filling both positions as Field Clerk and Office Engineer, now resumes his former place as Office Engineer.

We wish to congratulate Mr. and Mrs. O. L. Maynard, who are rejoicing over the birth of an eight-pound baby boy, born January 3, 1919.

Frank Burkholder, former timekeeper at Huffman Dam, left our employ January 4, 1919, and returned to his home in Troy. His place has been filled by Baldwin G. Locher, recently discharged from the naval reserve after three month's training.

Hamilton

H. B. Linden, operator on the electric dragline, who has been critically ill with pneumonia, is now reported out of danger and well on the way to recovery.

Assistant Division Engineer R. B. McWhorter has gone to Alabama for a two weeks' vacation. Mrs. McWhorter and son Robert are spending the winter there with her parents.

Harry Kneipp, truck driver, has left the job and returned to Dayton, his place here having been taken by Fred Hill.

G. W. Schrader, who is acting as inspector on the

THE MIAMI CONSERVANCY BULLETIN

levee work, has moved his family to Hamilton.

S. E. Roush, resident electrician, was ill for several days at his home at Middletown.

"Pete" Rains and Mrs. W. T. Rains have recovered from an attack of the "Flu."

Robert Kennedy of the real estate department has had his tonsils removed and is reported to be doing nicely.

Mr. Berry, warehouseman, was "gassed" recently by inhaling the fumes of hydrochloric acid, but has now recovered from the effects.

The lowest temperature reported so far by Observer A. F. Griffin was 2 degrees above zero on January 4.

Bowling fever has broken out on the Hamilton job. Great rivalry has developed between Supt. F. C. Williams and Warehouseman Harry T. Berry and a championship match between the two has been proposed.

Editorial

The editor hopes you like the "News Letter." If you don't, in any particular, he would like to know it, and he would like to know why. He is not thin-skinned; fire away. He wants the little sheet to represent the Conservancy workers, a thing impossible without your criticism and co-operation. Whether you run a dragline, a drafting pen, or a dish washing machine, this "News Letter" section of the Bulletin is for you, and what interests you is for it. So, what interests you, pass it in.

To this end we would like to see the "News Letter" gotten out not by a single editor, but by a board of editors; one to represent each division of the work. We intend to take this matter up at once with the several divisions, and hope to be able to announce the personnel of the board in the next issue of the "News Letter." Their names should be carried permanently at the head of the editorial column, for the convenience of those who have items to contribute.

In this connection it is interesting to see the effect upon the Taylorsville items of the very live Taylorsville Community Association. We believe their evident pep to be due to the team work made possible by the camp organization. The other camps might do much worse than follow Taylorsville's example and organize.

The First Conservancy Club Dinner

The first dinner of the newly formed Conservancy Club seemed to make a hit with everybody who attended. The affair, indeed, became embarrassingly successful. The demand for dinner tickets proved to be so great that the invitations to the people at the camps, after being extended, had to be revoked, to the chagrin of those in charge. At that, between a hundred and thirty-five and a hundred and forty Conservancy people attended the dinner that evening, pushing the facilities of the church for entertainment to the very limit. Between fifty and sixty people from the various camps, who had planned to come, had to be headed off.

Informality was the order of the evening. This was the intention from the start. The starch which stiffens so many such affairs, it was aimed to keep

out. The excellent dinner made a good beginning. Then came the singing of old songs, by a crowd that gathered around the piano, beginning with "Auld Lang Syne" and ending with well-known war songs of the day. These were a manifest help in making everybody feel at home; you could sing, or listen, or sit and talk, as you chose. The familiar choruses were followed by a song by Miss Ivonette Wright, which was enthusiastically encored. Fowler Smith then took matters in hand and engineered a few rapid fire toasts. These were of the same happy and informal character as the singing. Responses were made by Mr. Locher and Mr. Morgan, followed by Messrs. Porter-Shirley, Graham Smith, and Captain Everhard of the Basket Ball Team. Porter-Shirley made the hit of the evening. Long-windedness, the kill-joy of such occasions, was conspicuously absent. The speeches went with a snap.

The entertainment came to an end a little before eight o'clock, in order to permit the men present to attend the talk at the Engineers' Club by John S. Conway of the United States Light-House Service, to which they had been invited. The party broke up with very evident reluctance, and there have been many inquiries since as to when the next dinner will be held.

Conservancy Club Dinner and Dance

The next dinner and celebration of the Conservancy Club will occur during the first week in February, the exact date to be announced later. Plans are progressing favorably and an interesting program seems assured. The most popular feature apparently, giving a kind of sky-rocket finish to the affair, is to be a dance. Watch the Bulletin Boards! Bulletins will be posted at headquarters, warehouse, shop, and at the dams. No revoked invitations this time. Families of the members are invited. Any member is also at liberty to bring a partner, not a member, for the dinner and dance. If you are with the Conservancy, you are a member.

The Bowling League

The Bowling League opened its season on the Royal Bowling Alleys on West Fifth Street, Tuesday evening, January 15. The league is composed of six teams representing divisions of the District made up as follows:

Purfics, representing the Purchasing and Traffic.
Steam Shovels, representing the Railroad Relocation.

Slide Rules, representing the Drafting Room.

River Imps, representing the Dayton River Improvement.

Warehouse, representing the Warehouse.

Draglines, a "heterogenous agglutination," representing a wide variety of talent.

From the interest shown during the first week's bowling, it is very evident that the league is going to enjoy a very successful season, and some very good records are expected. All league games are bowled at 5:30 p. m. on Monday, Wednesday and Friday of each week. The Warehouse team defeated the Purfics two out of three games on Tuesday evening. The Draglines lost three games to the Steam Shovels on Wednesday and the Slide

THE MIAMI CONSERVANCY BULLETIN

Rules were only able to take one game from the River Imps on Friday night, making the standing of the teams as follows after the first week's bowling:

Standing

	P.	W.	L.	Pct.
Steam Shovels	3	3	0	.1000
Warehouse	3	2	1	.666
River Imps	3	2	1	.666
Purfics	3	1	2	.333
Slide Rules	3	1	2	.333
Draglines	3	0	3	.000

Captain Lewis of the Draglines claims he only had a Class 9 excavator in the field Tuesday night, but promises to be there this week with a Class 24 machine, which will scoop pins by the cubic yard.

Assistant Chief Engineer C. H. Paul has received recently a telegram announcing the arrival in New York of his brother, Edwin L. Paul, of the 55th Artillery, American Expeditionary Forces in France. This is the brother who helped drive the Kaiser out of the Argonne Forest "wohl uber den Rhein." He was fortunate enough to come through with no mark of battle upon him but a gold service stripe.

The Bulletin welcomed back an old friend and office mate in Sgt. J. F. Burkin, who has been in the Artillery at Camp Anniston, Alabama. He saw more hard luck than anything else during his service, being home two months of the period laid up with Flu, from which he barely escaped being laid away for all time in the last narrow niche. All the rest of the family were down sick with the disease at the same time. He will have charge of the topographic survey of the Germantown Basin, and will no doubt jump into that work with his old pep.

His friends were especially glad to welcome J. M. McWilliams back into the Conservancy fold. Mr. McWilliams is an old employee. At one time he was Mr. Morgan's Secretary. He left the Conservancy about eighteen months ago to enter war service, his work being in the Aviation Corps, first at Wilbur Wright Field, then at Fort Worth, and at Langley Field. He returned a few days ago, and is now at Lockington acting as Field Clerk.

A meeting of the Conservancy Athletic Association was held in the Bulletin office on January 9, with W. M. Smith, president, in the chair. Officers were elected to take the place of Miss V. M. Richmond, Secretary-Treasurer, who has left the employ of the District. It was voted to separate the two offices. Miss Gladys Thirkield was elected Secretary, and W. T. Stockman, Treasurer.

The Committee on Bowling tendered its resignation, which was accepted. It was voted to have six teams which should represent single divisions or alliances of two or more divisions; these teams to constitute a league and play a schedule of games. A committee was appointed to take charge of the schedule and arrange for alleys, the committee to consist of W. T. Stockman, Chairman, and the captains of the several teams; the captains to be elected by the members of the teams.

The meeting was well attended, men crowding the Bulletin office and overflowing into the hall, and the program was put through with a pep which prophecies a hot time on the alleys.

Basketball

Against the swift Tipp City bunch, on January 10, the basket ball team came back strong, running up in all 29 points. Twenty-four of these were made in the second half, against 22 for Tipp City in the same period. The better showing in the second half was partly due to a change in the personnel of the Conservancy team and in part to a shift in its lineup in the middle of the half, by which Kuboski took Floyd's place at center, while Floyd went in as forward, Everhard shifting from forward to take Kuboski's place at guard, with Shea as his guard mate and Maltby playing the other forward. With this lineup the Conservancy team outplayed Tipp City during the last half, as the score given indicates. The score for the entire game was 53 to 29, Tipp City making 31 points to the Conservancy's 5 the first half. Shea put up a fine game at guard. Everhard played his usual fast, consistent game. Floyd, though out of place at center, in his old position as forward threw 4 baskets in the last ten minutes. Kuboski in his new position at center did excellent work, while Maltby played his usual star game throughout.

Considering the first game at Tipp City not long since, when they beat us 87 to 15, the Conservancy team made a remarkable showing.

Following is the schedule of the Basket Ball Team is far as made out:

- Jan. 24—Cedarville College at Cedarville.
- Feb. 14—Hamilton Y. M. C. A. at Dayton.
- Feb. 19—Piqua Y. M. C. A. at Piqua.
- Feb. 21 or 22—Hamilton Y. M. C. A. at Hamilton.
- Mar. 7—Cedarville College at Dayton.
- Games with West Milton are still in doubt.

Among the returning Army men, we are glad to see Lieut. R. F. Eastman, who has been at Sandy Hook and Fort Monroe with the Coast Artillery. He will go back to his old place in the drafting room.

Lieut. Myron Cornish, noted in a recent Bulletin as being with the Air Service in charge of construction at March Field, California, returned to the Conservancy work the middle of January, at the Headquarters office.

Another of the returning Army men who was early in the employ of the District, is Lieut. E. W. Lane, he having entered the Conservancy service in 1914. He has been in the Air Service at Rantoul, Illinois, Lake Charles, Louisiana, Arcadia, Florida, and St. Paul, Minnesota. He is now attached to the Headquarters Office.

Arthur H. Kent of Chicago, until recently with the United States Army at Camp Kearney, California, has within the last few days joined the forces of the District. In the absence of Mr. Williams, Camp Overseer at Englewood, who is just now in the Miami Valley Hospital, Mr. Kent is undertaking the duties of that office.

THE MIAMI CONSERVANCY BULLETIN SUPPLEMENT

"The News Letter"

To Promote the Conservancy Spirit on the Work

February, 1919

The Germantown Damsite Association

The employees at the Germantown Dam got together on January 31st, 1919, and organized the Germantown Damsite Association.

A Constitution and By-Laws were adopted and the following commissioners were elected for a period of one year:

C. O. Shively, Chairman; A. L. Pauls, Albert Armstrong, P. W. McGinnis and Alex MacKinnon. Secretary and Treasurer; Chris Foehr, Jr.

P. W. McGinnis was appointed Chairman of the Social Activities Committee, A. L. Pauls, Chairman of the Educational Committee, Alex MacKinnon, Chairman Camp Welfare Committee and Robert E. Reynolds, Chairman of the Public Safety and Order Committee.

Up to this writing we have a membership of 182 and are looking forward to a much larger membership in the near future. Watch us grow.

Classes for the night school are now forming. The English class was opened, February 13, by A. A. Hauck from Headquarters. In the future Mr. MacKinnon and Miss Turner will teach this class.

Chairman Pauls expects to make Germantown a great educational center.

At a meeting of the Association, February 10, it was decided, on motion of Mr. McGinnis, to have a club room, equipped with one or two pool tables, etc., and with facilities for serving refreshments, provided this meets with the approval of the District authorities.

Chris Foehr, Jr.,
Secretary and Treasurer Germantown D. A.

The Riverside Community Association

The first regular meeting of the Riverside Community Association was held at the Mess Hall on the evening of January 24, 1919. The constitution of the Association was adopted, and the following members were elected as commissioners:

Mr. H. W. Herne.
Mr. L. J. Hills.
Mr. G. L. Southworth.
Mr. Fred Gibson.
Mr. G. N. Thomassen.

In accordance with the Constitution the Commissioners met the following week to perfect their own organization, to select an Association Manager, and to begin the consideration of community problems and the drawing up of plans for their solution. The Commissioners elected the following officers, these officers to be also the officers of the Association, as provided by the Constitution:

Mr. H. W. Horne.....Chairman
Mr. Fred Gibson.....Vice-Chairman
Mr. G. L. Southworth.....Secretary
Mr. G. N. Thomassen.....Treasurer

Mr. Arthur H. Kent, Camp Overseer, was appointed by the Commission as Association Manager.

The Association Manager has appointed the following as Directors:

Mr. H. H. Rupe.....Director of Public Works
Mr. P. D. Haskell.....Director of Public Safety
Mr. H. R. S. McCurdy.....Director of Public Welfare

Many other members of the Association will be appointed by the Directors to serve on committees.

All employees of the Miami Conservancy District and members of their families over sixteen years of age of

good standing and character and resident at the Englewood Dam are eligible for membership in the Association. Every person with these qualifications is desired as a member by the Association. The willing co-operation and support of all the residents of the camp is necessary to the successful carrying out of the plans of the Association and its officers, plans which are of great benefit to everyone. A large number have already placed their names on the membership roll, but more are desired. If not a member hand your application to one of the Commissioners, or to the Association Manager, to be placed before the Commission. The only financial obligations of membership are an entrance fee of fifty cents and dues of one dollar per year, payable in advance. The funds derived from these sources are to be used in carrying on the activities of the Association. Members are urged to pay their fees and dues to Mr. Thomassen, the Treasurer, at the earliest possible moment.

The Commission takes this opportunity to place before the residents of the camp some of the things it is planning to do. It is pleased to state that work on the remodelling of the farmhouse into a large community house will begin at a very early date. Arrangements have been made to have the cellar of the Community House partitioned in such a way as to provide an individual cellar room for each and every cottage in camp, to be used for storing vegetables, preserved fruits, etc. The Community House will provide a place for dances, entertainments and other public functions, as well as clubrooms and other desirable features. Motion picture shows are to be held at least once a week, in the Mess Hall until the Community House is completed. The first pictures will be shown in all probability next week. Plans for a big get-together social affair are under way. Keep on the lookout for an announcement of it and be sure to be there.

The Commission's program for the future include plans for beautifying the camp through lawns, trees, and flower gardens; for encouragement of vegetable gardens; for marking the regular streets, alleys and walks; for playgrounds for the children the coming summer; for tennis, baseball and other forms of outdoor sport for the adults; and for many other features that will make the camp more attractive for those who are living in it. Every effort will be made to improve the present inadequate mail service. Steps are being taken to organize an efficient form of fire protection in camp.

The Commission is anxious to have the assistance of everyone in removing conditions in camp that may be unsatisfactory and in obtaining suggestions as to possible improvements. A "suggestion and complaint" box has therefore been installed in the hallway at the office. Anyone, who has a complaint or suggestion to make, may drop it into this box. Such statements should be as clear, brief and definite as possible and must be signed by the persons making them. Anonymous complaints will not be considered. On the other hand, careful and thorough consideration will be given by the Commission to complaints and suggestions that are properly presented.

HAMILTON

Mr. and Mrs. A. F. Griffin were hosts at a delightful entertainment given recently at their residence on Park Avenue in honor of their sister, Miss Bessie Cutler, of Worcester, Massachusetts.

Division Engineer C. H. Eiffert and family will occupy their new residence on North "F" Street within the next few days.

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Mr. F. E. Davis, until recently employed at the Headquarters Office, has joined the Hamilton force as Draftsman.

Superintendent W. T. Rains reports improvement in the condition of his son, W. E. (Pete) Rains, who has been seriously ill of late.

Office Engineer J. E. Faist has been ill with grippe, but has recovered sufficiently to return to duty.

The feature of the bowling meet of February 11th was the keen rivalry between Warehouse Man Harry T. Berry and Superintendent F. C. Williams. Mr. Berry got away handsomely with a score of 56, while Mr. Williams crowded the 200 mark and is now in retirement.

Tony Reopo, Italian laborer on the Buckeye Street sewer work, was robbed by highwaymen on the Miami and Erie Canal near John Street on the night of the 3d instant. He lost \$600 and two watches. Police authorities caught the thieves and placed them in jail, but none of the booty has been recovered.

James Goller, night watchman on the Buckeye Street sewer job, discovered and reported the fire that destroyed the Lane Public Library in the early hours of Feb. 11th.

Obituary

John Brosey, fireman on the steam dragline, died at Mercy Hospital February 12th of pneumonia. He leaves a wife and one daughter, who have the sympathy of the Conservancy force.

GERMANTOWN

The religious welfare of the camp is being well taken care of by the ministers of Germantown and neighboring vicinity. Shortly after the holidays, arrangements were made by them to conduct church services every Sunday at the camp. On January 12, Rev. Shinn of the Reformed Church had charge of the services; January 19, Rev. Sieber, of the Lutheran Church; January 26, Rev. Ewing, of the Reformed Church of Farmersville; February 2, Rev. Underwood, of the United Brethren; February 9, Mr. Siebert, of the Lutheran Church; February 16, Mr. Shinn, of the Reformed Church, with special music by Captain Emery Baldof and Mrs. Shinn.

The Red Cross Organization met at the home of Mrs. A. L. Pauls, February 5. Six refugee aprons were made. Mrs. C. W. Faber of Dayton was a guest of the afternoon.

In the past weeks, there has been a great deal of merry-making going on. Tuesday, January 14, Mrs. Chris Foehr entertained a group of ladies for her house guest, Mrs. Clara Bliss of Cincinnati. The following day, Mrs. W. P. Hulings entertained for Mrs. Bliss.

January 23, a dancing party was given in the school-house. A three-piece orchestra from Germantown furnished the music. Several people from Germantown came out and a most enjoyable evening was spent by all.

On Thursday afternoon, January 30, Mrs. Austin Philpott and Mrs. Roy Schaffer entertained at a novel children's party. The ladies arrived in garbs of their youth, and never before had there been so many children in camp at one time.

February 8, Mrs. Roy Schaffer entertained Mrs. Philpott, Mrs. Foehr, Mrs. Hulings, and Mrs. Pauls at a birthday party.

Monday evening, February 10, a great many of the people had the pleasure of hearing Mr. Kettering lecture in Germantown on the subject, "What War Has Done for Science."

St. Valentine's Day was appropriately celebrated. Friday afternoon the school children entertained the children from a neighboring district school at a Valentine Party. They decorated the building with hearts and cupids, and refreshments were served by the Domestic Science girls. Friday evening a Masquerade dance was given by the older folks. This was the first party given by the Camp Association Social Committee, and they deserve great credit for the affair.

On February 19, the older children in the school were given a trip to the National Cash Register Works. Several trips of this nature are being planned for them.

Mrs. John Rock has been confined at her sister's home in Dayton with an attack of Influenza.

Mr. and Mrs. W. P. Hulings have as their guest Mr. Huling's mother, Mrs. Marcus Hulings, of Pittsburgh, Penn.

All dogs in camp have been disposed of.

Mr. Bernard Allen, our blacksmith's helper, passed away at the Miami Valley Hospital on February 8, following an illness of several weeks. Funeral services were conducted by Rev. Shinn, and the burial was in the Germantown cemetery. Mr. Allen leaves behind him a wife and son, to whom his associates extend heart-felt sympathy in their loss.

Tuesday evening, February 11, Mrs. Elizabeth Wehrley passed away at the home of her son, Mr. Henry Wehrley. The death was due to diabetes. The remains were taken to New Paris, where the funeral services were conducted, and burial was at Greenville, Mrs. Wehrley's old home. The heart-felt sympathy of the community goes out to Mr. Wehrley in the loss of his mother.

HUFFMAN

The ladies of the Huffman Welfare Association met at the Community Hall on Tuesday afternoon, February 11, to form a sewing club. Judging by the attendance, the club should prove to be quite a success.

On Friday afternoon, February 7, Mrs. C. C. Chambers entertained the ladies and children in camp at her home. A delicious luncheon was served, after which the party broke up, having enjoyed a very pleasant afternoon.

The Camp was very much pleased to have Mr. Porter-Shirley come out and conduct services on Sunday evening, February 9. He delivered an excellent sermon, and we all extend our thanks to him. We hope he will soon be with us again.

A very pretty Valentine party was held in the Community Hall on Friday evening, February 14. The hall was artistically decorated with hearts and cupids. Dancing was enjoyed till 12 o'clock. Ice cream and cake were served by the committee in charge.

TAYLORSVILLE

The Taylorsville Community Association is still forging ahead step by step and climbing the ladder of fame. Since getting a write-up in the Engineering News-Record and other prominent national weeklies they have become very enthusiastic, and unless we miss our guess, Taylorsville is going to be a busy community of many activities during the coming season.

They feel that as the originators of camp organization they should, and have set a high mark. Not only for their own good, but as a leader in this movement they are setting an example for others. The entire community seems to be interested in the spirit of the organization, and they realize that by consolidating their efforts better results will be obtained. They have appointed committees to handle all activities of the community. They work under the direction of the Commissioners and when anything comes up for action it is referred to the proper committee who see that it is properly handled. As an illustration, they have a Relief Committee to look after the sick, see that they have a nurse if necessary, send them flowers to cheer them along, etc. If any one gets unruly, disturbs the peace or persists in doing anything that might reflect on the community, then there is work for the Law and Order Committee. The Sanitary Committee sees to it that rubbish, tin cans, etc., are not thrown around the cottages or allowed to accumulate in places that might endanger the health of the community. So far they have not had to use any harsh means to have their requests complied with. It is not likely that they will, as all seem to be in favor of the plan to promote cleanliness and health.

Mr. A. O. Aulabaugh, our congenial and efficient Field Clerk and Camp Overseer, left February 1 to engage in other business. He had been with us for some time and had made many friends who regretted very much to see him leave, but at the same time we wish him oceans of success in his new line of endeavor. Mr. Aulabaugh was an enthusiastic worker in the Association and we hope to have him visit us as often as the opportunity presents itself.

They say that love is the tie that binds, so we lost another one of our office force February 8. Mrs. Johnson, our telephone operator, left to join her husband in New York, who has just been released from the Navy. They expect to reside in New York. She was well liked by all and our best wishes go with her.

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EDITORIAL

Board of Editors

Germantown.....	Miss May Turner, C. O. Shively
Englewood.....	Mrs. C. W. Porter-Shirley, D. W. Hen
Lockington.....	C. H. Shea
Taylorville.....	Miss Coral Benedict, H. B. Rogers
Huffman.....	Not yet appointed
Hamilton.....	R. B. McWhorter

The editor has been glad to find his suggestion, regarding associate editors at the various Conservancy centers, hospitably received. The names appear at the head of this editorial column. We shall hope and expect as time goes on to make the "News Letter" continually brighter and better. We feel that, to cover the field properly in Dayton, we need representatives both from headquarters, the shop, warehouse and garage, and the Dayton river work. We should like also a representative from the Railroad Division. We expect in the next issue to have these arrangements completed.

Miss Effie Geron, our new school teacher, arrived on February 3 to assume her duties and is getting along very nicely with the school. About 35 children are now enrolled.

It is with regret that we announce the death of Mrs. Tully, wife of Joe Tully, former Master Mechanic here, but who was transferred to Huffman Dam not long ago. They have been living here for several months and expected to move to Huffman soon. Mrs. Tully had been ill for some time.

On February 2 many people took advantage of the opportunity to hear Rev. Hirshman of Dayton, who delivered a very interesting sermon in the camp school house. On this occasion our newly organized choir "broke the ice." Choir rehearsals are held weekly. The chorister has hopes of some fine special numbers in the near future.

On the evening of February 7, Mr. and Mrs. Petty entertained the young people of his Sunday School class. Every one enjoyed the evening, which was filled with snappy games and clever stunts.

On the evening of February 14, the Misses Margaret McCarthy and Coral Benedict entertained a few families with an informal Valentine party at the home of J. W. Benedict. The evening was spent in playing games. The two games that proved to be most entertaining and created the most laughter were blindfold games; "pinning the heart on a lady," and "finding the keyhole of a large heart." Late in the evening refreshments were served, and the guests departed much too late to retire on the 14th.

February 16 Rev. Zimmerman of Vandalia again gave to us the privilege of hearing an elevating and interesting sermon. The text was, "God's Word."

B. F. Larkin, who has been entertaining Mr. "Flu" for the past two weeks, is slowly recovering.

The Girls' Intermediate Sunday School class gave a birthday party for Mabel Larkin at Mrs. Cole's, February 13. The girls enjoyed many games and also the refreshments.

On February 12 Mr. and Mrs. Helmer gave a party. Cards and dancing were enjoyed by all until a late hour, when refreshments were served. Each and all enjoyed the evening.

ENGLEWOOD

Since the publication of the January issue of the Bulletin the Riverside Community Association has been born, and from what we hear of its plans, it promises to be a very live organization, indeed. A systematic campaign is being conducted to secure every eligible person as a member, and to increase the live interest in the Association that is already evident in camp.

The residents of the camp are much pleased because they will have a new and large community house in the near future. Remodelling of a large farmhouse for this purpose has begun. The Community House will provide a large hall for dances, entertainments, and shows, as well as clubrooms, shower baths and other desirable features. Watch for the big house-warming, to which residents at the other dams will be invited.

Englewood is looking forward to a live summer in an athletic way. Playgrounds for the children are to be pro-

vided, in addition to tennis, baseball, handball, and other sports for the adults. We are going to have a baseball team which will give the other camps some strenuous opposition, so let them take warning.

We were greatly saddened and grieved by the death of Mr. Williams, our Camp Overseer, January 27, at the Miami Valley Hospital. He had played a large part in the life of the camp and had won a host of friends by his quiet and unassuming spirit of helpfulness. The sympathy of all is with his widow and family in their bereavement.

Mr. and Mrs. L. J. Hills enjoyed a visit during the month from Mr. Hill's mother and brother. His brother received his discharge from the service at Camp Dodge, having returned there from service overseas with the 88th Division.

Mrs. C. W. Porter-Shirley spent the first two weeks of February visiting in Chicago.

Mr. Hills and Mr. Kent, Camp Overseer, have started the formation of a Boy Scouts' Patrol in camp and expect to have it going full swing within a short time.

A dance was held at the Mess Hall the evening of January 25th and was attended by a large crowd, including a number of visitors from the other camps. Excellent music by an orchestra, refreshments and a jolly crowd combined to make an enjoyable evening.

Miss Elizabeth Jordan is now assisting Mrs. E. E. Everdell in the work of the camp school.

We expect to have a postoffice of our own within a short time. The residents of the camp have petitioned for a postoffice under the name of Riverside, Ohio, so if you hear or see the name "Riverside," you will know it means Englewood Camp.

DAYTON

Miami's First Steamboat

What would our honored forebears say,
Could they return and view today
From old Miami's spangled brinks,
A steamboat sporting on the links!

Imagine sturdy old Van Cleve
And Isaac Newcom, Wildcat Steve
And Minnehaha, Simon Boone
And Rip Van Crockett, Old Man Moon
And all the others of the first
Who struggled with the liverwurst,
To keep their frames on even keel—
Gee! gathered once more as of yore
Upon the old, familiar shore;
A real live steamboat in the stream
Emitting honks and smoke and steam!

Just picture how they'd crane their ears;
Their horny brows suffused with tears,
And gap and yap and yip and caw.
And jig and frisk and hip-hurrah!
Or stand spellbound and gnaw their cuds—
Revered scalp lifters of the woods—
At such a sight, where in their day
Naught but the modest crow and jay,
The sad-faced clam and meek dodo,
Disported in the H-2-O!

—Elldce, in the Dayton News.

A son was born to Mr. and Mrs. W. B. O'Brian on February 5, 1919. The Bulletin extends congratulations, and hopes the new vocalist will not compel our District Auditor to work overtime as "auditor" of another sort on the night shift.

One of the young ladies in the Drafting Department shocked her mother at the table recently by using the expression, in its innocent form, "damsite." A friend who was present suggested that sensitive persons might be saved from shell shock in such cases by calling it instead of damsite, a "darned situation."

Warehouse Wins at Bowling

The first half of the bowling schedule for the year came to an end with a hard-fought battle at the Royal alleys on Friday evening, February 14. The Purfics, tied for first place, met the Railroad team, and by losing the third game, passed the title of champions for the first half to the deserving Warehouse rollers. Captain Everhardt of the Warehouse had his team present, who did their bit in the

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way of encouraging the Railroads, and it is whispered that this had its effect upon the outcome.

During the game the high score was made when Froseth of the Railroads outrolled Captain Everhardt's standing high score by nine pins. This score of 209 will undoubtedly stand for some time, but there is no doubt the title will pass on to another during the second half of the season, which commences at once.

There is still room for good bowlers in the league, and if you are interested, Manager Stockman will see that you are placed with one of the teams.

Several of the Dayton teams are anxious to book games with Conservancy bowlers from the camps, and are particularly anxious to meet the Lockington aggregation.

Averages on First Round of M. C. D. Bowling League Ending February 15, 1919

Name	G. P.	W.	L.	Percent
Warehouse	15	13	2	866
Purfics	15	12	3	799
Railroads	15	8	7	523
River Imps	15	6	9	399
Slide Rules	15	4	11	266
Draglines	12	2	13	134

Team	Average
Purfics	701
Warehouse	700
River Imps	655
Railroads	639
Slide Rules	617
Draglines	571

High Ind. Score—Single Game—2nd—Everhardt	200
High Ind. Score—Three Game—1st—Stockman	502
High Ind. Score—Three Game—2nd—Everhardt	485
High Team Score—Single Game—1st—Purfics	772
High Team Score—Single Game—2nd—Warehouse	766
High Team Score—Three Game—1st—Warehouse	2177
High Team Score—Three Game—2nd—Purfics	2165

On February 21, the Conservancy Railroad Bowlers lambasted the Big Four Engineers at the Royal Alleys, Division Engineer Larsen, who was in fine fettle, rolling the high score—198.

La Junta, the Spanish Club, continues its program of meeting once a week, at noon on Fridays, at Elder's Dining Rooms, where it can work its jaw to a double purpose. It commits extensive depredations, both on Spanish grammar and Elder's "feed." Its greatest loss, so far, has been in the departure of Grafton W. Borgman, who has left the employ of the District. Mr. Borgman is an enthusiast on the Spanish language, and an adept in its use. He was the originator of the Club, and a unanimous vote of thanks and of regret was tendered him on his departure. He expects soon to go to South America, on a commercial mission for a Cincinnati house. La Junta wishes him success and expects him to achieve it.

Second Dinner of the Conservancy Club

The second dinner of the Conservancy Club was given on February 5, at the Y. M. C. A. dining room. Following the performance on the menu, Toastmaster Porter-Shirley called on Assistant Chief Engineer Charles H. Paul, who responded with characteristic humor. Messrs. Larsen, O. N. Floyd, McCurdy and Clawson then responded briefly for their various divisions of the work. Fowler Smith followed with a very interesting reminiscence of the meeting at the N. C. R. hall when, under John H. Patterson's vigorous leadership, the last \$700,000 of the \$2,000,000 Flood Prevention Fund was subscribed. There was also beautiful singing by Mrs. H. L. Rogers and Miss Ruth Beery, and the program ended with chorus work by the "gang." The attendance again overflowed the facilities provided. That is a good fault, which we hope to cure next time. The dinner was followed by a dance at the Christ Church parish house, which was kindly placed at the Club's disposal. It was enjoyed by those who attended, but this part of the entertainment did not prove as popular, for some reason, as the dinner. Taken altogether, the second meeting of the Club was better than the first, and furnished further proof that the organization fills a real want.

An eight-pound boy was born to Mr. and Mrs. L. C. Bernard on Friday, February 7, at the Miami Valley Hospital. His father seems to consider the youngster eligible for membership in "La Junta," affirming that he is talking Spanish already. Does he mean that the babe gives as good an imitation as some of the Club members? Anyway, "buena suerta" to the boy and his parents.

Assistant Engineer Charles H. Paul has been enjoying a visit recently from his brother, Leslie Paul, late of the American Expeditionary force in France. This is the brother referred to as "Les" in the letter published in part below, which will be read with added interest on that account.

The Basketball Season Ends

The Conservancy Basket Ball Team ended a checkered career by beating the Dayton Y. M. C. A. on February 17, by a score of 27-25. After its somewhat disastrous encounter with Tipp City in its initial game, it pulled itself together in the second half of a game with Cedarville on January 23, but was not quite able to win, the score ending Cedarville 52, Conservancy 39. With the help of Ruessenzehn, one of the Miami players, on February 1, it then beat the Piqua Y. M. C. A. 32-30, coming up strong as before on the second half. On February 17, it beat the Dayton Y. M. C. A. by another close score of 27-25, as already noted. It had in this game the aid of Wine, an excellent center, discovered rather late in the season in the shop. Ruessenzehn also played in this game. The season, as a whole, was creditable to the Conservancy players. The star of the team was undoubtedly Maltby, well-known for his work in helping win the State Championship for Steele Hi. Captain Everhard also did fine work throughout the season. Credit must be given also to Kuboski, Shea, Wine, and Sylvester for excellent work. Earl Maltby, as team manager, had a hard row to hoe and taking the showing as a whole, is to be congratulated. He has worked hard and enthusiastically, and has the thanks of every Conservancy lover of the game.

E. H. Paul Writes from the French Trenches

(In part; more next time.)

"This German 'Kultur,' is not so bad, old top, when properly applied. I am at present living in a 'De Luxe' dugout built by the Bosh, and it is evident that they intended to remain here much longer than they were permitted to do. * * * *

"The sides of this comfortable hole in the wall are of concrete, neatly white-washed. It is fronted with a courtyard sporting an ornamental brick hedge. There is a floor, likewise a roof, and each night at the appointed time Cpl. E. H. Paul, late of Massachusetts, sleeps upon a soft mattress which, in darker days, caressed the rotund bulk of some Hun officer. At the head is a shelf convenient for my personal effects and at the foot a towel rack.

"There is nothing more uncanny than a night air raid. You can hear the machines circling overhead and the explosions from their infernal load of droppings seem to shake the whole earth and shatter your ear drums, but no matter how you strain your eyes toward the dark blue sky, you can see nothing of the pest that menaces you. Of course, the anti-aircraft guns pop away, but they always remind me of an impudent young puppy yapping along in vain pursuit of a low-flying bird. Rumor has it that during the early stage of the great war, an anti hit its mark, but I have had no verification of this from authentic sources. Their chance of getting a plane is on a par with the proverbial celluloid cat chasing the asbestos rat through Hell. * * * *

"Owing to a remarkable and fortunate coincidence, I found Les a couple of weeks ago, as you have heard by this time. I got wind of the location of his battery and bumped over miles of crushed rock and mud holes only to find that, on that particular day, he was back at the Echelon. The next day I started out on foot, and after scouring the woods, I found him only six or seven miles from my original starting point. A day or two later, his outfit moved up to within a couple of miles of mine and since then we have seen one another nearly every evening. Can you imagine your two 'kid' brothers swapping experiences here in France? I am more than glad for my own sake, and doubly so for mother's sake.

THE MIAMI CONSERVANCY BULLETIN

MARCH 1919



VIEW DOWNSTREAM FROM TOP OF ENGLEWOOD GRAVEL WASHER, FEB. 5, 1919.

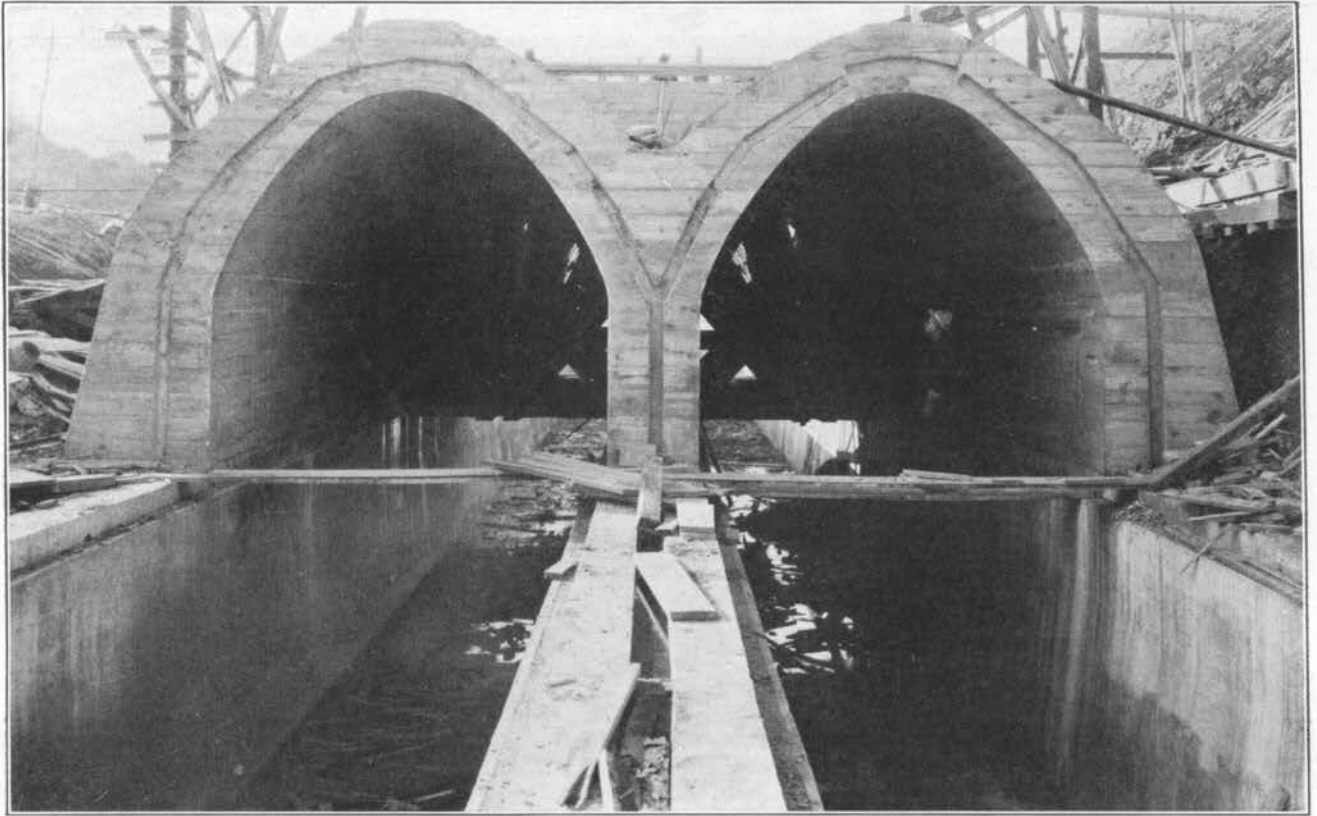


FIG. 103—CONCRETED SECTION OF THE OUTLET CONDUITS AT GERMANTOWN, JAN. 29, 1919.

This shows clearly the design of these conduits, two in number, which will pierce the base of the dam, permitting the water of Twin Creek to pass through to the valley below. The Cincinnati rock which had to be excavated for them can be seen at the right of the lower part of the right-hand arch. The conduits are two in number so that if either one should suffer injury, or its lining become worn with time, it could be closed for repair and still leave an opening through the other for the water of the creek. The conduits as built have twice the capacity which they eventually will have, in order to provide ample waterway during construction against such rise of the water during floods as might sweep away portions of the partially completed earthen dam in which the conduits are buried. When the earth work is completed, the portions of both conduits below the level of the top of the center wall which appears in the foreground, will be filled with gravel and covered with a concrete floor, leaving the two upper halves to carry the creek water. The grooves which appear in the faces of the arches are keyways into which the next section of the arches, which will occupy the foreground, will lock, thus binding the two adjacent sections more firmly together. Collars project from the outside of the conduits at intervals along their length, for the purpose of preventing water from seeping along the smooth concrete exterior surfaces, when there is water in the retarding basin. There will be 96 feet of earth on top of these conduits at the center line of the dam, the walls being thickened as they approach this center line in order to withstand the increase of earth pressure.

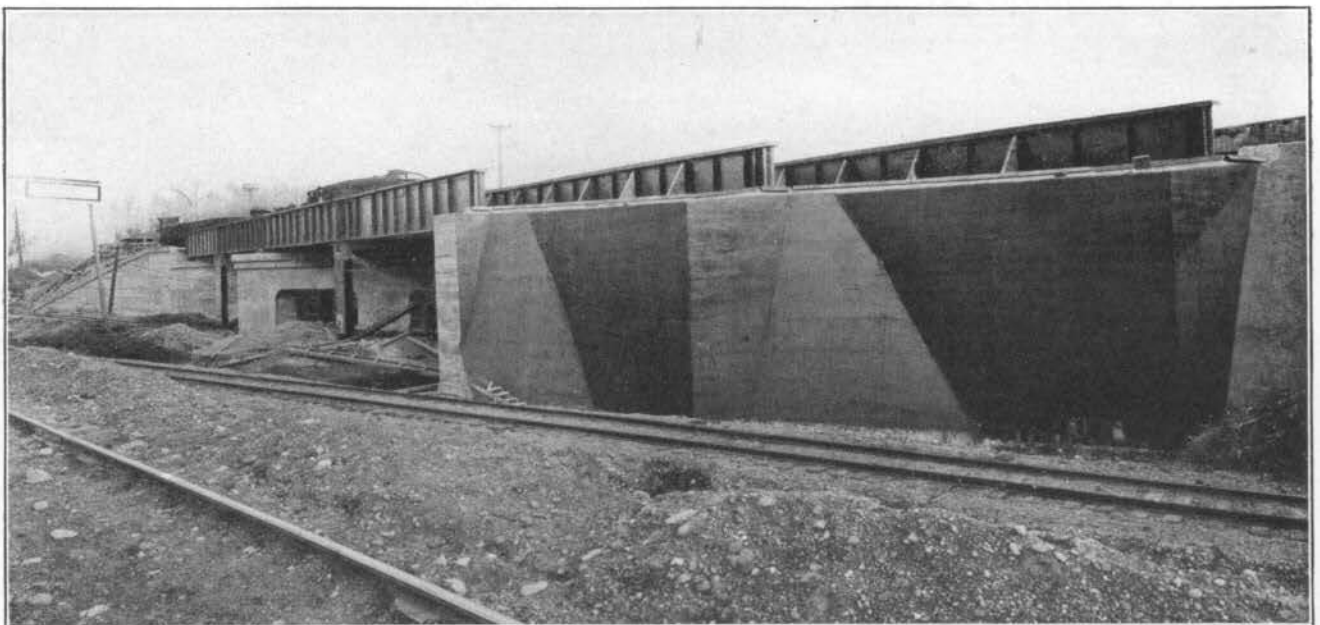


FIG. 104—UNDERPASS FOR HIGHWAY AND OHIO ELECTRIC UNDER ERIE AND BIG FOUR.

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THE MIAMI CONSERVANCY BULLETIN

PUBLISHED BY THE MIAMI CONSERVANCY DISTRICT

DAYTON, OHIO

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March 1919

Number 8

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Subscription to the Bulletin is 50 cents per year. At news stands 5 cents per copy. Business letters should be sent to L. F. Wilcock, Assistant Engineer, Miami Conservancy District, Dayton, Ohio. Matter for publication should be sent to G. L. Teeple, Miami Conservancy District, Dayton, Ohio.

The Action of the Retarding Basins

The second of the articles concerning the Conservancy farm lands appears in the present issue. It has to do with the effects upon these lands of the retarding basins when they come into action in the future on the occasion of a flood. There has been a good deal of misunderstanding as to what this effect will be. Many have thought that the farms in these basins would be greatly deteriorated in value by the fact that owing to their situation they will be subject to flood. The article endeavors to make clear that this is not the case, and that on the contrary, the lands, when the necessary changes have been made to adapt them to the changed conditions, will be benefited by floods rather than injured. The fact that these lands will at no distant time be placed upon the market makes it necessary that the truth regarding this matter be emphasized.

War and Labor

The labor chart of the District, beginning with July 30 last and ending the middle of February, shows the effect on a construction project of the war demand for men in a most interesting way. The number of men on the pay roll ran steadily downhill as the men drained away into the army, down to the very week of the signing of the Armistice, when the curve immediately begins to rise again, and rises with slight fluctuations up into February where the record ends. It is hoped in the next Bulletin to present this curve with a further study of this matter.

The Work of the Winter

The present winter, now practically over, has been quite unusual in the progress it has permitted on the work. There have been only two or three days during the entire season of severe cold. Records of the past 47 years indicate in fact that the present season has been one of the mildest in that respect during that whole period. All departments of the work have been continued almost without interruption throughout the season. The concreting naturally has suffered more than any other department, but even here it is fair to say that there are not infrequent summer seasons when concreting is as much interfered with by rain as the Conservancy concreting has been interfered with in the past winter by cold weather. This being the first season when actual construction work has been in active progress, makes it seem particularly fortunate. Last winter, had construction work been on, would have been a very different story.

The Conservancy Electrical Equipment

The Bulletin begins in the present issue a series of several articles on the electrical equipment used in the District. The first has to do with the reason why electrical equipment was chosen for most of the work. For the material in this article, the editor is largely indebted to Barton M. Jones, Division Engineer at the Lockington Dam, whose experience with electrical equipment in connection with construction work made him the natural person to turn to in connection with this particular subject matter. One of

the other articles will take up the transmission line with its appurtenances, and the third some details of the installations at the various jobs. It is worth noting that the conditions which made electrical equipment most desirable in the Miami valley will obtain more and more throughout the entire country. These conditions were simply that electrical power, developed with great economy and reliability, was within easy reach of almost all points on the work. There can be little doubt that in the future high-power electric transmission lines will be extended all over the country, taking their energy from water power plants and high efficiency steam plants erected at the mouths of coal mines. The Conservancy District in this matter is simply following the natural line of engineering development.

Chief Engineer Morgan Returns

Chief Engineer Morgan has been taking a vacation with his family on the Gulf Coast. Most of it was spent at Biloxi, Mississippi and Fairhope, near Mobile, Alabama. He returned to his work on Washington's Birthday, February 22.

Self-Governing Camp Communities Again

It is interesting to note the attention which the self-governing camp community association at Taylorsville, noted in the January number of the Bulletin, has received from well-known publications. The "Engineering News Record" of January 30 devotes its first editorial to the subject, and later in the same issue gives a description of the Taylorsville scheme. The "Survey," in its issue of February 14, devotes a column and a half to the same theme. Both of these periodicals recognize the significance and value of the work which is being done at the Conservancy camps in the endeavor to better camp life, and in so doing, to better the work itself.

It is pleasant to be able to record in this connection that the value of such associations to the District has already begun to be demonstrated. At Taylorsville, the interest in the matter shows no signs of flagging. Any one who comes in contact with the officers of the association cannot help being impressed with their earnestness and enthusiasm in working out its program, nor fail to feel its wholesome reaction on the camp morale, although the latter was already excellent. At Englewood, where at first the idea did not seem to find much favor, the Riverside Community Association has been recently formed, which is developing the same pep exhibited at Taylorsville. Its organization differs somewhat from the other, principally in adding an Association Manager to the commission which heads the scheme at Taylorsville, the Association Manager corresponding to the City Manager in cities like Dayton. A brief discussion of the relative merits of the two systems, due to Arthur H. Kent, Camp Overseer at Englewood, will be found on page 126. A wholesome rivalry is being aroused at the two camps, both in this and in other matters, and it is going to be interesting to watch, during the coming season, the relative efficiency of the two systems as they work out. At Germantown also, the association went through initial difficulties. These have been now overcome, and Germantown will be heard from later in an interesting way.

Death of James J. Kirby

News came, in a recent letter to Chief Engineer Morgan from the young man's sister, of the death of James Kirby of Company B, in the 11th Engineers. This was the famous "fighting 11th," which saw such active service in France, and whose work is believed to make it unique in the history of warfare. Mr. Kirby enlisted in this volunteer regiment in May, 1917, and sailed with it for France in June of the same year. They were the first American outfit to get into real action. They were the engineers who fought the Germans at Cambrai in November of 1917 with picks and shovels, and Kirby was with them in that famous action. He had many narrow escapes while working in exposed positions in bridge building, railroad repair, and similar work, yet he came through without a scratch, to succumb to an attack of pneumonia while waiting near Bordeaux for transportation home. His death was unexpected, and came as a great shock to his family.

Mr. Kirby was educated in St. Joseph's College at Buffalo, and graduated in engineering from the University of Valparaiso, Indiana. He was City Engineer at Iron Mountain, Michigan; then with Stone and Webster at Los Angeles, California. Later he came with The Miami Conservancy District, and was with the District when he enlisted. His work was mostly in the field on Railway Relocation, in which he made an excellent record.

He was one of those men who make friends wherever they go, and this makes his loss the more deeply felt. He is survived by his parents, Mr. and Mrs. John Kirby of Lackawanna, New York, and by his two sisters, the Misses Margaret M. and Anna M. Kirby. The family have the warm sympathy of all Mr. Kirby's friends of the Conservancy District.

Hydraulic Fill Begins at Englewood

The work of hydraulic fill at the Englewood Dam was actively started on Monday, February 24, the dredge pumps beginning operations on that date. The Englewood layout is somewhat different in detail from that at Taylorsville, where the work has been in progress for some time. A comparison of the two is reserved for a later article in the Bulletin.

Doctors Take Notice

Following the report of the blacksmith at Lockington mending a broken leg (as reported in the August Bulletin) comes this from the same camp.

A three-year-old boy in camp sustained a broken leg and progressed favorably under the doctor's care. When it became necessary to remove the plaster cast, the doctor telephoned that he would like someone to do this for him, as his time was more than occupied with influenza cases. He explained how the cast should be cut and that a pen-knife should be used, adding that it was a most tedious task and would probably take two hours. One of the camp ladies volunteered for the job, and went to her husband for the pocket knife, explaining of course why she wanted it. The advantages of a pair of tinner's snips for such operations was pointed out, and with much skepticism on the part of the volunteer surgeon, they were tried. The operation was neatly performed in eleven minutes.

The Retarding Basins and the Conservancy Farm Lands

The Action of the Basins Will Be to Prevent Destructive Effects. The Deposits of Silt Will Be Highly Beneficial

We are accustomed to see, in wild or newly settled regions, large tracts of land thrown open to purchasers, but in old and thickly populated districts, like that of the Miami valley in Ohio, it is a very unusual circumstance. The valley has been settled for over 120 years. Its population, at the time of the last census 9 years ago, was over a million, and its large cities have increased 25 to 50 per cent in population since that time. Dayton now has 160,000 people; Hamilton has 40,000; Cincinnati, just outside the watershed, has 450,000. Facilities for traffic are excellent. Fourteen steam and electric roads enter the city of Dayton alone. It is one

of the busiest manufacturing regions in America. The output of Dayton alone for the last year is estimated at over \$200,000,000. The valley is also one of the most fertile and flourishing agricultural centers. In the midst of this district, there will soon be thrown open for purchase some 30,000 acres of land; not waste lands, nor lands which have been passed over because better were available, but lands among the richest and most fertile in the valley. It is, we say, a very unusual circumstance that farms of such a character, in so large a body, in such a region, should be thus thrown upon the market.

They are in fact the farm lands in the five retarding basins of the Conservancy District. The basins, during heavy floods, will be subject to overflow, endangering, in their present location, the farm houses along the river bottoms, and on that account, it became necessary for the District to purchase these farm lands. The buildings will be moved to ground up the valley slopes so as to be out of danger from submergence by floods. The farms will be re-divided and re-adjusted to suit the relocated dwellings. The new farm houses will thus be entirely safe places in which to dwell. Floods cannot overflow them. Floods can, however, affect in greater or less degree the farm lands with which they are connected, and it becomes an interesting question to investigate just what this effect will be. What it has been in the past is well-known, but the construction of the dams and the operation of the retarding basins will introduce entirely new features. It is the effect of these new features which we must study.

There will be five of these great retarding basins, occupying, in each case, the richest valley bottom lands. At the lower end of each basin, built across from hill to hill, will stretch the dam, in length varying from 1,210 feet at Germantown to 6,400 feet at Lockington. Each dam is pierced at the base by a set of concrete conduits, two, or three, or four, in number. Except during seasons of flood, the retarding basins will be dry; as dry as they ever have been. To call them basins is indeed apt to be misleading. Except at the rare intervals referred to, they do not act as basins at all; they are just extensive river bottoms of very fertile and long-cultivated land. The stream winds through them from the valley above, and at the lower end, finds its outlet through the conduits at the base of the dam, which are built large enough to accommodate any ordinary stream flow, and even moderate freshets.

In times of flood, however, entirely new conditions will appear from any hitherto known. As the water rises in the river to the top of the banks, the conduits begin to flow full. As the river still rises, the conduits are unable to carry all the water which comes to them, being so proportioned that even when the basin is filled to maximum capacity they will only permit such volumes of water to pass as the river channel below can safely carry. When the water begins to come from the valley above faster than the conduits can carry it, the excess begins to back up and spread over the valley bottom immedi-

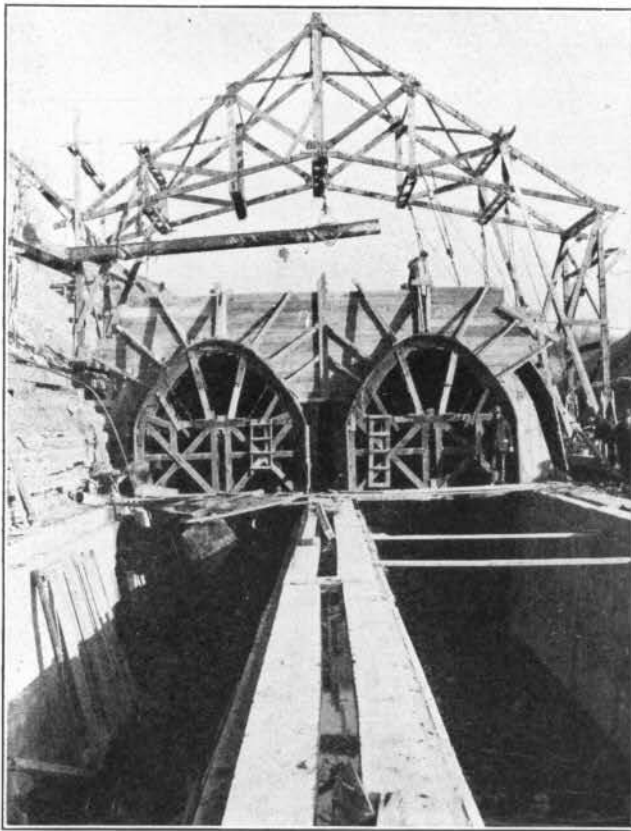


FIG. 105—CONDUITS AND TRAVELING TRUSS AT GERMANTOWN, JAN. 29, 1919.

The picture shows in more detail one of the traveling trusses referred to in Fig. 106. The truss is supported on vertical beams, as shown, these being carried on trucks with rollers which run on rails on the rock shelf on each side of the excavation. These rails, as shown, are at different elevations. The concreting chute appears slung from the truss by pulleys which permit its being lowered into place for action. The section, which runs up to the concreting track on the valley shelf, appears at the left (see Fig. 106). The truss is just now engaged in helping move the right-hand outer section of the concrete form for the right-hand arch, which may be seen standing away from the completed concrete, and supported above by ropes and pulleys, ready to be carried along by the truss to its new position further down the conduit where it will be used in concreting the next section. The method of bracing and supporting the interior arch forms appears clearly in the picture. These interior forms also move lengthwise on rollers down the conduit to be used in the next section of the work.

ately behind the dam. As the flood rises, it backs up farther, and spreads out wider, and becomes in fact a large pond with the river running into it at its upper end, and the conduits draining it through the dam at the lower. As the water rises still higher, the pond spreads up the valley and out along the slopes and grows into a lake. In the Englewood basin, during a flood similar to that of March, 1898, this lake would average nearly half a mile wide, would extend nine miles up the valley, and would cover 2,620 acres, or 4.1 square miles of land. At the dam, it would be 43 feet deep.

The behavior of the water in this lake is interesting. We think of a flood as something tempestuous and disastrous, but the lake would present no such appearance. The water level would rise very slowly, and the higher it got, the slower it would rise. The reason for the latter fact is evident. When the lake covers say 1,000 acres, to raise the level one foot higher would take a certain time, say 3 hours; when the lake covers twice the area, 2,000 acres, to raise the level of this double area one foot, assuming the rates of inflow and outflow to remain as before, would evidently require twice the time, or 6 hours.

As to damage, the farm buildings will be above the lake level beyond the water's reach. Moreover, the lake would present to the eye nothing stormy nor tumultuous. Quite on the contrary. It would look like any other lake with a rapid river running into it at its upper end. At the mouth of this river, as the water ran in, it would spread and slow down, until a few hundred feet out scarcely any current would be perceptible except that created by winds. At the foot of the lake, at the dam, it would be still calmer. Forty-three feet below the lake surface (supposing the case still at Englewood, and a flood equal to that of March, 1898) the water would be running swiftly and quietly into the conduit, but on the surface there would be simply a slow set toward the point of exit. The flood in fact, flowing in at the head of

the lake, spreads and loses itself in the vast mass of water, its destructive speed entirely removed. Thus the action of the retarding basin is not only to protect the valley below the dam from the destructive effects of the flood, but also, barring the effect on crops of a summer flood (a rare occurrence), it will protect the area within the retarding basin itself. This will be made still clearer as the discussion proceeds.

The flood in the river above the lake will continue to rise until it reaches its highest point or "crest." Then it will begin to recede, but the lake



FIG. 106—ANOTHER VIEW OF THE CONDUIT STRUCTURE AT GERMAN-TOWN, JANUARY 29, 1919.

The view is up the valley. It should be compared with figures 103 and 105. The collars, there referred to, for preventing seepage of water, appear here very plainly, projecting in both the sections which are finished. Three of the concreting trusses appear; the first two of a broad A-shape, and the farther one in shape of a broad inverted A. These trusses are supported on timber legs which carry trucks at their lower ends, the wheels riding on steel rails laid on the shelf of rock on each side of the conduit excavation. These trusses can thus roll along the tracks to reach any point of excavation. They carry the concreting chutes. The slanting form of one of these chutes appears at the right-hand of the picture. A second section of the same chute appears hanging horizontally to the truss a little to the left of the other. The two sections are capable of being joined into one slanting chute. The concrete is mixed at the gravel washing plant which appears to the right of the dragline excavator in the distance. It is carried on a 3-foot gage track, built on a shelf cut in the slope which appears to the right of the excavation and above it, the cars being 1¼-yard hopper cars drawn by a 6-ton gasoline locomotive. The cars discharge the concrete into the upper end of the slanting chute. The chute, at its lower end, discharges into the concrete forms. The traveling trusses enable the chutes to discharge anywhere in the length of the conduit excavation. The dragline excavator in the distance is digging the trench for the upstream end of the conduits. The little house in the foreground contains an electric motor running a centrifugal pump. The two together constitute one of the portable outfits described in the last number of the Bulletin.

level for a short period will still rise. It will rise until the inflow from the river at the head of the lake equals the outflow through the dam conduits at its foot, when its level will become stationary. Then as the river flow diminishes to an amount less than the outflow from the basin, the lake level will begin to fall very slowly. It will continue to do so until the lake is emptied and entirely vanishes, and the river re-appears, reduced to its normal proportions, flowing quietly between its banks as before the flood.

The time occupied by the water in filling and emptying the lake described will vary with the particular flood and with the particular retarding basin. Consider the basin at Englewood under stress of a flood like that of March, 1898. (This flood is selected because it is typical of the heavier floods which visit the valley, the river at Dayton rising to a 19.7 stage, which was close to the top of the levees at that time.) At Englewood, with such a flood, it would take 2 days to fill the lake and 9 days to empty it. The lake at its maximum would be, as stated earlier, 43 feet deep and would cover 2,620 acres. It would be 40 feet deep or more, and cover 2,300 acres or more, for a period of nearly 3 days. It would be 30 feet deep or more, and cover 1,600 acres or more, for about 6½ days. It would be 20 feet deep or more, and cover 900 acres or more, for about 10 days. The depths given are those at the dam; going up the valley slopes these would, of course, decrease to nothing at all. At Taylorsville, with a March, 1898 flood, the conditions would be a little different. The water would again take about 2 days in rising, as at Englewood, but the basin would empty in about 2¾ days instead of 9. The lake at maximum would cover about the same area as at Englewood, 2,600 acres, but would be much shallower. For that reason, and also on account of the much larger conduit capacity at Taylorsville, it would drain more quickly.

It will be interesting to look at another effect of the lake of water which occupies a retarding basin during a heavy flood. We know that these rivers, in flood, always carry large quantities of silt; that is, mud, fine sand, and organic material, so fine that it remains suspended for a considerable time even after the water is poured into a tumbler, and will only very gradually settle to the bottom. This material is not deposited in a bar, but spreads with the water throughout the entire lake and slowly settles to the bottom. Since the lake lasts all the way from a day to two weeks in the basins before it is able to flow out through the conduits in the dams, practically all of this material is deposited on

the valley bottoms. On the passing of the flood, it will usually be found covering, in a thin layer, all the overflowed fields. It is the material which Dayton residents will remember, deposited inches deep on carpets and furniture during the flood of 1913. The effect upon land of such a deposit is well established. It is one of the best fertilizers known. In the lower Mississippi valley, when a flood goes over the levees, the bottom lands outside of them are often greatly benefited.

Even where floods occur during the growing season, they are, in spite of the damage to the particular crop occupying the land at the time, in their net effect highly beneficial. This is clear from the evidence furnished by the retarding basins in France, where this means of flood prevention has been in use for a long period. These floods in France occur almost always in the autumn, in October, and they often do some damage to overflowed crops. Nevertheless, the value of these lands, as given by French authorities, is greater by \$50 to \$100 per acre than that of similar lands not overflowed. That is to say, in the French retarding basins, a flood, even an autumn flood, is considered a financial asset—it pays.

If this is true in a region where most of the floods work some injury to crops, it will be still more true in the retarding basins of the Miami valley where there will probably be little crop damage for the reason that summer floods in the valley, of a magnitude to work material damage, are exceedingly rare. There has been only one flood during the past twenty-five years—the flood of October, 1910—which was heavy enough to have worked crop injury extending any considerable distance above the dams, had they been in existence. All the other floods occurring during the growing season in that period—and there were only five of these—would have affected but a small area next the dams. In the 25 years considered, 80 per cent of the Miami valley floods would have brought land benefit to the basins without any accompanying crop damage whatever.

The result of our analysis, then, is to bring out the perhaps unexpected fact that once the farm buildings on these Conservancy lands have been moved, and the necessary re-arrangements made, the value of the lands will be greatly increased by the fact that they lie in the retarding basins and are subject to overflow. Far from being a detriment, once the changes are effected, floods will prove a benefit, and since these farms even hitherto have been among the most valuable in the Miami valley, their attractiveness as an investment, when they come into the market, ought to be great.

The Departure of A. D. Huff

A. D. Huff, Superintendent of Camp Construction, left the employ of the District on February 1, to accept a position with the United States Government as Superintendent of Building Construction at Wright Field. Mr. Huff entered the Conservancy service in February, 1918, and has been in charge of the building of the houses at all of the construction camps in the District. There are five of these construction camps. The buildings comprise cottages, messhalls, shops, offices, school-

houses, and community houses, the total number exceeding 200. Mr. Huff carried through the erection of these buildings with efficiency and thoroughness, his work including the inspection of the plumbing and other fixtures as well as the carpenter work. With Mr. Huff's professional ability goes a character which has won the liking of everyone whom he met. His colleagues see him leave regretfully, and wish him every success in the new work he is undertaking.



FIG. 107—PANORAMA OF THE WORK A

The view is looking toward the southwest, and down the valley of the Miami river. It shows all of the work except the excavation at the upper part of the outlet works, where the earth is being washed down by a hydraulic "giant" to be used in the hydraulic fill on top of the dam. The house at the river's edge at the extreme right is the pump house containing the high pressure and sluice line pumps for the hydraulic fill. The alternating current transformers, furnishing power to these pumps, may be seen beside the poles just to the left of the pump house. The two pipe lines may also be seen running from the pump house up to the trestle, and coming across the trestle close together side by side. One of these is the high pressure line of spiral steel pipe which supplies water to the giant, or water jet, which excavates the borrow pit. The other is a wood pipe line which supplies water at low pressure in large quantities to sluice the excavated material

to the dredge pump, which is out of the picture to the right. The dredge pipe line, which carries the mixed earth and water to the dam, is the nearer of the two pipes seen at the extreme right of the picture. It passes under the railway track, then turns and crosses the trestle unseen (being out of sight underneath), but re-appears again across the river, turning to the left along the right bank. It turns again to the left of the dragline excavator and runs at right angles to the river along the south side of the hydraulic fill pool, which can be seen just beyond the excavator. It discharges into the pool a little to the left and beyond the dragline. In the pool, which is enclosed by four embankments as may be seen, the earth which is carried with the water through the dredge pipe, drops to the bottom, thus gradually building up the dam. The water from the pool returns into the river through the two pipes which may be seen just to the left and below

February Progress on the Work

GERMANTOWN

Due to the moderate weather conditions during the past month, concreting has been carried on as rapidly as the forms can be erected. Care has been taken to protect the concrete against frost. Nine arches, all the temporary floor sections, and all but one center and side wall section of the conduit have been completed.

The large dragline has moved down stream stripping the north bank of Twin Creek of all stumps and logs. A cross dam will then be built along the bank, confining the lower ten feet of the hydraulic fill to that portion of the main dam north of Twin Creek. The dragline has also lowered the water in that portion of the creek which passes through the dam, by deepening the channel just east of the down stream toe.

Excavation of the outlet channel has been started and is progressing satisfactorily.

Work has begun on the excavation for the "hog box" by teams. The earth and gravel from the borrow pits will be brought in cars, and dumped into the "hog box." It will be sluiced from this by "giants" into a screen which will sort out all stones over 7 inches in size. All under this will be carried into a sump or pit, whence it will be pumped by a dredge pump to the pool on the dam.

Clearing and grubbing of the hillside at the south end of the dam has been practically completed.

The sidewalks in the camp have been staked out and

graveled recently, which adds greatly to the appearance of the camp.

There have been two deaths in camp during the month: those of Mr. Bernard Allen, and of Mrs. Wehrly, mother of the Camp Electrician.

A. L. Pauls, Division Engineer.

February 15, 1919.

ENGLEWOOD

The concreting of the outlet conduit, upon which, to a large extent, depends the time of completion of the entire dam, is progressing favorably. The final operation, pouring the arch, is about 25 per cent completed. The entrance and outlet of the conduit will be concreted well within the time of finishing the arch.

The large dragline, engaged for several months past upon the work of cleaning out the river channel within the limits of the dam, has finished this operation and is moving into place to continue excavating the cut-off trench along the center line of the dam.

The cross dam, to enable hydraulic fill to begin before diverting the streamflow, has made marked progress through a season when, ordinarily, work of this nature is not to be expected.

About March 1 a beginning will be made on the hydraulic fill by means of the 15-inch dredge pumps. This



TAYLORSVILLE, FEBRUARY 6, 1919.

the locomotive on the trestle (see page 57 in the November Bulletin). The lower (further) trestle, carrying the construction railroad, connects the B. & O. Railroad, which runs on this side of the camp, seen in the distance across the valley over the dragline. It also carries a highway, connecting the camp with points east of the river. The tall building on the left bank of the river is the gravel washing plant, which will be used when the concrete work begins during the coming season. The large dragline excavator, to the left of the gravel washer, is digging out the Cincinnati shale in preparation for the concrete outlet conduits, which will carry the Miami river through the dam after the latter is completed. The excavation must be carried much deeper than it shows at present at that point. This outlet structure at Taylorsville will be of great magnitude; its width, a little beyond the dragline excavator, exceeding 200 feet. The embankment form-

ing the left bank of the river, between the two trestles, is an earth cofferdam, built to keep the river out of the conduit excavation at high water while the conduits are under construction. The material excavated by the big dragline excavator, last referred to, is carried on the railroad track in the foreground across the right-hand trestle and dumped along the embankment which extends beyond the trestle. This embankment will become an integral part of the dam. The upstream toe of the dam is marked by a low bank, which can be distinguished following the pole line which extends into the distance from the pump house at the right. The downstream toe may be seen following the further railroad track across the valley, a little to the right of it, and to the left of the hydraulic fill pool. The Marion Steam shovel, seen in the foreground near the center, is excavating for a new railroad track along the east side of the conduit excavation.

February Progress on the Work, continued

marks a distinct step in the construction calendar, starting, as it does, the real machinery for the steady completion of the dam.

H. S. R. McCurdy, Division Engineer.

February 15, 1919.

LOCKINGTON

During January, concrete was poured 18 days at an average rate of 140 cubic yards per day, the total for the month being 2,510 cubic yards. Of this, 147 cubic yards was stone placed as plums. The slackened progress during the month was due largely to the time required, on account of the cold weather, for the concrete to harden sufficiently to enable the forms to be removed. The concrete reached the full height of the dam, 80 feet above the floor of the entrance channel, on Saturday, February 1, when the west wall north of the center section was completed. On February 14, the east wall was completed. To date, 20,000 cubic yards of concrete has been placed.

On January 27, a night shift that has averaged 20 men commenced excavating rock for the hydraulic jump pool. It had been planned to do this excavating with the south derrick while there was no concreting going on during the cold weather, but as the continued concreting utilized the derrick, night work became necessary. The excavated rock will all be utilized. Select and waste rock are separated. The select is used for riprap or laid aside for placing

ing the left bank of the river, between the two trestles, is an earth cofferdam, built to keep the river out of the conduit excavation at high water while the conduits are under construction. The material excavated by the big dragline excavator, last referred to, is carried on the railroad track in the foreground across the right-hand trestle and dumped along the embankment which extends beyond the trestle. This embankment will become an integral part of the dam. The upstream toe of the dam is marked by a low bank, which can be distinguished following the pole line which extends into the distance from the pump house at the right. The downstream toe may be seen following the further railroad track across the valley, a little to the right of it, and to the left of the hydraulic fill pool. The Marion Steam shovel, seen in the foreground near the center, is excavating for a new railroad track along the east side of the conduit excavation.

in concrete. The waste will be used as riprap lining, three feet thick, for the east slope of the outlet channel. This lining, useful as a protection, will serve also as a convenient "waste bank" for the surplus rock from the excavation. About 3,500 cubic yards of the rock have been excavated. The first cut of the outlet channel, on the east side, has been completed, bringing the total channel excavation to about 110,000 cubic yards. The two bridge abutments at the new site of the Buxton Pike bridge over the outlet channel are practically completed, the forms and concrete having been very successfully handled by the dragline. The pier will be built by the dragline when it again passes the point as it moves north excavating the west part of the channel.

Work has been started on the installation for placing the hydraulic fill. A forebay adjacent to the Miami and Erie Canal is being formed by building a small dam across a gulley. This will serve as a sump for the pumps furnishing water to the monitors. The sluice water will flow by gravity from this pool to the different parts of the borrow pit.

Electric power is now being obtained from the Millers Ford station of the Dayton Power & Light Co. at Dayton. The change-over from the Piqua service was made February 2.

B. M. Jones, Division Engineer.

February 17, 1919.

TAYLORSVILLE

The Lidgerwood dragline continues to be operated two shifts on the outlet channel excavation. This is now practically finished down to elevation 790. Two Cyclone well drills have been started at this elevation to drill down to mean low water level (764) so that the rock to this level may be shot and taken out before going deep enough to make pumping necessary.

The Marion Caterpillar dragline finished the ground sluice to the new location for the dredge pump. It has exchanged the dragline boom for a shovel boom and is now excavating for a new railroad track off the east end of trestle No. 2 and around the east side of the outlet channel.

At the new location for the dredge pump, the sump and pump foundation have been finished and all machinery and equipment installed. Sluicing was resumed on January 31. A better layout for the grizzlies was worked out for this location and two more 6-inch, high-pressure pumps have been installed so that now a 3-inch nozzle can be used instead of the 2-inch nozzle formerly used. This extra water from the nozzle is much better for cutting the hard blue clay that underlies most of the till at this location.

The south half of Road 13 has been completed. This gives an outlet now from our camp to the east.

An additional double house has been finished which completes all the buildings planned for our camp.

O. N. Floyd, Division Engineer.

February 17, 1919.

HUFFMAN

The excavation for the outlet works has been completed to grade from the upper end down to a point forty feet below the center line of the dam. At the present time this excavation is being removed at an average rate of 1,000 cubic yards per day. A total of 50,000 cubic yards has been excavated to date and placed in the fill for the relocation of the Big Four and Erie Railroads between Huffman and Dayton. This fill has been carried toward Dayton to a point about one-half mile east of Harshman.

It is expected that the placing of concrete in the outlet works will begin about March 1. Two electrically-driven, steel, stiff leg derricks have been erected to distribute this concrete; the cement warehouse has been filled, concrete tracks laid, a large stock of movable forms have been built, and the finishing touches are being put on the gravel washing plant.

The spreading of the material excavated from the cut-off trench has been completed from the Erie Railroad to the diversion channel. The dragline used on this work is now being moved to the borrow pit, where it will excavate gravel for the concrete in the outlet works.

C. C. Chambers, Division Engineer.

February 15, 1919.

RAILROAD RELOCATION

Baltimore & Ohio Railroad. The general contractors, Grant Smith and H. C. Kahl, and the sub-contractors, Condon & Smith, Vang Construction Co., and Kahl Construction Company, have five steam shovels in operation. The Vang Construction Company resumed operations with their shovel between Poplar Creek and Johnson Station after a shut-down of two months. Practically all the concrete work, and about 55 per cent of the grading, have been completed.

Big Four and Erie Railroads. The Walsh Construction Company excavated 36,000 cubic yards of material during the month of January in the big cut at Huffman Hill. They have about 50 per cent of the total of 33,000 cubic yards in the channel change at Harries completed. This material was handled with a small clam shell bucket, and must be handled again in order to put it in the adjoining railroad embankment. All of the temporary trestle for the fill at the west end of the big cut is completed.

Mr. George Condon as sub-contractor for the Walsh Construction Company has all the ties and rails distributed for the construction track on his work east of Fairfield. He is also constructing temporary trestles for the work south of Mud Run. Two steam shovels are expected to arrive on this work in the very near future. Frank H. Smith, Inc., have all of their concrete structures completed with the exception of the head-gates for the Dayton Hydraulic Company. They have the excavation almost com-

pleted. Mr. F. H. Sprague has all of his concrete structures completed with the exception of a few headwalls on the pipe culverts. He is now excavating the channel change at Mud Run. The steel superstructure of the under-pass just west of the Huffman Dam is completed.

The grading is about 65 per cent completed.

Albert Larsen, Division Engineer.

February 17, 1919.

HAMILTON

The Class 14 Bucyrus dragline, after spending several weeks at the shop, has moved to the north end of town and commenced work on the levees along the north spoil bank. These levees will form the banks for the head-race of the new power plant of the Hamilton Rossville Hydraulic Co.

The Class 24 electric dragline has reached a point opposite the spoil bank and is loading material on dump cars. The hauling equipment consists of three 40-ton American locomotives and thirty 12-yard Western dump cars.

The total amount of material excavated to date by the two draglines is 346,000 cubic yards, 294,000 cubic yards of which is channel excavation and the remainder taken from borrow pits for railway embankment. Of this amount 260,000 cubic yards was excavated by the Class 24 machine. These figures do not include any second handling of material.

Good progress has been made on the Buckeye Street sewer, the job being now 75 per cent completed. The total length of completed sewer is 1,325 feet.

Work is being continued on the relocated Black Street. Part of the water mains have been laid and all of the brick has been removed from the old street.

C. H. Eifert, Division Engineer.

February 17, 1919.

DAYTON

The main channel excavation to date amounts to 290,000 cubic yards. The large excavating machines have moved, including the material handled more than once, a total of 454,000 cubic yards. Machine No. 789 has completed the main excavation of Mad River below Webster Street Bridge, and all of the new south bank except the portion near the bridge. No. 790 has completed the new west bank of Miami River from Herman Avenue south to Station 56, near the end of Emmet Avenue.

McWilliams Northern Dredging Company has completed its machine work on Contract 41, and is continuing with teams and scrapers. Fifty-five thousand cubic yards of levee embankment have been placed on this contract.

The steam tug was launched January 5. The boiler and the electric wiring are now being installed. Plans are being made for a 30 by 68-foot scow on which to mount the caterpillar dragline machine, whose erection is just being completed at Herman Avenue.

Ten 4-yard dump cars and two 6-ton gasoline locomotives have been received for distributing material on levee enlargement work along tree-lined banks.

C. A. Bock, Division Engineer.

February 15, 1919.

RIVER AND WEATHER CONDITIONS

The river and weather conditions during the month of January continued to be favorable for construction progress. The temperature was above normal, the precipitation below normal, and there were no rises of importance in the various streams of the valley. With the exception of January 3 and 4, when the minimum temperatures at the Dayton Weather Bureau station were 2 degrees and 1 degree above zero, respectively, the temperatures were not low enough to affect the operations. The average for the month at the Dayton station was 34.4 degrees, or 4.8 degrees above normal.

The total precipitation during the month, at the District's stations, varied from about a half an inch to about an inch and a half. At the Dayton Weather Bureau station, the total was 6.97, or 2.04 inches less than normal. There were only three days during the month on which there was a precipitation of .01 of an inch or more. At the Dayton station there were 12 clear days, 12 partly cloudy days, and 7 cloudy days; the average wind velocity was 10.4 miles per hour, the prevailing direction being from the southwest; and the maximum velocity for five minutes was 33 miles per hour, from the north.

Ivan E. Houk, District Forecaster.

February 21, 1919.

Why Electrical Equipment Was Chosen for Conservancy Work

Cheap and Reliable Electrical Power Was Available. Electric Motors Have Advantages of Simplicity and Efficiency

The question of the source of power to be used on the construction work of the District was an important one. Work was to be done at a number of different points, some of them widely separated. The work would be heavy and would require energy in large quantities, totaling upwards of 8,000 horse power. The applications of the power would be of great variety. There would be the large dragline excavators, taking several hundred horse power each. There would be pumps for various purposes and of a great variety of sizes, up to one taking several hundred horse power. There must be power for gravel washers, concrete mixers, air compressors, wagon drills, shops, derricks, and for electric lighting. At the various camps, there would be also a number of the smaller domestic uses for which power would be a convenience. Altogether, more than twenty different applications could be counted where power would be necessary.

To provide for these various uses, the power evidently should be adaptable, reliable, economical, and efficient. The sources considered were steam, gasoline, and electricity, and a comparison of these was made before any equipment was purchased. Electrical power is available in the Miami valley where it can be easily brought to any of the construction centers. It is generated in large quantities, which make it economical. Due to the fact that the elec-

trical transmission lines are fed from currents from many interlocking dynamos the power would be highly reliable, since if one generator breaks down for any reason, others will still be available. Electric motors such as would tap the power from the transmission line have been highly perfected in reliability and economy. Moreover, when of the "induction" type, as most of those needed could be, they do not require skilled attention. Once connected up, they can be left largely to themselves, not needing even to be oiled except at infrequent intervals.

To make a direct, concrete comparison, suppose a steam dragline using coal. The fuel must be used with a boiler and engine of small size and efficiency when compared with the boilers and steam turbines of large central plants supplying electrical generators. Coal must be hauled over rough and muddy ground to a machine working away from roads. A fireman must be employed to stoke the furnace. Contrast with this, an electric dragline which employs no fireman, and to which the energy comes, not over rough roads in carts, but through the air on wires, available at any instant.

Or, contrast electric and steam power as applied to centrifugal pumps, of which dozens of many sizes are in use in the District. Centrifugal pumps may be given a very high rotative speed. At this high



FIG. 108—CONCRETE CULVERT ON RELOCATED B. & O. R. R., TAYLORSVILLE, FEB. 18, 1919.

This culvert is 8 feet in diameter and 273 feet long. It will extend under the new railway track and under both levees just above the west end of the Taylorsville dam. The level of the new railway, which passes through the west end of the dam, is about 17 feet below the top of it at this point. The dam is therefore extended toward the north alongside the railroad in two levees (which will thus become virtually a part of the dam) until higher ground is reached on the west side of the track. The western levee can be seen over the dump-car train in the picture, extending toward the hill in the distance, where it stops. In case an extreme flood should make it necessary, these two levees will be joined at their upstream ends by a short cross levee which can be quickly built across the track, thus temporarily blocking traffic, but saving the country below the dam from being flooded by water running along the tracks. So extreme a flood will probably never occur. It would be much more severe than that of 1913.

speed, a small sized pump will do the same amount of work that a much larger pump would do running more slowly. A high speed electric motor is perfectly adapted to running such a high speed pump. The two can be mounted on the same base, and rotate on the same steel driving shaft, forming an exceedingly compact piece of apparatus. "With this compact unit, contrast an equivalent outfit consisting of a steam engine, a boiler, a pile of coal, a water tank, a driving belt, a large slow running pump, a special attendant, and more than all, a coal bill hard to forget."

Consider that one item of coal. The District would need, as stated, coal burning apparatus totaling 8,000 horse power, broken up into dozens of units, scattered over a wide area, to points some of them over seventy miles apart, and running in the aggregate hundreds of machines. Consider the cost of transportation of the coal to all these units, over railroads, roads and rough ground, requiring to be loaded or unloaded from cars into piles, from piles into wagons or trucks, from wagons again into piles, and again from piles into draglines or bins. Contrast with this the instantaneous transmission through wires of electric power, available at any hour of the day or night by the mere throwing of a switch.

Consider the relative amounts of coal burned; in the one case under a multitude of comparatively small, inefficient boilers, subjected to rough construction conditions, through winter weather, attended by many men of average skill; in the other case burned under a few large, efficient boilers, protected from the weather, attended by a few men of high skill, and producing power economically by means of steam turbines.

Next to the coal the matter of skilled attendants is probably most important. Each one of the steam units, as has just been said, would require a skilled operative. There would be dozens of these. With electric motors, requiring, as has been noted, very little attention, many of these skilled men can be dispensed with, with a corresponding saving in cost.

The matter of lighting is also important. At every camp light of some kind is required. On jobs of magnitude, like those of the District, electric lighting is preferable both in economy and convenience. With steam apparatus, an electric generator would have to be installed at each job. With electric power from a large central station, the lights could be tapped from the transmission line in the usual manner. The superiority of the latter scheme will be evident.

A summation of the points which have been stated will make reasonably clear the great superiority, everything considered, of electrical over steam equipment for most of the work of the District. A decision between the two was in fact easy to make. As between gasoline and electricity, many of the considerations already urged in favor of the latter also apply: especially in the matters of easy portability, reliability, simplicity, and ruggedness to withstand the rough usage to which construction equipment is often subjected, gasoline motors are decidedly inferior.

Except for the work at Hamilton, the electric power is obtained from transmission lines of the Dayton Power and Light Company. At Hamilton, it is obtained from one of the local companies. In both cases, the electrical current obtained is of the

3-phase, 60-cycle, alternating variety. This type of electrical current has remarkable properties which fit it especially for power purposes and for long distance transmission. It is these properties which fit it so well for the work of the Conservancy District, and it will be interesting to examine them more at length.

A "direct" current of electricity flows in a wire in one unvarying direction. An "alternating" current flows first in one direction and then in the other. In "60-cycle," alternating currents these reversals follow each other with extreme rapidity; to be exact, 120 times a second. The current vibrates to and fro in the wire like a tuning-fork.

Such a vibrating current has peculiar properties. If the coil of wire carrying it be slipped over the end of an iron bar, vibrating currents of magnetism will be induced in the bar, and if a second coil be slipped over the bar, a second vibrating current of electricity will be induced in this coil. By winding many turns of fine wire on the second coil, it can be made to exert a very high electrical pressure, and by connecting its ends to the wires of a pole line electrical power can be transmitted, with slight loss, to distances of many miles. Such a bar of iron, as that above mentioned, bent into a ring, constitutes in fact, with its two coils, what is known as a "step-up transformer," frequently used in electric power transmissions. Considering what it does, it is a wonderfully cheap and simple piece of apparatus.

The electrical pressures carried on power transmission lines have to be very high, running up to 30,000 or even 60,000 "volts" and in consequence, they are dangerous when introduced into buildings; but by connecting a second transformer to the transmission wires, in reversed relation to that above, the high pressure current can be reduced to a safe low pressure which may be carried anywhere. Such a transformer is called a "step-down transformer," and may be seen on poles bringing the current into houses almost anywhere alternating currents are used.

It should be added that such transformers can be used only with alternating currents.

A single alternating current like that described is well adapted for lighting but not for power purposes for reasons that cannot be here explained. For power lines more complicated alternating systems are used, made by combining 2 or 3 simple alternating currents. The "3-phase, 60-cycle" system combines 3 such alternating currents, as those described above, vibrating in 3 wires, the 3 currents following each other $1/180$ of a second apart. Such a current in its electrical and magnetic action is very complicated. But the machinery which produces it, on the contrary, is very simple in its mechanical construction and operation, and the electric motors of the "induction" type, adapted to be run with it, are beyond question the simplest known, whether using steam, electricity, oil, or gas.

An induction motor consists essentially of two parts. First an outer stationary ring of iron with radial pieces or "poles," wound with copper wire, projecting from its inner surface toward the center. And second, a rotating iron drum with copper wires strung in slots which are cut lengthwise of its cylindrical surface, these copper wires being connected all together at each end by a copper ring. The rotating drum has no electrical connection



FIG. 109—FINISHING THE LEVEE AT HAMILTON, FEB. 7, 1919.

The levee appears at the right. It is built of material excavated from the river bed at the left by the dragline excavator, which is seen at work. The team is standing on the original level of the river bank on a "berm" or shelf, which has been left between the slope of the levee and the slope of the bank below. The team is hauling top soil material to be spread on the levee slopes. These latter will be sown to grass, both for appearance and to save the slopes from washing. The top soil had previously been deposited by the dragline in piles, as seen, in places where an excess of such material was available. The view is up stream at a point a mile or more south of Hamilton. The dragline seen is now at work opposite the lower end of the city, loading material into cars which will haul it to be dumped for fill in the low ground in Peck's Addition.

whatever to the power line. The coils wound on the poles of the ring are connected to the power line by 3 wires. Turn the current into such a motor and the iron drum begins to rotate, furnishing power to any machine with which it is connected. Mechanically such a motor is extremely simple. Electro-magnetically, extremely complex things are taking place. Three overlapping electro-magnetic waves, corresponding to those of the 3-phase, 60-cycle current spoken of above, are vibrating in the iron of the ring. What is remarkable is that their net effect is to produce a succession of powerful magnetic waves, which instead of vibrating back and forth, in the ring, pursue each other around it steadily in one direction at a speed corresponding mathematically to the 60-cycles per second and the number of projecting "poles" on the inside of the ring. An equal number of similar magnetic waves pursue each other around the outer part of the drum, dragging the drum with them, in a vain attempt to catch the waves in the ring. It should be added that these magnetic waves, invisible and intangible though they are, are extremely powerful realities, developing energy in large motors equal to that of hundreds of horses.

The points to be emphasized in these induction motors is their extreme simplicity of mechanical construction, their simplicity and reliability in operation and the further fact that, owing to their simplicity of construction, they can be subjected to rough handling by unskilled labor on the construction work with very little liability to injury. It is

this type of motor which is in very large use all over the District, in size ranging from a little machine you could put in your hat to one weighing tons and delivering several hundred horse power.

An induction motor runs at very nearly constant speed, however the load may vary, the speed variation running from 2 per cent in the large sizes to 8 per cent in the smaller. It has one disadvantage in that it takes 3 to 4 times its full-load current in getting started. This drops momentarily the electrical pressure in the mains where large sizes are used; thus dropping momentarily the power delivered to other lights or motors on the circuit. Slight modifications in the design are introduced in large sizes to obviate this difficulty. These constant speed motors of the "squirrel cage" type, (so called because of the arrangement of the copper conductors in the rotating drum) are used to operate all the Conservancy equipment except the draglines, derrick hoists, wagon drills, and dredge pumps. For these machines variable speed is necessary, and variable speed motors are used of the "slip ring" pattern.

The motors for the dredge pumps presented a special problem. These pumps, it will be remembered, are heavy centrifugal machines which pump sand, mud, or gravel, mixed with water, from the borrow pit to the hydraulic fill on top of the dam. As the work progresses and the dam becomes higher, the head against which the dredge pump must work constantly increases. The total increase may be 30 to 40 feet, greatly increasing the force to be exerted

by the pump. A centrifugal pump, which is also a very simple piece of machinery, consists of a series of curved paddles rotating rapidly within a hollow iron shell. The material to be pumped is sucked in at the center of the shell by the rotating paddles and thrown out at the circumference into the dredge pipe. The paddles do not touch the outside shell, so that as the pressure in the dredge pipe increases, due to the increasing head at the dam, the speed of the paddles must be increased correspondingly to force the water into the dredge pipe against this increasing head. Thus the speed of the pump, and the speed of the motor which runs it, must vary.

To secure this variable speed, either "slip ring," alternating current motors may be used, or direct current motors; and since the amount of work to be done by these dredge pumps at the 5 dams will be very great, totaling 8,000,000 cubic yards of earth, mixed with from 5 to 10 times that quantity of water, to be pumped from the borrow pits to the dams, a careful comparison of the direct and alternating current systems for this purpose became necessary.

In first cost the direct current motor exceeds the alternating. Also, since it must be fed from alternating current mains, additional apparatus in the shape of a set of special transformers and a rotary converter would have to be purchased to "rectify" the current from the mains. On the other hand, the direct current motor, at the reduced speeds necessary during much of the pumping, is more economical than the alternating. Comparing the higher first cost and the lower operating cost in the one case, with the lower first cost and higher operating cost in the other, it was found that they broke about even.

This reduced the comparison to the advantages and disadvantages in operation. The direct current machine is more complex, requires a more skilled attendant, and requires also the additional apparatus referred to. Each piece of this additional apparatus added a link to the chain of machinery, a breakdown at any point in which would interrupt the work, at cost of direct time and money, besides time and money involved in possible interruption of other work connected with the same job. All these considerations pointed to the use of alternating current motors.

For dredge pumps of the sizes to be used by the District (using 350 to 500 horse power) motors making about 350 to 500 revolutions per minute are considered to embody the best practice. Alternating current motors of the slip ring, direct-connected, induction pattern, and of the speed mentioned, were accordingly selected.

In the purchase of the equipment, two principles, in addition to those already considered, were held constantly in mind. One had reference to the salvage value of the equipment when the work for which it was purchased should be completed. Sizes and kinds were obtained which would bring the largest figure when placed on sale at that time.

The second consideration required that standard makes and sizes should be bought, permitting interchange in case of breakage during operation. By using the same makes and sizes on all the jobs, fewer spare parts would need to be carried. An entire machine, if necessary, could be transported by truck from one job to another for an emergency. Following these principles, the highest economy during construction has been secured.

Englewood Versus Taylorsville on Camp Organization

To the Taylorsville Camp belongs the credit for initiating the movement toward self-government in the construction camps of the District, but to the Englewood Camp goes the credit for improving upon the Taylorsville plan; so at least the residents of Englewood believe. Of course, the relative value of the two organizations will depend more upon the vigor, wisdom, and aggressiveness with which their respective constitutions are put into effect than upon the forms of the constitutions themselves, but nevertheless the form is very important. It should be both interesting and helpful to other camps, which may be contemplating organization along these lines to make a comparison, and to point out wherein the Riverside Community Association believes its constitution to be the better-drawn and more workable document.

There are several important and fundamental differences and a number of minor ones. The Riverside Constitution is considerable the longer of the two, but for that reason it has been possible to make it more clear and definite. Both constitutions incorporate the "Commission" idea, but the Riverside plan includes the "Association Manager" feature. At Taylorsville all the authority and responsibility is centered in the Commission, which is thus obliged to handle all the detail work of the Association, its only assistance coming from certain com-

mittees which are appointed. At Riverside the Commission is directly responsible for the proper administration of camp affairs, but it has the assistance of an Association Manager, who, in this case, is also Camp Overseer, and who is able to devote a portion of his time to the work of the Association and to carrying the policies of the Commission into effect. The Association Manager is authorized by the constitution to appoint directors and through them, committees, to assist him in his work.

The Riverside Association feels that this plan has several advantages. In the first place it affords an opportunity to a large number of members to take an active and responsible part in the direction of Association affairs. This is done without in any way infringing upon the authority of the Commission or limiting its power. The Commission is responsible to the electorate for the proper performance of the duties of its subordinates, and it is authorized to direct their activities. It is relieved, however, from the greater part of the detail work and is enabled to direct its attention to the solution of the more important camp problems.

Again it must be recognized that the proper administration of the various activities of an association requires a large amount of time on the part of the officers. To put the whole load upon the Com-

mission seemed likely to work an unnecessary hardship upon its members and to demand more time than they could properly give. The Riverside plan guards against this.

At Taylorsville a member of the Association must be a resident of the Camp for three months before becoming eligible for election to the office of commissioner. The Englewood people hold that there are men who become better acquainted with Community problems within a month than other men would in six months and who, because of livelier interest and enthusiasm and greater natural aptitude, would be better fitted for election as commissioner. Under the changing conditions of employment and residence at construction camps it would seem that fitness alone should be the determining factor in the election of commissioners, as is the case in the Riverside Association, and the period of residence at the camp is of little importance.

The entrance fees and dues of the two Associations are the same, but the dues at Riverside are payable yearly in advance. This obviates the

trouble and work of frequent collection of dues. A provision is made, however, that any person becoming a member after six months of any fiscal year shall have expired shall pay only one-half the dues for that fiscal year.

The other chief feature of the Riverside constitution which is not incorporated in the Taylorsville constitution is the Recall. The Recall provides an easy and convenient method of getting rid of a commissioner or commissioners who are guilty of negligence or inefficiency in the performance of their duties, while at the same time the percentage of the membership of the Association (two-thirds) which must petition for recall in order to make it effective, safeguards any commissioner against unfair or unjust treatment. It is doubtful whether it will ever be necessary to invoke this provision, but the presence of it in the constitution is sure to enhance the commissioners' sense of responsibility to the membership of the Association.

Arthur H. Kent,

Camp Overseer, Englewood Camp.

The Work at Englewood

(See picture on outside front cover)

The dragline excavator at the left is removing stumps, logs and all other undesirable material from the river bottom and bank so that they may not be included in the structure of the dam. These materials are hauled off the damsite by the construction trains behind the excavator. The concrete conduits appear in the middle of the picture in process of construction. They are very similar to the Germantown conduits described under figure 106. Two of the traveling trusses there described appear in the picture. Beyond the further one appears the boom and mast of a derrick used for depositing concrete in the forms for the outlet structure. This outlet structure is too wide to permit the use of slanting chutes like those described under figure 106. The left-hand railroad track in the foreground (3-foot gage) carries the concrete cars. The other two are standard gage, for carrying machinery, cement, and other materials. The roof of the cement shed is in the immediate foreground. The building to the right is a blacksmith, carpenter and machine shop. It is expected to finish the conduits early in the coming summer, but the river will not be turned into them until the following season.

C. F. Boardman, Chief Engineer of the Lackawanna Steel Co., visited the Conservancy work on February 14, and found naturally many points of interest.

Mrs. Laura H. Warner, file clerk and stenographer in the Office Engineer's office, resigned on January 31, in order to rejoin her husband upon the latter's return from the war. Mrs. Warner started work in the Engineering Department in October, 1917, having been transferred from the Appraisal Department, where she had been employed for nearly a year. All who came in daily contact with her learned to appreciate her as a most earnest and accurate worker, and will much regret her departure.

Taylorsville Loses A. O. Aulabaugh

A. O. Aulabaugh, Camp Overseer at Taylorsville, left the employ of the District a few weeks ago. Mr. Aulabaugh began his work with the Conservancy on June 19, 1918, in order to get work which would take him out of doors. Mr. Aulabaugh brought to the work of camp organization at Taylorsville an experience and ability, which enabled him to carry out his work with unusual success. He is going into business for himself in Dayton, in advertising and selling. He is an old and capable hand at this game, and his colleagues wish him prosperity in it.

A. B. Creager Goes to U. S. Labor Office

A. B. Creager, assistant in the employment department, retired on January 31, and has accepted a position in the United States government labor office at Dayton.

Mr. Creager started with the District as Timekeeper at the Germantown feature, coming to the Employment office in May, 1918.

The scarcity of labor during war conditions made constant demands for strenuous effort in the seeking of men, and in making known the work of the District.

In all these efforts Mr. Creager was a willing and faithful worker, and we wish him success in his new job.

F. C. Williams Goes to New York

Word is received as we go to press that F. C. Williams, engineer in charge of the sewer work at Hamilton, has resigned his position with the District and will go to New York, where he will be associated with James Ferry & Sons, contractors.

The Miami River steam tug, to be used in pushing loaded scows of excavated material to the spoil banks and levees, and a picture of which was published in our last issue, was given a successful steam test on the river on February 20. A descriptive article on this tug, with plans, etc., will be printed in a later Bulletin.

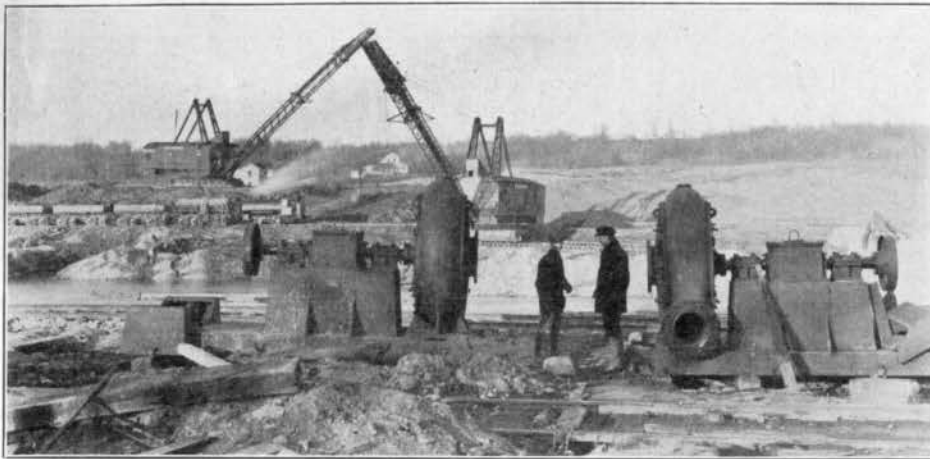


FIG. 110—DREDGE PUMPS, ENGLEWOOD, FEB. 5, 1919.

These are 15-inch centrifugal pumps, with a capacity of 7000 gallons per minute, run by electric motors, built by the Morris Machine Works. They will pump the mixed earth and water from a "sump" or pit to the hydraulic fill pool on top of the dam. The Stillwater river is seen just beyond. The dragline excavators across the river are cleaning out the river and preparing the damsite for the hydraulic fill.



FIG. 111—TRUCK AND TRAILER, DAYTON, JAN. 9, 1919.

This shows a 5-ton truck with 5-ton trailer, loaded with four 20-inch I-beams 32 feet long. The beams weigh a ton apiece. They are intended for the construction railway trestle across the Stillwater river at Englewood, where they replace two bents of piles which have been removed to permit free passage for ice during the winter, a precaution taken to safeguard the trestle against damage.

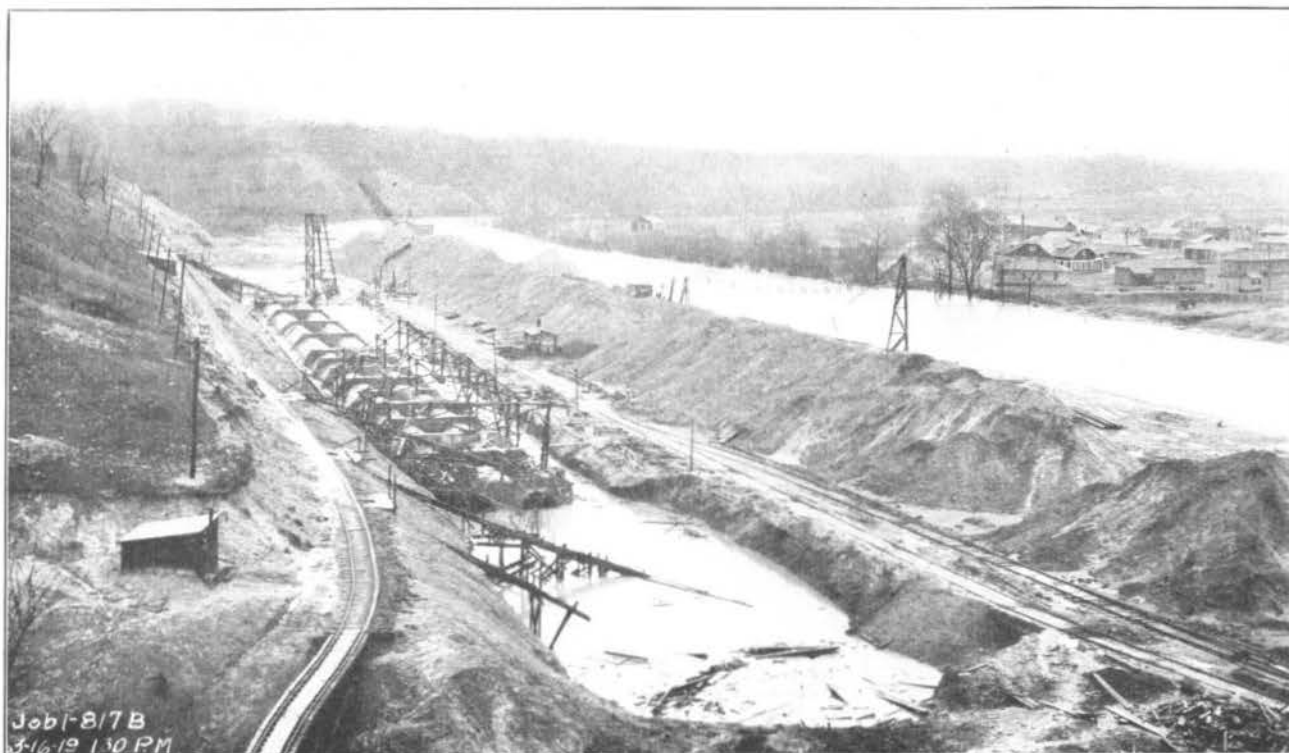


FIG. 112—EXCAVATION FOR OUTLET WORKS, TAYLORSVILLE, FEBRUARY 6, 1919.

The view is northerly from the top of the gravel washing plant (Fig. 107 was taken from the hill slope near the steam shovel, which is seen to the right of the locomotive in the distance, and looking southerly). The excavation, which is in rock, is being done by the big dragline in the foreground and the steam shovel just mentioned. The material is loaded into 12-yard dump cars drawn by 40-ton, standard gage, steam locomotives, and unloaded as described under Fig. 107.

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GERMANTOWN CONDUITS IN FLOOD, MARCH 16, 1919. SEE PAGE 137.



FIG. 114—GRAVEL WASHING AND SCREENING PLANT AND CEMENT HOUSE, ENGLEWOOD, JULY 15, 1918.



FIG. 115—STARTING THE GRAVEL THROUGH THE SCREENING AND WASHING PLANT.

This is an end view of the gravel screening and washing plant at Englewood, showing the conveyor belt carrying the raw materials up a long incline to the top of the plant which is about 60 feet above the ground. The large hopper in the foreground has just received the contents of a 12-yard dump car. Through a hole in the bottom of this hopper the gravel is being fed on to the belt, the quantity being regulated by a steel gate operated by a lever. The man standing on the platform is operating that lever. Note how evenly the gravel is spread over the belt.

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THE MIAMI CONSERVANCY BULLETIN

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DAYTON, OHIO

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April 1919

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Subscription to the Bulletin is 50 cents per year. At news stands 5 cents per copy. Business letters should be sent to L. F. Wilcock, Assistant Engineer, Miami Conservancy District, Dayton, Ohio. Matter for publication should be sent to G. L. Teeple, Miami Conservancy District, Dayton, Ohio.

Completion of Arches at Germantown

It is with much satisfaction that we record the completion of the concrete arches for the outlet conduits at the Germantown dam. The last of the concrete was placed March 22. The conduits, two in number, are each 540 feet long, or together nearly 1100 feet. The only concrete now remaining to be placed at this damsite is at the intake and outlet of the conduits. But a few hundred cubic yards are required at these points.

Victory Gardens

Last year the home gardens of America produced more than \$500,000,000 worth of food products. These vegetables were used locally. They did not add to the railroad problem. They took the place of food which could be shipped to our Allies in Europe. They did their part to win the war. They may well be called "Victory Gardens," and all who worked in them have a right to be proud of the record.

The coming of peace has not ended the world's food problem, which is America's problem. Millions of men in Europe are still idle, and must necessarily be for months. They are up to America to feed for this year, and possibly for several years. The "Victory Gardens" of America must continue their work. We appeal to every worker of the District who has a garden, or can get to one, to do his part in making them what they should be during the coming season.

Concrete Work Begins at Huffman

The placing of concrete for the outlet works at Huffman dam was begun on March 7, which is only a few days behind the schedule which was adopted some time since. At Huffman and at Taylorsville, for different reasons, the beginning of this work comes later than at the other three dams. At Huffman it is due to the fact that the Ohio Electric and the Big Four railways in their original locations ran so near the site selected for the outlet works of the dam that the railways had to be removed before excavation for the outlet could be started. This meant that new subgrades and tracks for these railroads had to be prepared before the old ones could be abandoned, since trains must be kept running. The railroad work at Huffman Hill was unusually heavy, and almost all of it was in rock, requiring thus more than the usual time. It is for these reasons that the outlet works at Huffman are only beginning. It is expected that being now begun, they will be energetically pushed to completion during the coming season.

Thirty-Four Telephone Calls Per Hour During Flood

Some indication of the anxiety felt by the residents of the low-lying sections of Dayton and neighboring towns during the recent flood is reflected in the number of telephone calls received at the headquarter's office of the Conservancy District. By actual count the number of requests for informa-

tion that were answered by the telephone exchange operators alone between Sunday 9 a. m., March 16, and Tuesday noon, March 18, amounted to 1,720. This is an average of 34 calls per hour through the day and night, or probably a much larger number for the day-light hours. In addition, there were many special requests for information that were answered by various officials. It is probably no exaggeration to say that during the 51-hour period referred to, over 2,000 calls were answered pertaining to possible flood danger.

Conservancy Wins First Appraisal of Benefits Cases

The first cases involving appraisal of benefits to property in the Miami Conservancy District were recently heard before the commonpleas court of Butler County. In both instances the jury returned a verdict in favor of the District, thus confirming the amount of benefits which will result from protection against floods, as determined by the Board of Appraisers. The cases are of interest inasmuch as they are the first of their kind ever heard before an Ohio Court. The first was that of Josephine Breeding who owns two lots in Middletown, and the second that of Patrick Brady, also of Middletown. Both parties had appealed from the award of benefits approved by the Conservancy Court in 1917. The cases were tried in Judge Harlan's court.

We expect to publish an analysis of these cases in a future issue.

Attention, Liberty Bond Holders

For the benefit of all who own Liberty Loan Bonds of the fourth series, we wish to advise that the first interest payment falls due April 15. To collect this, it will be necessary to clip the first coupon, and present it at any bank. The amount called for on the coupon will then be paid in cash. The amount of the interest in case of a \$50 bond is \$1.01, and for a \$100 bond is \$2.02. Although the interest is payable April 15, it is not necessary to present coupon at the bank on that particular date. The coupons are good any time after the 15th.

Tooth of Mammoth Exhumed at Hamilton

The tooth of a mammoth, an extinct species of elephant (*Elephas primigenius*) was found recently in the excavation for the Buckeye Street sewer. The tooth weighs four pounds, has a grinding surface three inches by seven inches and a root about eight inches long. Local authorities pronounce it a fine specimen, unusually well preserved. The Encyclopedia Britannica shows a picture of a mammoth molar which is a fine likeness of this specimen.

New Definitions of "Engineer"

Robert W. Shelmire of Chicago, in a letter to "Engineering and Contracting" concerning new definitions of the word "engineer," raises the objection of usage. "An engineer" (he quotes from four dictionaries) "is one engaged in engineering." It also means, "one who runs an engine," because usage has so decreed. There is much to be said for Mr. Shelmire's contention. Usage, in fact, determines in the end what all words mean. Of

course, Mr. Krom's endeavor is to hedge in the usage, but his chance of penning it into the particular inclosure he has built, judging by the history of the English language, is extremely small. A word is the unruliest thing alive. The word "alive" is used advisedly. Words are born, they live, and they die. Some are more alive than others. The word "engineer," born some centuries ago, is still among the liveliest, and a really live word, once it gets started in any direction, is harder to head off than a hen. Witness the vitality of slang words, many of which manage to "get by," in spite of all the army of the rhetoricians, brandishing brooms, and win a permanent place in the language. A word like "engineer" isn't an exotic, to be pruned and trained in a greenhouse. It is a wild dandelion, sown by the wind, planted in every ear. All the engineers in all the American Societies, backed by the Army and Navy, might agree on a particular definition of the word, and the old meanings would all cheerfully survive. "Dominant species vary most," and a vigorous word, like "engineer," is a good deal more apt to branch and multiply its meanings than to restrict them. It is going to be more and more necessary, it is to be feared, whenever you want exactness, to define the particular "engineer" you mean.

The Conservancy Technical Reports

Attention is called to the notice regarding the Technical Reports published by the District which is given in another column, and to the list of the Reports appended thereto. It is believed that these Reports are of sufficient value to those who are interested in work similar to that in which the District is engaged to merit the attention of the profession.

Dayton River Improvement

The Miami river improvement through Dayton has now reached a point a trifle below the mouth of Mad river. The beginning stage of the works may be said to be completed. The second and larger stage is now under way. The characteristic feature of this latter part of the work is the method of transportation of the material. At Hamilton this transportation is by means of locomotives and dump cars; in Dayton it is by means of scows pushed by a river steamer. The excavating and unloading are done by two large draglines (Class 175 A Bucyrus) with 125 and 135 foot booms, and 3½-yard buckets. One excavator digs and shapes the channel, loading the material upon the scows; the other unloads the scows and deposits the material in levees and spoil banks upstream. The loading excavator is now carried on the usual dragline mats and track, laid on a gravel bar slightly above water level. Later it will be mounted upon a scow. The unloading dragline will travel on mats along the shore in the usual way. In order to insure at all times a sufficient amount of water to float the scows, an inexpensive timber dam has been built near the mouth of Wolf Creek. A second similar dam will be built for the lower portion of the work at a point a little below the city. It is a pleasure to record that this mature stage in the progress of the Dayton channel improvement work is now in full swing. A detailed account of it will appear in an early issue of the Bulletin.

The Storm of March 14-19

It Followed the Usual Law of Large Storms in This Country. On March 16 It Threatened Serious Flood.

The storm which caused the flood of March 15-20 followed the general law which all storms in the United States follow with a greater or less degree of strictness. This law, discovered and developed during the middle and latter parts of the nineteenth century, has now become well established, and it is by a study of any particular storm in relation to it that predictions as to rainfall and as to flood are possible.

In accordance with this law, all storms in the United States, of any magnitude such as are liable to cause floods, originate in the western states and travel eastwardly. These storm areas are roughly circular or oval in form and cover a great extent of territory, averaging over 1,000 miles in diameter. The center of the storm is of much smaller extent, characterized by low barometric pressure, and is technically known as a "low." Passing away from this center in all directions, the barometer reading increases until it reaches the normal amount of 30 inches or more. The winds in the storm area blow spirally about and toward this center, and always, in the northern hemisphere, in a direction contrary to the hands of a clock. All storms, then, except local storms of brief duration, may be looked upon as huge spiral vortices of wind and rain—they are in fact called, technically, "cyclones"—whirling about centers of low barometric pressure, the entire spiral traveling eastwardly across the country at the rate of from 15 to 30 miles or more per hour, this

speed not representing the velocity of the wind but the velocity at which the entire vortex travels, carrying the center of low pressure with it.

The rain which accompanies such a circular vortex of storm usually occurs in the southeastern portion of it. The reason for this is that the wind in this portion, following the law of direction just given, comes from the southward, laden with vapour from the Gulf of Mexico, and blowing as it does into a colder region, the moisture condenses and falls in rain. On the western half of the storm, the wind comes from the northward, from a colder and drier country. It contains, therefore, little moisture and brings very little rain. It may be noted in passing that the storm of March 15-20 gave an almost perfect exemplification of these principles. The center of the storm, the low pressure area that is, passed Dayton on Monday afternoon about three o'clock. The rain, true to its law, all occurred in the earlier and eastern half of the storm, the latter and western half of it, which passed Dayton subsequent to Monday afternoon, bringing no rain.

The Government Weather Bureau, receiving observations regarding temperature, barometric pressure, rainfall, etc., from all parts of the country, by plotting these observations on a map of the United States, is enabled to tell when one of these great spiral storms, with its low pressure center, is developing, which will always be in the far western states. And when one develops, the Bureau knows for a



FIG. 116—THE WORK AT HUFFMAN DURING THE FLOOD, MARCH 16, 1919.

The view is looking downstream toward the southwest. Mad river is seen in the distance near the center of the picture. The water in the foreground at the right occupies the old bed of the river, now enclosed by an earthen cofferdam, seen at the right, with the diverted river channel beyond it. To the left of it is a second interior cofferdam built to keep the water out of the excavation at the left, in which the concrete conduits are just getting under construction. These conduits will eventually carry the river water through the base of the dam. The flood, as will be seen, nearly filled the space between the two cofferdams, but was kept out of the excavation by pumps, vigilance and hard work. Men may be dimly seen, near the center of the picture, working with shovels and wheelbarrows raising the level of the cofferdam. The derricks seen are for handling the concrete.

sure, rainfall, etc., from all parts of the country, by plotting these observations on a map of the United States, is enabled to tell when one of these great spiral storms, with its low pressure center, is developing, which will always be in the far western states. And when one develops, the Bureau knows for a certainty that it will move eastward. Its exact course cannot be foretold, but its probable path can be. Likewise something is known regarding its speed. Knowing the facts, the weather it will bring to the country east of it can be approximately foretold.

The storm which caused the flood of March 15-20 began to form on Thursday, the 13th, and by the next morning had fully developed, with its center of low barometer (29.3") over Colorado and Wyoming. The difference between this and the high barometer to the east (over Ontario and Quebec in Canada) was 1.6 inches, indicating a storm of considerable magnitude. Rain was in fact falling over most of the central Mississippi and lower Ohio valleys. (In accordance with the law, falling east and south of the storm center.)

The storm area moved eastward and by midnight (Friday) rain began in the Miami valley. By Saturday morning a half inch had fallen, and reports began to come into the District Forecaster's office in Dayton that the streams of the valley were rising. It was clear from the government reports from further west that more rain was coming, to an amount which would raise the river stages of the valley 5 to 10 feet, and warnings were accordingly issued to that effect to the various construction centers. It rained in fact all day Saturday and all Saturday night, an amount up to Sunday morning of about $2\frac{1}{4}$ inches. The larger streams rose with corresponding rapidity, the Miami in Dayton reaching a stage of 8 feet by 10 o'clock Saturday night.

Such being the condition, arrangements were made on Saturday afternoon by Mr. Kuhns, the Secretary of the District, for maintenance of full telephone service at the headquarters office through Saturday night, Sunday and Sunday night, so that flood reports and warnings could be delivered promptly at any time.

By Sunday morning, however, the entire storm, of which the rain in the Miami valley was but a minor manifestation, showed signs of beginning to break. It had at an earlier stage developed two centers of low barometer (an aberration analogous to that of a "double-yolk egg"). One of these had disappeared. The other (moved eastward now to a point over Wisconsin and Lake Superior) had weakened. It



FIG. 117—LOOKING EASTWARDLY UP THE MIAMI RIVER, MARCH 16, 1919

.....This shows the danger to the large dragline excavators used in excavating the enlarged river channel. This machine stood on a small island when the flood began. The next day after this picture was taken, it stood in 7 feet of water. This was also true of the other excavator, which is like the first, seen in the distance at the right. Both machines came through without injury.

looked as if the rain might cease that night (Sunday)

But the promise did not develop. It kept on raining all day Sunday, and by night a new storm center (of low barometer) had appeared, this time over Arkansas and Oklahoma. Heavy rainfall had developed to the east of this center, reaching at Memphis, Tenn., 8 inches, an unusual intensity. This area of rainfall reached from Oklahoma to Indiana. It was moving east, and the Miami valley was in the direct track of it. Rain might fall on Sunday night over the valley, quite probably, to an amount of one or two inches. The rainfall had already reached $2\frac{3}{4}$ inches. All the streams were swollen to bank-full stages or higher. The river at Dayton was now at 12-foot stage. An additional inch of rain would raise it to the 18-foot stage. Two additional inches would raise it nearly to the top of the levees. And it looked as if two inches were coming. Things looked Sunday night, in fact, like another real flood.

But by morning things looked quite different again. The rainfall over the valley during the night was only $\frac{1}{2}$ inch, instead of an inch or two inches. The Arkansas storm center had moved northeast over Illinois in a rapid shifting, and the barometer readings reported from the eastern states indicated that it would pass east of the Miami valley within a few hours. The streams, moreover, in their swollen state, were now carrying the water away nearly as fast as it came ($\frac{1}{2}$ inch in 12 hours). It was felt that all danger of serious flood was past.

This proved to be the fact. Showers occurred in the valley during Monday and Monday night, but amounting to only about $\frac{1}{4}$ inch in all. The storm center passed over Dayton about 3 o'clock Monday afternoon, as stated. The Miami, Stillwater, and Mad rivers reached their crest stages during Monday and Monday night, and by Tuesday morning, the streams were falling at all points in the valley. The total rainfall for the storm had been about $3\frac{1}{2}$ inches.

How the Flood of March 15-19 Affected Construction Work

No Damage to Equipment and Very Little to the Work. Plans Made Long Ago to Meet Any Flood That Can Come.

It would be strange if in work which has been as carefully planned as that of the Miami Conservancy District, the object of it all being to control and guard against floods, the process of construction itself should not be carefully planned against flood danger. Such planning would naturally be a part of any good engineering program in such a case. It has been, of course, a part of the program of the Conservancy engineers.

The flood of March 15-20 therefore found them entirely prepared. When the plans were undertaken some five years ago, careful studies were made of the rainfall, not only of the valley, but over the entire country east of the Rocky Mountains, so as to know what effect any large general storm would have on rainfall in the Miami valley. Something regarding this phase appears in the preceding article. Studies were also made as to the effect of different amounts of rainfall in the valley upon the "run-off"; that is, upon the quantity of water flowing in the various streams. With these studies in hand, it is possible to tell with considerable accuracy, when reports of rainfall in the valley come in over the telephone, what the stages in the various streams will be, and how they will affect the valley below. Knowing this, warnings can be sent to the engineers on the various projects that the time has come to take the precautions which have long been planned to guard both the work which is under construction and the equipment which is engaged in doing it.

Such a program of warning and of action was in fact carried out in the case of the flood of March 15-20, with results which were highly gratifying. There was practically no loss whatever to the equipment. Of the electrical equipment, for instance, the Chief Electrician reported the only damage was the up-rooting of one line pole by the Miami river, the pole itself being immediately recovered. The following paragraphs give in some detail the story of the effect of the flood at the various projects upon the work in progress.

At Taylorsville the principal precaution taken was the lifting of the electric motors in the pump

house, west of the river, above the possible rise of the flood. The pump house, on account of the necessity of getting suction, had to be placed on low ground just beside the river, where it is naturally subject to flood. The pumps are run by 5 electric motors, which would be badly damaged by immersion in water. The probability of moderate floods being foreseen, beams were built into the pump house frame at the time of erection, immediately over each of the motors, so that by means of tackle attached to the beams, the motors could be lifted. It was foreseen on Saturday that it would be necessary to raise the motors the next day and by five o'clock Sunday morning the operation was begun, after the manner stated. To raise all 5 motors took 2 hours and 20 minutes, and the operation was completed while the water was still about 1 inch below the pump house floor. They were raised about 4½ feet, or to an elevation of about 876. Wire rope had been prepared beforehand so that the motors could be lashed to the beams at this safe elevation. The dredge pump house on the east side of the river is at so high an elevation that it was un-

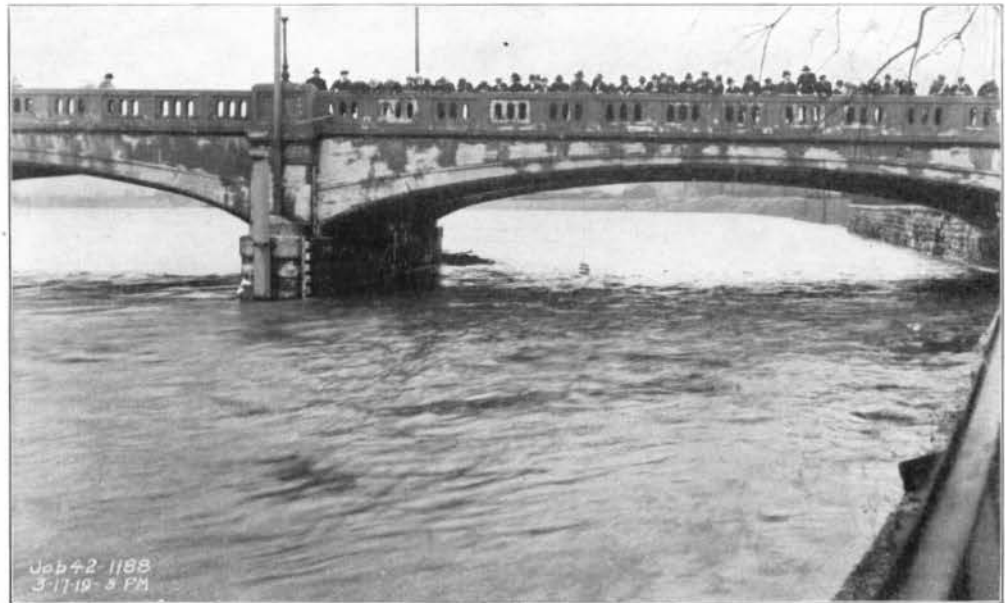


FIG. 118—MAIN STREET BRIDGE, DAYTON, AT THE CREST OF THE FLOOD, MARCH 17, 1919.

The vertical box projecting out of the water at the end of the bridge pier contains part of the recording gage. It connects electrically with an automatic apparatus in the headquarters office of the District, which produces on a chart a graphic record of the stage of water in the river at all times during the day and night. The vertical board marked with figures, on the corner of the pier near it, is the ordinary river gage, showing by the figures and divisions on it the stage of the water. The apparatus looking like a small triple torpedo hanging by a cord from a point near the center of the right-hand arch, is a current meter about to be lowered for an observation into the river. It measures the velocity of flow of the current.

affected.

Next to the motors, the trestles were given most attention. Men were kept on them during the continuance of the flood, clearing away drift as it caught on the piles, so that it would not jam and produce dangerous pressure. The trestles came through without any injury whatever.

Thus the only material result of the flood at Taylorsville was to delay the work of the hydraulic fill, since the centrifugal pumps, already spoken of, were necessarily put out of operation. This delay amounted to about 2 days. There was also a slight delay to the drilling in the borrow pit east of the river, where the Cincinnati formation is being blasted out, due to seepage of river water into the excavation. This delay was of very little importance.

At Huffman, to protect the work of concreting from water, two earthen cofferdams are used, one within the other. The interior cofferdam encloses only a small area immediately adjacent to the portion of the conduit which is being concreted, successive interior cofferdams being thrown across the excavation as the work progresses. These interior cofferdams are to save expense involved in pumping out large areas to keep the work dry.

Pumps have been placed to unwater both the interior cofferdam, and the space between it and the exterior one, and these pumps were, of course, set

ferdam, and the seepage was kept to a practically normal level. It was possible in fact to begin concreting again at Huffman on Tuesday, and by Wednesday it was going ahead at normal speed. Here also there was no injury to machinery or equipment, and the only loss was due to the delay, which would have been brought about by weather conditions independent of flood.

At Lockington the flood rose 7.4 feet above the bottom of the outlet channel. This channel connects the excavation, where the concrete walls of the conduit and spillway structures are being built, with Loramie Creek in the valley below. At the lower end of this outlet channel, the highway crosses it. This highway was left unexcavated as a cross cofferdam in case of just such a flood. It was connected to the spoil bank on the west side of the main excavation by another cofferdam running north and south on the west bank of the outlet channel. The water rose within 3 feet of the top of this cofferdam. As a further precaution, in case this freshly built levee should give way, another cross dam was built



FIG. 119—ENGLEWOOD CONDUITS IN THE FLOOD, MARCH 16, 1919.

These concrete conduits, two in number, now approaching completion, are being built in a long cofferdam excavated next the river bank. The stream side wall of this cofferdam may be seen in the foreground at the left. Further in the distance, it is entirely submerged. The arched tops of the conduits just appear above the water. The full pressure of the water was not allowed to come against the outer cofferdam wall. When it was seen that a flood was inevitable, pipes were opened at the lower end of the conduits beyond the derrick seen in the distance, thus connecting the conduit excavation with the river channel at comparatively low level. The water was thus permitted to reach its natural level in the excavation, equalizing the hydraulic pressure on the cofferdam wall. No injury was done to the structure or equipment in this flood. Electric motors below flood level were lifted out of danger. The water was pumped out of the excavation after the subsidence of the flood by a pump of 5500 gallons per minute capacity, in somewhat less than two days.

at work when the water came. Men were also kept at work with wheelbarrows re-inforcing and raising the interior cofferdam where it showed signs of weakness. An extra pump was also placed and set at work to aid in pumping out the space between the two cofferdams. By these means, the water, excepting seepage water, was kept out of the interior cof-

ferdam, and the seepage was kept to a practically normal level. It was possible in fact to begin concreting again at Huffman on Tuesday, and by Wednesday it was going ahead at normal speed. Here also there was no injury to machinery or equipment, and the only loss was due to the delay, which would have been brought about by weather conditions independent of flood.

injury whatever to the work at Lockington. There was only delay, and this was due to weather conditions, and not to flood. In point of fact, on Tuesday, March 18, the biggest run of concreting for the month was placed, 251 cubic yards, and this would have been placed the day before if weather conditions had not interfered. At Lockington also preparations were made to raise the electric motors out of the excavation and up to safe level in case the water should come in.

At Dayton the conditions were quite different from those at any other place on the Conservancy work during the flood. This was due to the fact that the principal work of river excavation in Dayton is carried on by two powerful draglines which work practically at the river level. Thus they are exposed to more danger of injury during high water than any other machines used in the District. Both these machines at the time of the flood were at work in the river north of Main Street bridge. (They are shown in figure 117). It was feared that the dragline "mats" on which these machines stand would be undercut by the current, causing the machines to sink into a hole from which they could be raised later only at considerable expense and a delay of perhaps two or three weeks. The situation was one that simply had to be faced, the circumstances under which these machines work being unavoidable. They were raised to as high a position as possible, which proved indeed to be high enough. There was no undercutting, although the machines stood for a time in 7 feet of water. The machines therefore were able to begin work at once on the subsidence of the flood. Part of the immunity of the draglines was unquestionably due to the comparatively steady speed of the river current, and this in turn was due to the work which has been done on the river channel from Main Street bridge to Island Park. The river channel between these points is indeed nearly in the final condition called for in the Conservancy plans, and its effect in smoothing the current of the river was noticeable, and very satisfactory to the Conservancy engineers.

The scows, built to transport the excavated river material to the spoil banks and levees, were entirely uninjured by the flood. A canal had been dug by one of the draglines between the new and the old levee on the north bank of the river below Herman Avenue bridge. The scows were moored in this canal where they were entirely protected from the rush of the flood. The steam tug was moored in a similar harbor next the ship yard on the south bank. The small dragline, mounted on a scow, was at work just above the Sunset Avenue dam. It was anchored to "dead men" planted on the river bank, and out-ride the flood without mishap.

The new levees in Dayton were affected only by a slight wash at the height of the flood.

At Hamilton there had been a small rise in the river two weeks before the flood of March 17. The large dragline there was then at work beside a riffle where the current was contracted and rather swift. Due to the necessary deepening of the river at this point by the dragline the current had begun at that time to undercut the bank on which the dragline stood, necessitating, as a precaution, that the dragline be somewhat drawn back from the bank edge. This dragline during the flood was at work in this



FIG. 120—NATIONAL ROAD BRIDGE, STILLWATER RIVER, MARCH 17, 1919.

The river overflowing its banks, March 17, is here seen sweeping across a low point in the road near one end of the bridge, blocking traffic for a season. This road, when the work at Englewood is completed, will cross the valley on the center line of the dam far above all possibility of such conditions as are seen here.

same location, and the same precaution proved to be all that was necessary. The dragline was raised and drawn back from the edge of the bank. On Monday night at maximum flood, the dragline track was about 2 feet under water, but the machine itself was unaffected. The smaller dragline was excavating at Little Reservoir in the upper part of the city, and was at so high an elevation that it did not stop work at any time on account of the flood. Work on the Buckeye Street sewer also was unaffected by the high water. The river at Hamilton reached a stage on Monday night of 14.3 feet, 0.9 feet above that indicated at Dayton. The river current at Hamilton, on account of the narrower channel, was also swifter than at Dayton by perhaps 40 to 50 per cent. Nevertheless, there was no damage done to the equipment, and very little to the levees which had been constructed.

At Germantown word was received on Saturday morning, March 15, that a 10 to 11 foot rise in Twin Creek might be expected. Work was continued as usual until noon. In the afternoon, the electric motors, used in unwatering the conduit excavation, were raised out of the pit to a safe elevation. The dragline, which was at work at the lower end excavating the outlet channel, was drawn back upon higher ground. The lumber in the excavation was lifted out and piled in the clear. These precautions all proved necessary, since the creek, backing up the outlet channel, went over into the conduits at 2 a. m. Sunday. As it turned out there was no damage done except that due to delay. The condition of the conduits after the flood went over is shown on the front cover. Preparations were at once made to pump out the excavation. On Sunday two 8-inch pumps were sent down from Dayton, which were set up and began work pumping on Monday between 5 and 6 p. m. The total amount to be pumped was between 5 and 6 million gallons of water. By Friday 70 per cent of this water had been pumped out. Concreting, which had been stopped, began again on Thursday. The last of the water was pumped from the excavation Saturday. The dragline began work again excavating the outlet channel on Monday morning.

At Englewood there were only two motors which were endangered by the flood, and these were both lifted out of harm's way before the water reached them. One of these was the derrick motor in the outlet excavation, the other the pump motor connected with the gravel washing plant. Arrangements had been made long before the flood came for the safety of these motors in anticipation of just such a contingency. A 48-inch pipe at Englewood leads the river water to the pump house where it is used in connection with the hydraulic fill. The gates in this pipe were shut to keep the pumps from flooding. In anticipation of flood, pipes had been placed connecting the conduit excavation at its lower end with the river channel. When it became evident that the flood would rise high enough to endanger the cofferdam, due to the pressure of the river water, the valves in these pipes were opened,

permitting the conduit to be flooded, thus saving a rupture of cofferdam walls. The trestle across the Stillwater river was watched carefully to see that drift material did not pile up so as to produce a dangerous flood pressure on the structure.

The net effect of all these precautions was that there was practically no damage to the work at Englewood. There was a slight wash of the embankment at one end of the trestle, but this was of no moment. While the flood was on, preparations were made for pumping out the conduit excavation when it should subside. A 12-inch pump with a capacity of 5500 gallons per minute, with connected electric motor, was sent down from Dayton, and mounted for work. It began pumping out the excavation at 3:30 p. m. on Thursday, March 20, and by Friday noon the conduit was practically pumped out.

March Progress on the Work

GERMANTOWN

During the past month concreting has been carried forward at a satisfactory rate. About March 17, the last of the 18 arches will be completed. The major portion of the concreting still remaining to be done at the conduits consists of two headwalls, the inlet partition and side walls, and the south wall of the outlet.

To facilitate the placing of concrete in the south wall of the outlet a hoisting tower has been erected to a height of 60 feet. This tower has been completed and the placing of concrete in the south wall has been started at this writing.

Work on the "hog box" for the hydraulic fill is progressing satisfactorily. The timber cribbing which carries the standard gage track along the upper side of the hog box has been finished. The remaining walls are also on a fair way to completion.

The placing of the permanent cut-off below the base of the dam has been started. Steel sheet piling is being driven by a steam pile driver along the center line of the dam to a depth varying from 25 to 40 feet below the base of the dam proper.

On March 10 a night shift was started at the gravel washing plant in order to obtain a sufficient supply of washed aggregate for building the spillway and the permanent floor through the conduits. This material is to be stored and the plant dismantled.

The large dragline has been excavating the outlet channel during the past month.

The camp roads have been graveled and graded again, and all fire equipment located ready for instant use.

Arthur L. Pauls, Division Engineer.

March 15, 1919.

ENGLEWOOD

At the present writing but 9 sets of arches, aggregating 270 feet, remain to complete the outlet conduits. In addition, a small amount of concrete is yet to be placed in the outlet walls and a somewhat greater amount in the inlet walls.

The large steam dragline is excavating the cut-off trench along the center of the dam near the east end. The material is being deposited in the downstream portion of the dam.

The cross dam, just east of the river, is progressing favorably and has reached a height of about 15 feet.

One 15-inch dredge pump began pumping hydraulic fill into the dam near the downstream toe on February 24. The second pump, delivering material to the upstream portion of the dam, will soon be in operation. The work to date on this item has consisted principally in tuning up the pumping plant.

An old farm house is being adapted for use as a camp community building.

H. S. R. McCurdy, Division Engineer.

March 15, 1919.

LOCKINGTON

Concreting has progressed at a fair rate, the total placed to date being 22,000 cubic yards. The concrete structure will be completed on or before May 30, except for that part which cannot be placed until the dam is practically completed. The part referred to is the overflow dam, situated between the main walls, which will form the spillway and conduits.

Rock excavation for the hydraulic jump pool has been completed, and concreting of the steps in the bottom began March 12. The stone dressing on the east bank of the outlet channel has been practically completed down to the road, and a considerable amount of selected rock has been stored in piles for future use in the concrete and for slope paving. This material came from the pool excavation.

The large dragline, after excavating, handling forms, and placing 437 cubic yards of concrete in the pier and abutments for the new bridge, is again excavating the outlet channel. From its junction with Loramie Creek the channel is complete upstream for a distance of about 900 feet. The road embankment across the channel has been left undisturbed. This embankment, with that thrown up along the west side by the dragline while excavating the outlet channel, gives flood protection to the concreting operations against a stage in Loramie Creek of about ten feet.

The smaller dragline, in addition to furnishing gravel to the washing plant, is finishing the east slope of the lower end of the entrance channel preparatory to paving with stone.

Soil stripping has been resumed on the area east of the gravel storage pile, and clearing and grubbing in the valley bottom is now under way.

A stiff-leg derrick made at the Dayton shop for digging with a drag bucket is being erected to excavate the sump for the dredge pumps. After this is completed it will be used for installing equipment and handling replacements in the pump house.

The small earth dam forming the sump and forebay for the monitor water pumps, connected to the Miami and Erie Canal, is practically completed.

Barton M. Jones, Division Engineer.

March 15, 1919.

TAYLORSVILLE

The Lidgerwood dragline has finished the excavation in the outlet channel south of center line of dam down to elevation 790, and has moved to the south end of the portion of the channel that is to be lined with concrete. It has commenced excavation down to final grade for concrete. Practically all the material to be excavated below elevation 790 is rock. This is being drilled for blasting by two Cyclone well drills.

A new railroad track for handling the materials excavated from the outlet channel has been constructed from trestle No. 2 around the east side of this channel on a berm cut into the slope.

The hydraulic fill work is going better at the new location. The average solids handled per hour during the month of February was 110 cubic yards pit measurement, or about 170 cubic yards measured in embankment. One dredge pump runner has been worn out after about 130 hours' service, during which time it handled about 12,000 cubic yards measured in excavation. At the end of 91 hours and 10,000 cubic yards handled it was so worn that it would only deliver satisfactorily to the nearest point on the dam.

The concrete foundation for the gravel dumping hopper has been put in and the cement warehouse is practically finished.

A connecting track has been located between the present track of the B. & O. R. R. and the new location of that road.

The grading on Road No. 13 has been finished and the graveling is about two-thirds done.

O. N. Floyd, Division Engineer.

March 15, 1919.

HUFFMAN

Concreting of the outlet works was begun on March 7. A little over 600 cubic yards were poured the first week in the footings for the two side walls at the upper end. The floor between these walls is now being placed and the forms for the first lift of the side walls have been erected.

The beginning of the concrete work at this season of the year is quite fortunate, as it should enable the placing of all the concrete in this structure before cold weather next winter, thus avoiding the expense of protection against freezing.

The excavation in preparation for this concrete has been progressing very satisfactorily. It is practically completed down to the bottom of the stilling pool below the conduits, and no fears are entertained that this part of the work will not be kept well out of the way for concreting. About 25,000 cubic yards were excavated during the month of February and placed in the fill for railroad relocation. Almost all of this excavation was Cincinnati formation, a mixture of rock and hard shale.

Gravel for the concrete aggregate is being excavated with a 1½-cubic yard steam dragline and transported in side dump cars to the combined washing, screening and concrete plant.

The building of a temporary highway has been started across the valley connecting the Valley Pike with the Springfield Pike, just above the dam. It takes the place of the highway which will be built later across the valley on the top of the finished dam.

C. C. Chambers, Division Engineer.

March 15, 1919.

HAMILTON

The total material excavated to date by the two draglines amounts to 400,000 cu. yds. This does not include any second handling.

The smaller Bucyrus steam dragline is continuing work on the levees across the north spoil bank, having placed 14,000 cu. yds. to date this month.

The large Bucyrus electric dragline is moving northward at a point opposite South avenue, loading material on cars and at the same time excavating a deep channel for lowering the water in the river above.

Considerable difficulty has been experienced with the injectors on the locomotives on account of the hardness of the city water which has been used up to the present time. A pumping outfit for supplying river water has been installed, which it is hoped will overcome this difficulty to a large extent.

The concrete work on the Buckeye street sewer is 84% completed and the excavation is 95% completed. A tunnel is being driven to carry the sewer under the B. & O. tracks.

All water mains, gas mains and sewers in relocated Black street have been completed. The section east of Second street has been graded and rolled, and is ready for the concrete base and curb.

C. H. Eiffert, Division Engineer.

March 17, 1919.

DAYTON

Channel excavation to date amounts to 323,000 cubic yards. In making this excavation the two large dragline

machines have moved 592,000 cubic yards of material. About 20,000 cubic yards have been excavated for the canal in the spoil bank on the west side of the river below Herman Avenue. This canal is temporarily being used as an anchorage slip for the scows in times of high water, like that of March 16.

On March 1 the steam tug Dorothy Jean made her first trip down the river to Dayton View bridge and returned to the harbor at Herman Avenue. Scow transportation of excavated materials was begun on March 4. The material was excavated and loaded by dragline No. 790 at a point in the main channel opposite the end of Emmett Street, and was unloaded by dragline No. 789 upon the north bank of the mouth of Mad River.

The steam dragline No. 751 has been transported on scow No. 4 to Sunset Avenue dam, preparatory to making the closure of the dam.

Price Brothers concrete block-making plant is ready for operation. A No. 1 Aurora rock crusher has been purchased to be used for crushing oversize in the gravel for the manufacture of the blocks.

Fifty-seven thousand cubic yards of levee embankment have been placed on Contract 41.

Work was practically at a standstill for several days after Sunday, March 16, when heavy rains caused a rise in the river which reached a crest stage of 13.4 on Main Street gage about midnight of March 17. The big dragline machines stood in a depth of 7.0 feet of water but sustained no damage. There was no damage to the scows or other equipment.

C. A. Bock, Division Engineer.

March 19, 1919.

Big Four and Erie Railroads. The Walsh Construction Company is keeping up its monthly average in the excavation of the Big Cut at Huffman Hill, 38,000 cubic yards being excavated during the month of February. In order that the work should continue without interruption a second steam shovel was installed, replacing the one which had been in continual operation and which is in need of repairs.

Mr. George Condon has just completed installing a steam shovel outfit for the grading of the line near Fairfield. He has also started excavating in this vicinity with the elevator grading outfits.

Frank Hill Smith, Inc., have all of their concrete work completed and are now finishing the excavation for the new channel for the Dayton Hydraulic Company at the new headgates. The latter headgates are now completed.

Mr. F. H. Sprague is finishing his work in connection with the Big Four and is moving the equipment to the Ohio Electric work which is being started between Fairfield and Carlisle Junction.

B. & O. Relocation. The general contractors, Grant Smith and H. C. Kahl, and the subcontractors, Condon and Smith, Vang Construction Co., and Kahl Bros. Construction Co., are excavating for the roadbed at a rate of about 60,000 cubic yards per month with two revolving Erie steam shovels and three Bucyrus 70-ton steam shovels.

Condon and Smith have completed the cut at Taylorsville Dam and are beginning to excavate the cut at Tadmor. The Vang Construction Co. are excavating in the cut south of Poplar Creek. Kahl Brothers are excavating in the various cuts south of Johnson Station and H. C. Kahl is excavating in the cut about two miles north of Needmore Road.

It is expected that the grading between North Dayton and Taylorsville Dam will be completed in May, so that track laying can be started June 1. The grading north of Taylorsville will be completed very soon after the track laying and ballasting are completed between North Dayton and Taylorsville Dam.

The Ohio Electric Railway. Through the big cut at Huffman Hill and across the flatter land east of it nearly to Fairfield, the Ohio Electric Railway in its relocated position parallels the relocation of the Erie and Big Four, running across the flat on the top of the northern levee. The grading on most of this work has been completed, excepting that portion in the big cut. A mile of grading west of the big cut has also been completed, together with the permanent track and overhead trolley wire construction for the same distance.

Just south of Fairfield, the relocated Ohio Electric leaves the relocation of the Erie and Big Four, branching northwardly to Carlisle Junction. The work on this latter portion of the electric road, now just being started, has been put under the supervision of F. H. Sprague, who has had charge of the bridge work on the Big Four and Erie relocation. The Ohio Electric Railway will be represented on this work by F. O. Minnich, Assistant Engineer, under the general supervision of J. H. Sundmaker, Chief Engineer.

The work still remaining to be done in excavating the big cut at Huffman Hill is being carried out by the Walsh Construction Co.

Albert Larsen, Division Engineer.

March 18, 1919.

RIVER AND WEATHER CONDITIONS

The river and weather conditions during the month of February continued to be favorable for construction prog-

ress. The temperatures were above normal, the precipitation less than normal, and there were no rises of importance in any of the rivers of the valley. The average temperature at the Dayton U. S. Weather Bureau Station was 33.8 degrees F, or 3.1 degrees above normal.

The total precipitation during the month, at the District's stations, varied from about a half inch to about an inch; and the maximum 24-hour precipitation did not exceed a half inch at any station. The number of days on which the rainfall exceeded .01 of an inch varied from 3 to 12 at the various places. At the Dayton U. S. Weather Bureau Station the total precipitation was 1.11 inches or 1.97 inches less than normal; there were 5 clear days, 7 partly cloudy days, and 16 cloudy days; the average wind velocity was 12.0 miles per hour, the prevailing direction being from the northwest; and the maximum wind velocity for five minutes was 62 miles per hour from the southwest, on the 28th.

Ivan E. Houk, District Forecaster.

March 20, 1919.

The Conservancy Gravel Washing and Screening Plants

Material Elevated by Belt Conveyor; Then Passes by Gravity Through Screens, Bins, Measuring Boxes and Mixer to Concrete Cars.

A well-designed screening and washing plant for sand and gravel is the backbone of any concrete outfit intended to deliver first-class concrete in large quantities.

It is the exception, rather than the rule, to find in nature, gravels already containing the various sizes of fine and coarse aggregates graded in the proportions required for the manufacture of concrete. It is rare also to find sand or gravel that does not contain dirt and other undesirable foreign matter. These require removal by washing before the sand or gravel can be used in concrete.

The only place in the Conservancy District where gravel for concreting did not require treatment was at Hamilton. There the District was unusually fortunate in obtaining satisfactory "bank run gravel," as it is called, from the excavation, for the Buckeye Street sewer. The material was shoveled from the waste bank directly into the hopper of the mixer along with a proper proportion of cement. It should be said, however, that this gravel was very carefully watched, tests being made of it each day to be sure that the ratio of the materials and the cleanliness remained as they should be.

When the matter of gravel washing plants was under consideration, plans and propositions were obtained from three different manufacturers. All of these sent men to Dayton to inspect the conditions under which the plants would operate. From the Dull Company, its president, Raymond W. Dull, came in person and made an exhaustive study of the requirements. His form of plant was finally selected.

The vital points in a washing and screening plant are; first, its capacity; second, its ability to properly separate and screen out the several sizes desired; third, its ability to thoroughly wash the material and dispose of all dirt and foreign matter. It is a common fault in such plants that, when the bins get low, sand or dirt will be found in the gravel. The effect of this on the mortar is evident. Suppose a 1-3-5 concrete is being mixed and that with the bins low, there is much sand in the gravel; the ratio may become, perhaps, 1-3½-4½ instead of 1-3-5, thus making the mortar too "lean" by the excess of sand. As to capacity, in the case of the Conservancy work,

the maximum required, taking the bin storage into account, was considered to be 300 cubic yards per day. The bins act as reservoirs, filling when the mixer is not running at full capacity and emptying

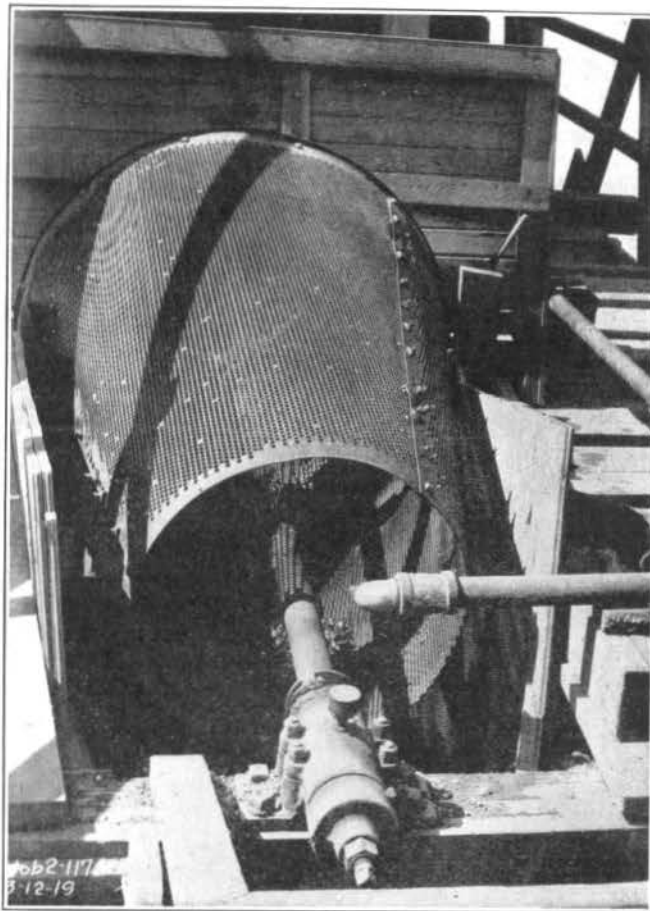


FIG. 121—A GRAVEL SCREEN

The screen is the last of a set of three screens which sort the sand and gravel. The screen was stopped in its rotation and the water turned off in order to take this picture. The pipe on the right side has a nozzle turned toward the center of the screen for spraying the materials. This serves the double purpose of washing and expediting the screening process.

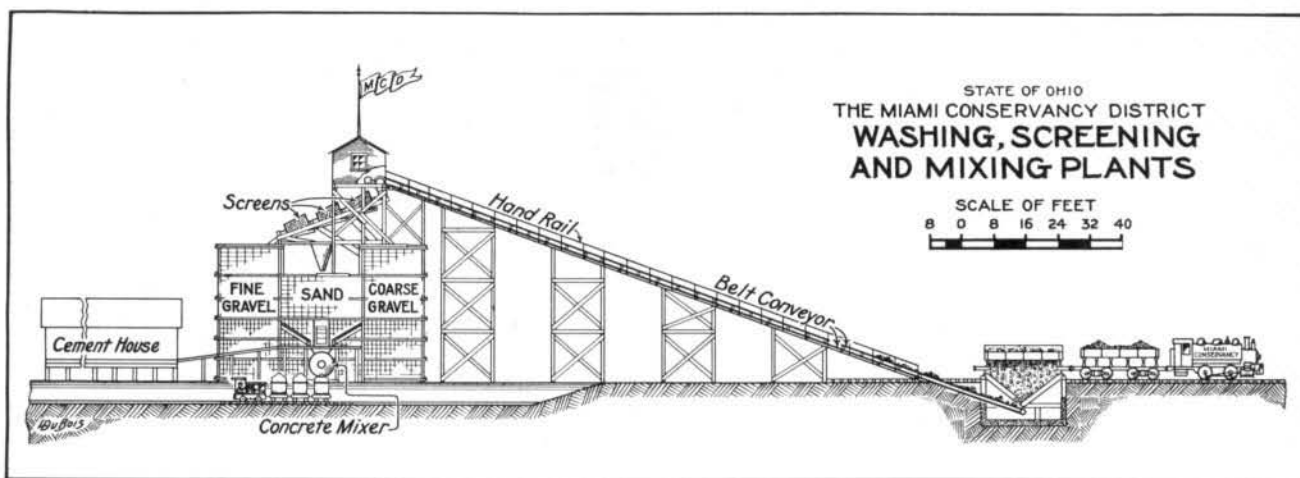


FIG. 122—GRAVEL SCREENING AND WASHING PLANT

This shows the entire gravel washing and screening plant, together with the cement house, and the concrete mixer. The construction train at the right brings gravel from the stock pile. The view shows the rear car in the act of dumping into the gravel hopper. The material travels from the bottom of the hopper on a belt conveyor up the incline as shown. (See also Fig. 115.) At the top of the incline, the gravel falls into a feeding hopper, and passes thence successively through the screens, marked in the drawing. These screens, three in number, are of $\frac{3}{8}$, $1\frac{1}{2}$ and 3-inch mesh, the coarsest being at the top. Stones greater than 3 inches in size are carried by a chute to a car on the other side of the washing plant. The $1\frac{1}{2}$ -inch to 3-inch gravel goes to the coarse gravel bin, so marked. The $\frac{3}{8}$ -inch to $1\frac{1}{2}$ -inch gravel goes to the fine gravel bin. Material less than $\frac{3}{8}$ inches in size goes to the sand bin. Strong jets of water wash dirt and other impurities from the gravel as it passes through the screens. (See Fig. 121.) The waste water and dirt are carried away down a discharge trough to one side. The concrete mixer appears just below the sand bin. Chutes carry the material from the fine and coarse gravel and sand bins to the mixer, measuring boxes being built into the chutes, enabling correct proportions to be obtained. These measuring boxes permit adjustment for variable proportions. The cement is wheeled from the cement house up the slight incline to the mixer, as appears clearly in the picture. The mixer discharges into $1\frac{1}{4}$ -yard steel concrete dump cars, three of which may be seen standing on the track, the right-hand one just underneath the mixer. The 3-ton, 3-foot gage, gasoline dinkey which pushes these cars is seen just to the left of them. The total length of the cement house is 100 feet; of the gravel washer, including the gravel hopper, 215 feet. The total height of the structure, to the top of the little house above, is 64 feet. The length of the 20-inch conveyor belt is 360 feet.

slowly when it is. The capacity mentioned has proved in practice sufficient for the needs of any of the jobs.

It was decided to screen the coarse aggregate into two different sizes, one ranging from $\frac{3}{8}$ to $1\frac{1}{2}$ inches and the other from $1\frac{1}{2}$ to 3 inches. The necessity for this arose from the fact that gravel from different portions of the gravel pit varies considerably in size, even from hour to hour. At one time, it will be fine, at another coarse. If no separation were made, the fine and coarse would occur in pockets in the coarse aggregate bin. The system installed permits of drawing the correct amounts from these two bins into the concrete mixer. In this manner greater uniformity in the mixing is assured. It is a point in favor of using the two sizes that really no extra screening area is required, but only a division of the same length of screen into two sizes, one fine and the other coarse. The same thing holds as to bin capacity; all that is required is to build a partition across the bin, separating the fine from the coarse.

Some of the gravel plants required certain special modifications. Those made at Lockington have been described in the February Bulletin. At Germantown, perhaps, the least modifications were necessary. The gravel from that damsite being fairly clean, the washer there requires less water. Also the grading of the gravel is nearest what it should be, making unnecessary the introduction of extra screens, such as were used at Lockington. It appears probable that at Huffman also the natural gravel will be fairly clean, and will require but little washing.

In all of the gravel washers, there has been difficulty with the sand hoppers, as described in the case of Lockington in the February Bulletin. At first, when the valve at the bottom opened to release the sand, some of the wash water flowed away with the sand. This would have been no disadvantage if the sand had been discharged into wagons or cars for transportation to the mixer, as the excess of water would then have mostly drained away through the bottom of the car or wagon body. But at the Conservancy dams, the concrete mixing plant is integral with the screening plant, and the presence of this water in the sand introduced uncertainty in the mixing of the concrete. Being variable in quantity, it made a proper mix as to amount of water difficult to secure. Means thus had to be taken to separate the excess water from the sand before permitting it to run into the sand bin. At Lockington, the sand screw is used, as described in the February Bulletin. At Englewood and Germantown, tipples are used to accomplish the same purpose, which they do effectively. The one at Germantown, being built after the performance of the first one installed at Englewood had been watched in operation, works somewhat better. At Huffman and Taylorsville, a still different scheme may be evolved. Details regarding all these modifications will be published at a later date.

The design of the plant forms a compact and effective combination. It includes a screening plant, a washing plant, a storage plant, and a mixing plant, all practically under one roof. The raw material, a mixture of sand, gravel and clay, is elevated on a conveyor belt from the receiving hopper at the bot-

tom of the structure. This belt carries it to the top, where it drops into a feeding hopper. From that point it descends step by step by gravity, passing through the various screens, in which process it is assisted by water sprayed from nozzles. All oversize stones are rejected, and the sand, once separated from the gravel, is thoroughly washed as described. The materials, now washed and sorted, continue their downward journey, each into its respective storage bin. From the bins it passes on down chutes into the measuring boxes, which are only way stations placed in the chutes, and thence into the mixer, where it is mixed with cement and water to form the concrete. The mixers in turn unload by gravity into cars which carry the concrete to the forms. At Englewood and Germantown it again discharges by gravity from the cars into final place in the conduit forms.

In the case of the cement alone, there is an exception to this gravity carriage of materials, the cement, contained in cloth bags, being wheeled from cars into the cement storage shed and from this shed to the mixer platform. Because of greater convenience in handling, and because also a bagful of cement is an accurate measure of quantity, it was felt that there was nothing to be gained by emptying the sacks in bins and conveying the cement in loose form to the mixer.



FIG. 124—DISCARDING THE UNFIT MATERIALS AT THE ENGLEWOOD SCREENING AND WASHING PLANT.

Oversize gravel, rejected by the screens, is being discharged from a chute into a 12-yard dump car to be hauled away. The large pipe overhead carries off the muddy water resulting from the washing of sand and gravel.

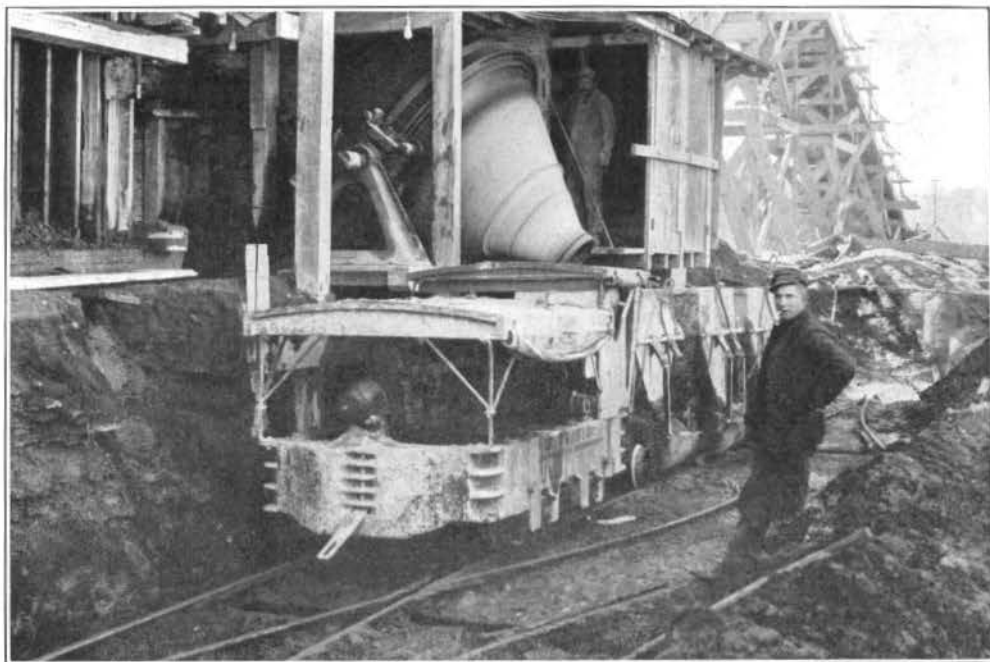


FIG. 123—THE LAST STEP IN THE MANUFACTURE OF CONCRETE

A one-yard Smith concrete mixer at the Englewood plant in the act of discharging its load into a 1 1/4-yard, radial gate, steel hopper car. There are three of these cars in the picture, the train being drawn by a 3-ton, 36-inch gage, Plymouth gasoline locomotive.

The Conservancy Technical Reports

All data of permanent value relating to the history, the engineering investigations, the design and the construction of the works, connected with the Miami Conservancy District, are being published by the District. The following volumes are now available and may be obtained by addressing The Miami Conservancy District, Dayton, Ohio.

Other volumes are in preparation.

LIST OF TECHNICAL REPORTS

Published by The Miami Conservancy District, Dayton, Ohio.

PART I—THE MIAMI VALLEY AND THE 1913 FLOOD.

By Arthur E. Morgan,

Chief Engineer of The Miami Conservancy District. 128 pages, 6" x 9", 44 illustrations, paper covers; price 50 cents net, postpaid.

This volume is introductory to the series of Technical Reports, but is not in itself, however, of a technical nature. It contains a vivid description of the flood of March, 1913, which caused great damage in the Miami River Valley, and as a result of which the flood control works now being built were undertaken.

PART II—HISTORY OF THE MIAMI FLOOD CONTROL PROJECT

By C. A. Bock,

Division Engineer of the Miami Conservancy District. 194 pages, 6" x 9", 41 illustrations, paper covers; price 50 cents net, postpaid.

This is a recital of all events of interest in the history of the flood prevention movement in the Miami Valley. Its chief value lies in the fact that it describes the steps necessary and the difficulties usually encountered in initiating and carrying out a great public engineering enterprise of this nature.

PART III—HYDRAULIC JUMP AND BACKWATER CURVES.

By Sherman M. Woodward, R. M. Riegel and J. C. Beebe. 111 pages, 6" x 9", 88 illustrations, 12 tables, paper covers; price 50 cents net, postpaid.

The first part of the book, entitled "Theory of the Hydraulic Jump and Back Water Curves," sets forth the theory of these complex phenomena, and is written by S. M. Woodward, Professor of Hydraulics and Mechanics at

Iowa University, and Consulting Engineer for The Miami Conservancy District.

The second half of the book, entitled "The Hydraulic Jump as a Means of Dissipating Energy," is devoted to a description of the experiments conducted by J. C. Beebe and R. M. Riegel of the Engineering staff of the District, to determine the properties of the hydraulic jump and its utilization in stilling the water which will issue at high velocities from the outlet conduits in the dams now being built by the Conservancy District.

PART IV—CALCULATION OF FLOW IN OPEN CHANNELS

By Ivan E. Houk,

Hydrographer of The Miami Conservancy District.
283 pages, 6" x 9", 79 illustrations, 48 tables, paper covers; price 75 cents net, postpaid.

This is a report describing how the maximum flow of the Miami River and its tributaries during the disastrous flood of March, 1913, was determined by subsequent measurements of the river channels and flood elevations. A large part of the volume is devoted to a discussion of different formulas, many of them of foreign origin, used in computing stream flow.

PART V—STORM RAINFALL OF THE EASTERN UNITED STATES.

By the Engineering Staff of The Miami Conservancy District.

310 pages, 6" x 9", 114 illustrations, 11 tables and appendix, paper covers; price 75 cents net, postpaid.

This book sets forth the results and investigations made to reach safe conclusions as to the probable size and frequency of severe floods in the Miami River. Its most noteworthy feature is a study of the relations between the areas covered by different depths of rainfall and the duration of such rainfall for each of the 33 largest storms on record in the eastern half of the United States.

PART VI—CONTRACT FORMS AND SPECIFICATIONS.

By the Engineering Staff of The Miami Conservancy District.

192 pages, 6" x 9", 3 diagrams, paper covers; price 50 cents net, postpaid.

This volume has been issued to meet the continued demand for copies of the standard specifications and contract forms in use by The Miami Conservancy District, in the construction of the large earth dams and the protection works along the river channels.

ATLAS OF SELECTED CONTRACT AND INFORMATION DRAWINGS TO ACCOMPANY PART VI.
10 pages of text, 15" x 11", 139 plates, paper covers; price \$1.50 net, postpaid.

The Atlas contains 139 representative selections of plans made preparatory to the letting of contracts.

F. H. Sprague Starts New Job

The building of the new grade and of the concrete structures for the Ohio Electric railway between Fairfield and Carlisle has been placed under the superintendence of F. H. Sprague. The relocation of this line is part of the program of railroad changes made necessary by the Huffman basin. Mr. Sprague lately completed the concrete structures for the Big Four relocation. O. E. Minnick, Assistant Engineer, will supervise the work under the general direction of Albert Larsen, who is Division Engineer for the District, and is in charge of all railroad relocation.

Major K. C. Grant Joins Dayton Engineering Firm

Major Kenneth C. Grant, Construction Division U. S. Army, recently returned to Dayton, where he has become connected with the firm of Frank Hill Smith, Inc., Engineers, as a member of that firm. Mr. Grant was one of the first Conservancy men to enter the government service. This was in April, 1917. He had charge of construction work, first for the Signal Corps and later for the Construction Di-

vision. He was located successively at Washington, D. C., Langley Field, Va., and Camp Grant, Ill. He became Major in October, 1918.

Dust Eliminator for Cleaning Empty Cement Sacks

The cut shows a simple yet efficient device now being used at the Englewood dam to eliminate dust while cleaning empty cement bags. It consists of a box 6 feet long, 3½ feet wide, and 3 feet deep, with a wooden air shaft running from the top of the box up through the roof of the cement shed. Three inches from the top of the box, the two long sides flare out, as shown, at an angle of about 45 degrees. The box has a lid narrower than the width of the box so as to leave an open space about 2 inches wide between the long edges of the lid and the sides of the box, as shown. The empty cement sack is dropped mouth down through this 2-inch slot and shaken into the box. The effect of the ventilator is to prevent dust rising through the slot into the cement shed.

The device practically eliminates the dust, due to shaking empty cement sacks, so disagreeable to laobrrers. It reclaims fully twice as much cement as when the bags are shaken out as usual on the floor of the cement shed, or in an open box. Also twice as many bags can be cleaned in a given time as by the usual method. Eleven full bags of cement were saved from 1500 bags cleaned.

This device originated with John Owens, foreman of the Englewood gravel washing and concrete mixing plant.

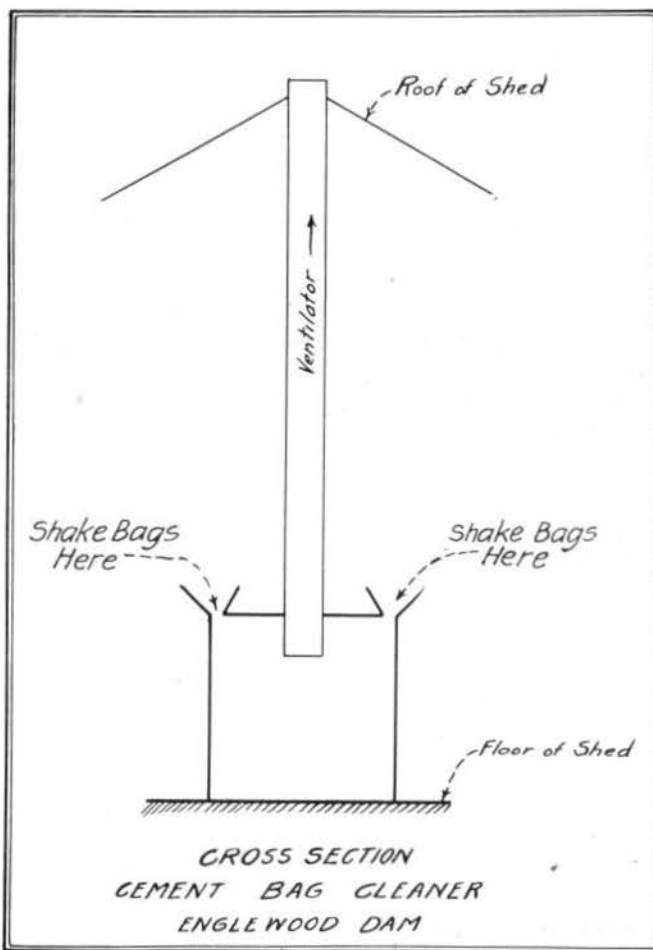


FIG. 125

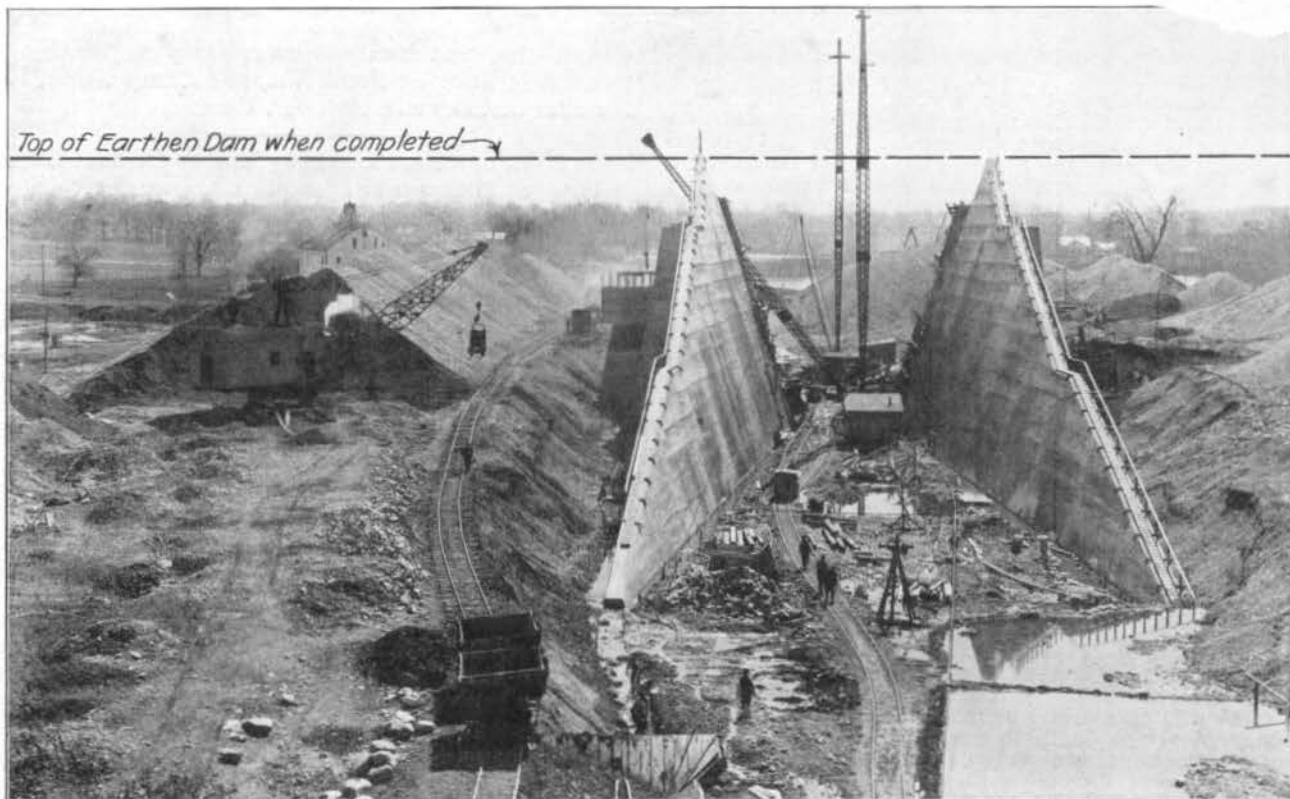


FIG. 126—ENTRANCE TO LOCKINGTON CONDUIT AND SPILLWAY STRUCTURE, MARCH 20, 1919.

The walls have now reached their full height, and the upstream half of the structure is almost finished. The horizontal line drawn tangent to the tops of the walls marks what will be the crest of the earth structure when the dam is completed. A heavy concrete cross wall will block the space between the two walls, at the center line of the dam. It will be pierced at the bottom by the two conduits and carry the spillway at the top. Full height of structure is 82 feet.



FIG. 127—CATERPILLAR DRAGLINE MOUNTED ON SCOW FOR MIAMI RIVER WORK, FEB. 27, 1919.

The machine has just been run from the bank upon the scow, over the timbers seen, under its own power. It is now at work on the Sunset Avenue dam further down the river. It has a 60-foot boom and a 1-yard bucket.

THE MIAMI CONSERVANCY BULLETIN SUPPLEMENT

"The News Letter"

To Promote the Conservancy Spirit on the Work

April, 1919

HUFFMAN

Huffman Community Association

Since Wednesday evening, January 21, 1919, when the Huffman Community Association was established under the commission form of government, regular meetings have been held on the first Wednesday of each month. We have fifty-three members in our Association. Although our horn has not been heard loudly tooting, we have been doing things constantly.

The first five commissioners elected were Mr. Gena, Chairman and Secretary-Treasurer; Miss Rahm, Assistant Secretary-Treasurer; Mr. McMillen, Commissioner of Public Safety; Mr. Guthrie, Commissioner of Parks; Mrs. Saylor, Commissioner of Education, and Mrs. Clawson, Commissioner of Social Activities.

At a meeting of the Commissioners held in January the following permanent committees were chosen: Committee on Parks; Mrs. Guthrie, chairman; Mr. Shuler; Mr. Madigan; and Dr. Saylor.

Committee on Social Activities: Mrs. Clawson, chairman; Mrs. Guthrie; Mrs. Dubois; Mr. Hodge.

Committee on Education: Mrs. Saylor, chairman; Mr. Chambers; Mr. Clawson; Miss Goss; Mr. Mark.

Committee on Public Safety: Mr. McMillen, chairman; Mr. Hawk; Mr. Maynard; Mr. Schirtzinger.

A few changes have been made in these committees since the last meeting. Mr. Shuler now fills Mr. Guthrie's office as Commissioner of Parks; Mrs. Burns replaces Mrs. Guthrie on the Social Committee, and Mr. Rogers, our Field Clerk, has been appointed on the same committee, while Mr. Shuler's former position is occupied by Mr. Dubois.

Departure of Mr. and Mrs. Guthrie

A great gloom settled over our Camp when, on Tuesday morning, March 4, the worldly goods of Mr. and Mrs. O. K. Guthrie were seen leaving in a Conservancy truck for Taylorsville. They were favorites with all, and their hearty and capable co-operation in all our social activities will be greatly missed.

The Huffman ladies were much surprised and greatly pleased when a notice was read at the Sunshine Club on Wednesday afternoon, February 26, to the effect that the men of our Camp invited all the ladies to a dance on Friday evening, February 28, given in compliment to Mr. and Mrs. O. K. Guthrie.

They certainly outdid themselves to make it a success. Music was furnished by the Jyrating Orjazztra of Dayton that made the entire company eager to renew their youth.

At intermission, the men served a bountiful lunch, consisting of sandwiches, pickles, cookies and coffee. The ladies wish to compliment their hosts on their ability as caterers. We feel they are fully capable of taking our places.

The time for "Home, Sweet Home," came all too quickly. "Didn't we have a good time?" was on everyone's lips as the party left the hall.

On Thursday evening, February 27, the Huffman Dancing School closed on account of Mrs. Guthrie, the pianist, leaving Camp. The congenial gatherings are missed by all those who attended.

On Sunday, March 2, Dr. and Mrs. J. M. Saylor entertained Mr. and Mrs. Guthrie and Mr. Hodge at a farewell dinner in compliment to Mr. and Mrs. Guthrie.

The next evening another dinner party was given in their honor at the home of our Division Engineer, Mr. C. C. Chambers.

Library and Reading Room Opens

On Sunday evening, February 23, 1919, the Committee on Education met at the formal opening of the Reading Room and Library. About twenty persons were present to view the room and offer suggestions and criticisms.

In addition to writing facilities, the Reading Room is equipped with about twenty different magazines and periodicals, and two daily and Sunday papers. A traveling library of fifty volumes has also been secured through the State Traveling Library Department. We hope the Reading Room will afford much pleasure to all our Campites who care for reading.

Children Celebrate

On Friday afternoon, February 22, the children of the Camp school gave a George Washington entertainment in the Community Hall. The following program was given:

Song—Washington's Birthday	School
Salute to the Flag	School
The Boy and the Flag	Paul Reese
How George Washington Looked	Arline Green
Song—George Washington	Geneva Saylor, Jeannette Swerking

Maxims of Washington	William Mark, Daniel Heinz, Wm. Bozarth, Willard Mark, Daniel Swerking, Edward Swerking.
Washington's Grave	Betty Mark
The Honest Boy	Roy Reese
Song—America	By all present
Something Better	Dorothy Reese
The Red, White and Blue	Mary Bozarth, Katherine Morgan, Therza McMillan.

Our Flag	School
Song—To the Flag of the Stars and Stripes	School
My Country	William Mark
Three Flags	Jerome Wurz
The Star-Spangled Banner	By all present

We are glad to welcome Mr. Tully and Mr. Baker, with their families, into our circle of Campites.

Red Cross Sewing Club

On February 11, 1919, the ladies of Huffman Camp met at the Community Hall to organize a sewing club. The meeting was called to order by Mrs. Vern Clawson, Chairman of the Social Committee. The following officers were elected: Mrs. C. C. Chambers, President; Mrs. R. M. Mark, Vice-president, and Mrs. A. H. Burns, Secretary and Treasurer.

It was decided to meet every two weeks, on Wednesday afternoon, from 2:30 to 5 o'clock. The members are to entertain in alphabetical order. There were fifteen ladies present and four new members have been obtained since then.

Honor to Mrs. Clawson

A most enjoyable surprise party was given Mrs. Verne Clawson on Tuesday evening, March 11, in honor of her birthday. Mr. Clawson wisely waited until Monday evening before inviting the neighboring Campites.

The party met at the bungalow next door and about 7:30 proceeded to the Clawson piazza. When all were as-

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sembled, they threw the door open and poured into the bungalow, singing:

"Hail, Hail, the Gang's all here,
With a basket of violets
And hearts full of cheer."

Mrs. Chambers then presented Mrs. Clawson with a glass basket filled with violets. Three tables of "Five Hundred" furnished amusement during the evening and delicious refreshments, consisting of ice cream, cake, candies and nuts, were served.

Those present were: Mr. and Mrs. Shuler, Mr. and Mrs. Chambers, Mr. and Mrs. Dubois, Mr. and Mrs. Hodge, Dr. and Mrs. Sayler, Miss Lillie D. Rahm, Mr. and Mrs. Clawson, Mrs. Steadman, and Miss Mildred Goss.

GERMANTOWN

On March 11, Mr. Hauck was with us and entertained us at a moving picture show in the school house.

The Red Cross organization met at the home of Mrs. Clarence Shively. Fifteen children's garments were completed during the afternoon.

Friday evening, March 15, a musical entertainment was given in the school house by four young ladies of Middletown. Following the entertainment arrangements had been made for dancing, and delicious refreshments were served during the evening.

On March 13, a great many of our Camp residents had the opportunity of hearing Col. Robert E. Hubler of Dayton lecture in Germantown on his experiences in the world's war.

The church services have been well attended during the past month. Sunday afternoon, February 23, Rev. Underwood of the United Brethren Church in Germantown, delivered the sermon; March 2, Rev. Ewing of Farmerville; March 9, Mr. Underwood, and March 16, Rev. Shinn of the Reformed Church conducted the evening service.

A choir, under the leadership of Mrs. Amos Fortier, has been organized and their music adds greatly to the services.

Thursday afternoon, February 20, Mrs. Walter Somers entertained at a Poverty Party. An old-fashioned taffy pull furnished the afternoon's entertainment, and a most delightful time was enjoyed by the ladies.

On March 1 a dancing party was given in the school house.

Monday evening, March 3, Mr. Walter Somers, the carpenter foreman, was delightfully surprised by his workmen and several friends, the occasion being his birthday. On behalf of the workmen, and as a token of their friendship and esteem, Mr. Kelly presented Mr. Somers with a handsome Morris chair and a shaving set.

Mrs. Clarence Heckman, Mrs. Arthur L. Pauls, and Miss May Turner spent the week-end in Cincinnati.

Mrs. Roy Schaeffer was lately called to her home in Van Wert, owing to the serious illness of her brother.

Mrs. Chris Foehr spent several days recently visiting in Winton Place.

Mrs. August Phillpot has returned from a short visit with relatives in Ada, Ohio.

TAYLORSVILLE

The Community Association

We are glad to note the amount of publicity our Community Association is receiving through various publications. We read with interest the article in the March Bulletin, "Englewood versus Taylorsville on Camp Organization," and about the only comment we wish to offer is to say, "By their fruits ye shall know them."

Residents of the Community are very much interested in the Association and many new names have been added to our roster in the past month. It appears that every one is falling in line with the Association's way of doing things, and the prospects are very bright for good results in all of our activities during the coming spring and summer. Just now, much interest is being evinced in the social affairs, church and Sunday school, and good attendance is recorded at each event. Sunday school is held every Sunday morning at 10 o'clock, and church every other Sunday afternoon at 3 o'clock. During the past month we have held three dances and two picture shows, but these are only starters, as we expect to have two picture shows weekly and not less than two dances a month, with home talent plays, minstrel shows, lectures and card

parties as often as possible. Our Sunday school is working on a play and we hope to put it on soon. We are also organizing a ball team and hope to have our hat in the ring to all the other Conservancy projects when the season opens.

The Association has purchased a player piano, which has been placed in our new hall. We expect to derive a great deal of pleasure from it, as we have more than one hundred rolls of music now and expect to add many more.

Taylorsville Now on the Map

Taylorsville is soon to have a railroad station, and will be a regular stop for some of the B. & O. trains. Men are working on the depot now and as soon as it is completed we will have a regular express, passenger, and freight office, which will add much to the convenience of the community. We also expect to have a postoffice here in the near future.

Wedding Bells and Orange Blossoms

We wish to extend our best wishes and congratulations to the newlyweds, Mr. and Mrs. Omer Hinton, who were recently married at Celina, Ohio. They eluded their many friends and came to Taylorsville, slipping in after dark, thinking they would be safe in their retreat, but the wide-awake and ever watchful eye of Taylorsville was on the job, and at the proper time a crowd gathered and with the aid of bells, horns, and other music making implements they were given a rousing welcome. After the treats were passed around, congratulations were extended, and the fun-makers dispersed to their homes. The bride was formerly Miss Lydia Fox of Celina, Ohio.

Christening

Sunday school and church were held in our new hall for the first time on March 9. It is much larger and more convenient for gatherings than the school house, and we believe it will add much to our Sunday school and church services. Many new members have been added to our Sunday school during the past month.

The Only Education

Our school teacher, Miss Geron, has formed a class in cooking for all girls above the fourth grade. Classes are held on Mondays and Thursdays after school, and we would judge that they are making good progress from the dainty dishes some of the girls are bringing home as samples. Much interest is being shown by the girls in their work.

Sunday, March 2, Mr. Upson, Mr. Levers and Mr. Clevenger of the Dayton Y. M. C. A. conducted our church service. Mr. Levers gave a very interesting talk on "Obedience." Mr. Upson and Mr. Clevenger sang several beautiful solos. Mr. Upson also led the congregational singing. The service was enjoyed by all present and we shall be glad to have them with us again at any time it is convenient for them to come.

The ladies sewed for the Red Cross at Mrs. Freund's on Thursday afternoon, March 13.

Rev. Zimmerman of Vandalia U. B. church gave us one of his fine sermons on March 16. The choir gave two special numbers.

Mrs. Cole's Sunday school class held a birthday party for Dorothea Benedict at her home on March 8. Games and a taffy pull were enjoyed by all.

Mr. and Mrs. Owen Hinton entertained the Young People's Class one evening. Games were played, luncheon served, and everybody had a good time.

Mr. and Mrs. Chase entertained some of their friends with a card party on Thursday, March 6, and a luncheon was served after the games.

Tuesday evening, March 11, Mr. and Mrs. Come entertained a number of their friends with a party for Mr. Come's father, of Ann Arbor, Mich., who has been visiting them for the past week. Cards were played and luncheon served at a late hour, after which all departed having had a very pleasant evening.

Miss Marie Chambers of Dayton visited here for a week with her aunt, Mrs. Holahan.

HAMILTON

Hamilton has an enthusiastic bowling team which meets every Tuesday evening for a three-game session on the Y. M. C. A. alleys. The high score to date is 205, rolled

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EDITORIAL

Board of Editors

Germantown	Miss May Turner, C. O. Shively
Englewood	Mrs. C. W. Porter-Shirley, D. W. Henry
Lockington	C. H. Shea
Taylorville	Miss Coral Benedict, H. B. Rogers
Huffman	Miss Mildred Goss
Hamilton	R. B. McWhorter

We have met critics who accuse the "News Letter" editors of running a "country-town newspaper," because it contains so many personal and local doings. We can only retort that that is just what we started out to do. The Bulletin gives the matters of public interest; the News Letter reflects the other side. We have been proud of the Conservancy camps, because they are not really camps, we say, but neat, well-ordered villages. It is true, and the News Letter is the village newspaper. Our sole aim is to make it a good one—a live one. Life is made up of something more than squibs, and hits, and jokes. It is more than a funny column. It is made up of births, weddings, deaths, neighborly meetings, and a tangled web of daily human happenings among friends and acquaintances. The business of the News Letter is to reflect something of all this. All critics can ask of us is to do it in a live way. We expect to do it in a live way.

by Mr. Eiffert. Other high scores are, Schrader, 194; Davis, 190; Griffin, 189.

H. B. Linden, formerly employed on the Hamilton work as electric dragline runner, has returned and will begin work immediately. About three months ago he had a very severe illness of influenza and pneumonia, from which he has now recovered sufficiently to go back to work.

ENGLEWOOD

The Movies

Two motion picture shows were held in the Mess Hall during the month, through the kindness of Mr. Hauck, Camp Inspector, and were enjoyed by large crowds. In addition a show was given at the Camp School for the benefit of the children. Motion pictures are to be shown regularly once a week or more after the Community House is completed.

Henry and His Hen in a Cyclone

The heavy windstorm during the month occasioned considerable excitement in camp, as well as causing some damage. The roof of Mr. Hills' house was blown off and deposited in his backyard. Don Henry, popular Field Engineer, had purchased a chicken for his Sunday dinner and had penned it in a coop in his backyard. When Henry came home from work, his Sunday dinner had vanished. Prompt and diligent scouting revealed it making tracks down the road toward Dayton. Henry got busy and hauled out from storage in the attic all the artillery he possessed, consisting of a rifle and a double-barrelled shotgun. He was seen by his neighbors shortly afterwards, armed with the rifle, stalking his prey down the road, with his wife acting as shotgun bearer, in case he should miss with the rifle. However, Henry brought down his bird by a bullet in the leg. When interviewed, he stated that he did not propose to sit quietly by, in these days of expensive living, and see \$1.40 wander away into the wilderness without a protest.

Englewood Challenges the World

The Riverside Community Association takes this opportunity to challenge formally the other camps to a series of baseball games for the Conservancy baseball championship. It suggests that each camp appoint a representative to act on a baseball committee for the purpose of arranging a schedule of games for the season and to handle any business details in connection with such series. It further suggests that a pennant be put up for the winner of the series, emblematic of the championship of the Conservancy Baseball League.

The residents of camp are looking forward to the rearrangement of the old farm house to serve as a Community House, before the end of March. The building is

very well arranged for community purposes, with a large room for dancing, motion picture shows, and social entertainments, and ladies' and men's clubrooms. It is to be provided from the funds of the Association with a player piano, pool table, writing tables, checker and card tables, and other features which will mean much to the social life of the camp.

A Boy Scouts' Troop has been formally organized in camp with Mr. L. J. Hills as Scoutmaster and an initial membership of eleven boys. The first patrol is to be known as the "Wolf Patrol."

Mr. J. Owens is enjoying a visit from his sister from Utica, New York.

A dance was held at the Mess Hall the evening of Saturday, March 1, music being provided by an orchestra from Dayton. Refreshments were served during the evening. A number from Taylorville and other camps were present.

Considerable progress is being made by the residents in beautifying the camp. Lawns are being put in and trees planted. All rubbish and litter around camp has been cleared up and the roads have been put into first-class condition. A plot of ground has been set aside for gardens for the children of the Camp school. Prizes are to be offered to the children raising the best gardens.

LOCKINGTON

Through the kindness of Mr. Hauck, Camp Inspector, the Camp has enjoyed several picture shows in an improvised theater in the Mess Hall. The movies will be shown out-of-doors during the summer months.

The Camp was deeply grieved by the death on March 2 of June Haldane, two-year-old daughter of Mr. and Mrs. D. S. Haldane, at the Presbyterian Hospital in Chicago. Mr. and Mrs. Haldane have the sympathy of the entire community.

On Saturday, February 15, Miss Anna Filler and Mr. George M. Baker were married at the home of the bride in Piqua. Mr. Baker is our popular engine runner.

A brass band is being organized by the Conservancy men who live in Lockington, with Mr. R. S. Hutchings as bandmaster.

The bowlers regret that there are no alleys here on which they can practice before accepting the challenge issued to them in the March Bulletin, but notwithstanding this handicap, an effort is being made to organize a team to meet the Dayton bowlers. It is rumored that one of the Lockington men recently slipped off to Dayton and defeated some of the Dayton sharks.

Mr. Warburton, our Superintendent, moved his family from Taylorville to Lockington on March 17.

The addition of shrubbery around the cottages has greatly improved the appearance of the Camp. Credit for this is due to Billy Ginn and W. O. Hayn, who scoured the country for suitable shrubs. Billy Ginn hung up a record last season when he obtained twenty squashes from three seeds. He is ready to compete with any gardener in the District.

DAYTON

Bouquet Shower to Taylorville

The editor regrets more than ever his inability to attend the memorable doings at Taylorville on March 22. By all accounts, it was the greatest affair of the kind yet staged in the Conservancy District. Everybody who was there, when the subject is mentioned, begins at once to throw large bouquets in great numbers in the direction of Taylorville. These bouquets are directed toward all features connected with the affair, the largest number being perhaps aimed at Big Chief and Big Chief McCarthy. His five-course banquet is pronounced by all a masterpiece, and his speech in response to repeated calls (which was NOT a five-course speech), is hailed as likewise a masterpiece in its kind. The one feature on the program which could divide attention with Mr. McCarthy's accomplishment was the after-dinner speech of Mr. C. H. Paul. His standing as a humorist was high before this gathering, but after his talk at Taylorville he stands out supreme and unchallenged as the humorist of the Miami Conservancy District. No such occasion in the future will be complete without him.

The editor has tried unavailingly to get some one who was there to write the affair up for the New Letter, but everybody has side-stepped. Words, they declare, are not equal to it, and the editor is forced to draw on his imagin-

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ation. Seriously, we do not believe that headquarters or any of the Conservancy projects can hope, taking everything into consideration, to come up to the mark which Taylorsville has set. There are stars on all the projects, but Taylorsville is a constellation. That is not a bouquet; it is a fact. Where, to hit at the very stomach of the question, shall any of the rest of us go for a chef like Mac?

We are glad to have C. W. Howe with us again. He recently obtained his discharge from the army, and went to work in the Dayton office on March 17. Mr. Howe took the regular training camp course for engineer officers at Camp Humphreys, Virginia, and was commissioned a lieutenant in the Reserve Corps.

Among the familiar faces that have returned to the force since the ending of the war is that of C. H. Schwartz, who became a first lieutenant with the 212th U. S. Engineers. His rotund appearance bears witness to the good treatment which he received at the hands of Uncle Sam. Mr. Schwartz has been with the District for many years. He was one of the first men on the job.

Dayton Matches the Great Germantown Fish Story

The progress of engineering science continually evolves new ways of doing old things. Some time ago dragline No. 789 was at work opposite the gas house in Dayton. Scooping up a bucketful of earth from the bank, the dragline runner was proceeding to swing his load when two live rabbits jumped out of the bucket to the ground below. One escaped by swimming a canal to the south bank. The other plunged into the river and when last seen was still swimming. So much for rabbit hunting. The application of the dragline to fishing occurred at Germantown, where in clearing out the bed of Twin Creek, the dragline bucket lifted out a hollow tree stump. This had no sooner risen into the air than live fish began to leap from it. They did not all escape, for when the bucket was lowered on the land later, a dozen or fifteen of a length of seven or eight inches, were still inside the stump. One would hardly expect to see an eight-ton dragline bucket applied to hunting and fishing, but it appears the thing can be done.

The Pathe Film Company, under the guidance of L. F. Wilcock, was occupied on March 21 and 22 in taking moving pictures of various features of the Conservancy work. These will be issued in connection with the Pathe news service.

A letter to Walter M. Smith from Charles Altfillisch, dated March 18, tells of his arrival at Newport News, and of his being en route to Camp Dodge, Iowa, for mustering out. "It is wonderful to get back to the U. S. After the war I had no desire to remain in France or the Army. . . I met Mr. Morgan's nephew while in France. For a time he was in the same company. Haas left us at Langres, France, last July, and I have not seen him since."

James W. Cullen writes Dubois on a picture post card from France: "I am up for air again, and will answer your letter real soon. No kidding. Remember me to the crowd."

Lieutenant Byron Bird, formerly Assistant Engineer with The Miami Conservancy District, paid us a visit recently, having returned from the Army, with which he has been connected since June, 1917. He was engaged in construction work at aviation camps. In the year and a half of service, he was stationed at a number of localities, among which were: Rantoul, Illinois; Harrisburg, Pennsylvania; Washington, D. C.; Houston, Texas; Lonoke, Arkansas; and Vancouver Barracks, Washington. He told of some interesting experiences, and seemed to be none the worse off for his extensive peregrinations.

Warehouse Wins Bowling Pennant

On Friday evening, March 21, a most enjoyable season of bowling closed at the Royal Alleys. An enthusiastic bunch of fans were present to see the Purfics and Warehouse teams stack up for the high honor. The interest was particularly keen owing to the fact that these two teams stood high on the list and that, providing the Purfics took three games, it would be necessary to roll another game to decide the tie. This, however, was unnecessary,

for Captain Everhardt's men rolled good tenpins, taking the first game by two pins and the last by considerably more, the Purfics being able to bag only the second game. All three games were close and the ribbons that bedecked the arms of the Warehouse men were well earned as well as the huge pennant that will go to them as Champions of the Miami Conservancy League.

All of the teams rolled good games during the season with totals close and well up in the seven hundreds. In fact, the season appeared to all as much too short, the ten weeks having been filled with enthusiastic sport for the participants. The Warehouse carries not only the honor of winner of the most games (27 out of 30 played), but also holds the high three-game total (2355), the high game total being held by the Purfics (850), as well as the high individual total held by Stockman, 211.

The teams finished up as follows:

	G.	W.	L.	Pct.	T.P.	Ave.	H.S.
Warehouse	30	27	3	899	21449	714.29	830
Purfics	30	24	7	799	21354	711.24	850
Railroads	30	13	17	433	18797	626.17	731
River Imps	30	11	19	366	19160	638.20	698
Slide Rules	30	11	19	366	18737	624.17	721
Drag Lines	30	5	25	166	17636	587.26	727

A generous percentage of refund from the Royal Alleys provided quite an interesting prize list, the amount being divided according to the standing of the teams at the finish of the season. Manager Stockman has the appreciation of the entire league for his efficient management. Now for the outdoor sports.

The News Letter prints regretfully the sad news that Messrs. Stockman and Everhardt, the mighty ones of the Headquarters Alley Aggregation, met Messrs. Shea and Smith of Lockington recently, and, as champions, were gently laid away to rest in the cold ground. Stockman, when we saw him, had conveniently forgotten the score, but his smile was still on. They can't beat our Grand Old Man as a sport.

SPRING FEVER

The time is drawing near—or close, when we again shall get our dose of that most dreaded of all ills that gives not in to balms and pills—spring fever—as for countless years it has been known by boobs and seers. I hate to see spring fever land, for it takes all my grit and sand. When Big Ben shoots at break of day, I scarce can tear loose from the hay; my frame is filled with pains and aches, I do not want my buckwheat cakes. I weep and wail and kick and cave, and nick my features when I shave. I do not want to go to work; I would much rather moon and shirk. I crave to get my line and hook and warm a boulder by the brook; and watch the kildees play croquet, and muse and dream the day away. Or languish on the velvet green and marvel at the brilliant sheen upon the bullfrog's silken wing, and listen to the turnip sing. Yet tho I shrink from old spring feve', I am the last galoot to grieve and growl and get up on my ear, because warm weather's drawing near.—Eldee in Dayton News.

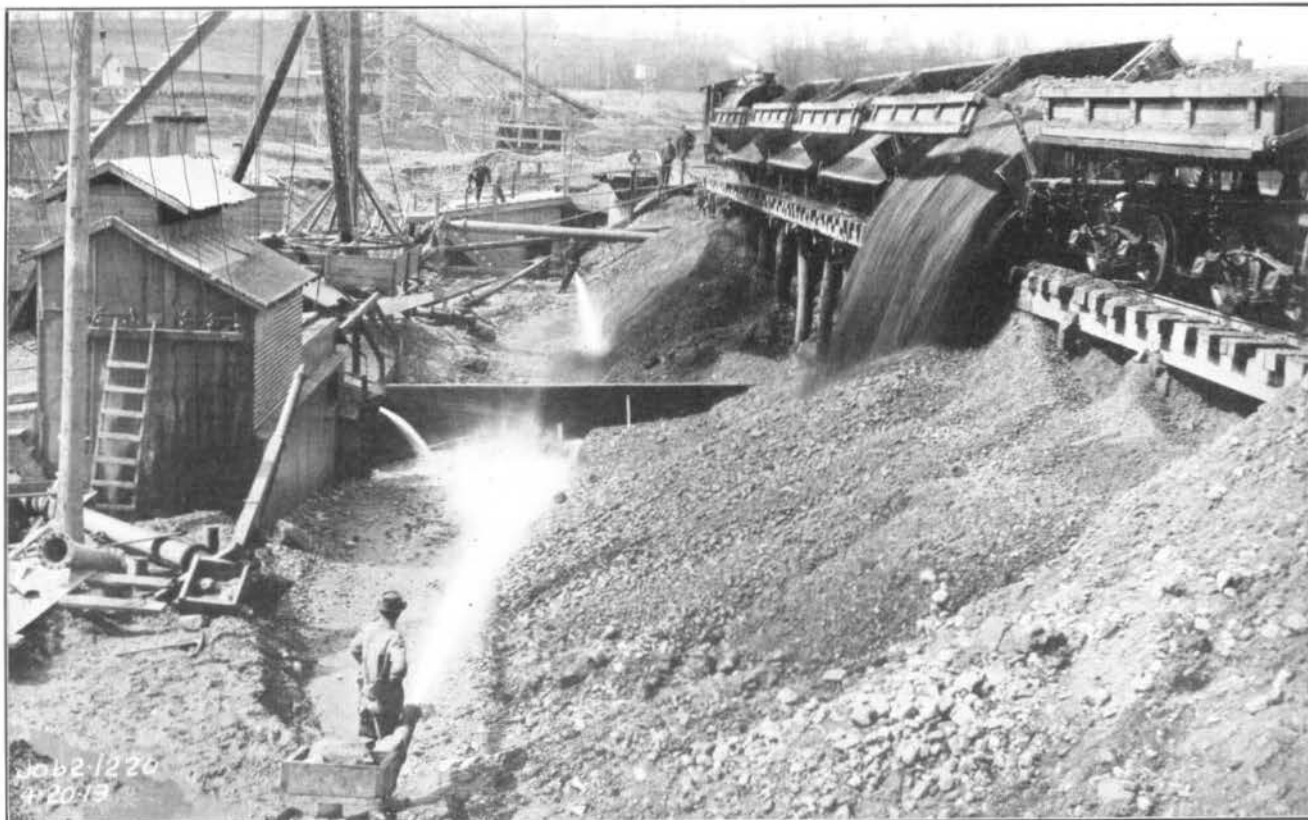
W. B. O'Brian, of the Administrative Division, received word recently from Sergeant H. E. Bonner of the A. E. F. Headquarters at Tours, France, telling of the pleasure which he received, along with other Dayton boys, in looking over copies of the Miami Conservancy Bulletin, which somehow came overseas to his hand. He said some of the pictures brought old Dayton days back with great vividness.

We print below another brief extract from the very interesting letter of E. H. Paul to his brother, our Assistant Chief Engineer, printed in part in the last issue:

"The thing that scared me most was not perpetrated by the enemy at all, but by an American outfit. I was riding in a motorcycle sidecar over a partly constructed road well toward the front in search of Les, when a '155,' planted close to the road, blazed away right over my head. Upon my word, the concussion stopped our motor and my hair did not lie flat again for ten minutes. That calibre of gun has the most wicked 'bark' of any that I have heard. It seems to tear your vitals loose and shake them like dried peas in a pod, and the scream of the projectile as it flies on its errand would make Wagner's wildest dream seem like a pastorate."

THE MIAMI CONSERVANCY BULLETIN

MAY 1919



HOG BOX FOR HYDRAULIC FILL AT ENGLEWOOD. APRIL 20, 1919.



FIG. 129—LOOKING DOWN THE MIAMI RIVER, MAY 21, 1918, BEFORE WORK WAS BEGUN. SEE PAGE 151.



FIG. 130—THE SAME AS FIG. 129, JANUARY 29, 1919.

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THE MIAMI CONSERVANCY BULLETIN

PUBLISHED BY THE MIAMI CONSERVANCY DISTRICT

DAYTON, OHIO

Volume 1

May 1919

Number 10

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Subscription to the Bulletin is 50 cents per year. At news stands 5 cents per copy. Business letters should be sent to L. F. Wilcock, Assistant Engineer, Miami Conservancy District, Dayton, Ohio. Matter for publication should be sent to G. L. Teeple, Miami Conservancy District, Dayton, Ohio.

The Victory Liberty Loan

The campaign for the Victory Liberty Loan is on. The total amount to be raised is four and one-half billions of dollars. The quota for Montgomery County is \$6,404,000. The quota for the Conservancy has been set for \$100,000. We went over the top before and we shall surely do it again. If you have not already subscribed, now is the time to get in line. Saturday, May 10, is the last day that you can buy a bond.

Financially the Victory Loan is far more attractive than the bonds for the Fourth Liberty Loan offered for sale last fall. They are in fact not bonds, but notes, to be paid off at the end of four years. If it wishes, the Government may pay them off after three years. During the interim they bear $4\frac{3}{4}\%$ interest. This is a decided increase over the $4\frac{1}{4}\%$ paid by the bonds of the Fourth Liberty Loan. This interest is payable semi-annually.

Another attractive feature of these notes is the easy terms of purchase. Fourth Liberty Loan bonds had to be paid for inside of a little over three months. Payments for the new notes are six in number, distributed over a period of six months. Those of us who found it hard to meet installments on bonds last fall, will find the burden this time is cut in two.

The Victory Loan sales for the District will be in charge of H. G. Sibley, one of the Conservancy men from the army, who has recently returned from France. Mr. Sibley was one of the first men to leave Dayton for the front. He served first in the Ambulance Corps and later joined the Engineers. In

all he was over seas for a period of nearly two years. He has come back hale and hearty and his first job on this side is going to be to jump in and help finish what he helped all but finish over seas. He will be assisted in his work by the following corps of men:

Englewood—H. S. R. McCurdy, Arthur H. Kent.
Taylorsville—H. M. Sherwood, J. E. Eberly, W. D. Rogers.

Huffman—C. C. Chambers, Verne Clawson, Dr. John M. Sayler, H. W. Minton, E. H. Baker, Ben H. Rogers.

Germantown—Alexander Mackinnon, Arthur L. Pauls.

Lockington—C. H. Shea, W. J. Smith, Jr., H. T. Meiners, L. J. McWilliams, J. G. Applegett.

Hamilton—R. B. McWhorter.

Dayton—Warehouse—John F. Braun.

Dayton—Shop—J. T. Hall.

Erie and Big Four R. R.—W. R. Yount.

Baltimore & Ohio R. R.—Wm. D. Kramer.

Ohio Electric R. R.—W. R. Yount.

The work at Hamilton and Lockington will be under the Victory Loan Organizations of the local counties.

The Bulletin wishes to Mr. Sibley and to all the salesmen at the various Conservancy Divisions the greatest success in their patriotic work. It urges every Conservancy worker to stand by and help the Victory Loan Drive over the top, and pledges its own assistance to that end.

Miami River Improvement Through Dayton

This work is now in full swing in its second stage. The first stage carried it from above the city to a little below the mouth of Mad River. In this stretch the material was transported as well as excavated by the large dragline machines employed, a large part of the material being moved twice. During the second stage the loading dragline is mounted upon a special scow, and the excavated material is transported to its place in spoil bank or levee by means of a steam tug and scows. The dragline was mounted on its scow for the first time on April 28, and immediately set at work excavating. The channel section of the small timber dam at the mouth of Wolf Creek, to provide water to float the loaded scows, was closed on April 23. An account of the river improvement through Dayton is published in this issue of the Bulletin.

Hydraulic Fill at Englewood

This work, which has now been in operation for some time, differs somewhat in method from that at Taylorsville. (See Bulletins for November, 1918, and March 1919). At Taylorsville the material in the "borrow pit" is excavated by undermining it with a powerful jet of water. It is transported from the borrow pit to the dam by pumping it (in a thin mixture of earth and water) through a steel pipe. At Englewood the material is excavated from the borrow pit by a dragline excavator, loaded upon dump cars, and transported to a "hog box" next the damsite by a locomotive. Dumped into the hog box (see illustration on outside front cover page), it is washed down the sloping sides and bottom of the box by powerful jets of water into a "sump," whence it is pumped to the hydraulic fill pool on top of the damsite as at Taylorsville. The Englewood arrangement is a modified form of what is known as "semi-hydraulic fill." For the Englewood situation, the borrow pit there being in the river bottom instead of on a hillslope as at Taylorsville, excavation by a hydraulic jet is impossible, since a large part of the material to be excavated lies below ground water level, where a water jet could not reach it. A full account of this work will appear later.

"The Man Who Goes Through the Motions"

The curse of routine is that it deadens the thinking faculties. Unfortunately, most work, especially in these days, is routine. A man starts to do a thing a certain way. He succeeds in doing it that way and he follows up his success. He repeats. Others imitate him. They repeat. The operation becomes standardized. It becomes routine—habit—and correspondingly hard to break. We do it with our eyes shut, although the circumstances have quite changed. The square hole has become a round hole, but we use the old square peg to fill it just the same. Thus the paths of Blackstone's cows through Blackstone's pasture become the streets of Boston—Lincoln Highways for cows, but for twentieth century Bostonians altogether too narrow, crooked, and dirty.

All this has application to us workers of the District. We all follow routine, and routine, followed long enough, will make a dead spot in any brain. It is safe to say that there is not a man on the job,

up to the Heads of the Works, who, if he looks, will not sometimes find himself simply going through the motions—turning a mill without wheat—following Blackstone's cows. We forget that the best way of doing a thing—anything—building dams or blacking boots—has never yet been discovered. It is up to us to find it. God gave us gray matter for just that purpose. It is up to us to use the gray matter.

Hand Fire Extinguishers Prove Worth

The value of the hand fire extinguishers, which are installed in the buildings at all the camps, was demonstrated at Huffman on Saturday, April 5, when one of the 24-man bunk-houses, northeast of the main road, took fire. The fire started from a kerosene stove in a corner room and when discovered, flames were bursting out of the door and windows of this room. Luckily, Messrs. Chambers and Clawson were only a short distance away. They gathered men together armed with seven or eight of the fire extinguishers from nearby buildings. The windows were broken by throwing missiles at them. Men then crept up to the windows and turned the hose of the extinguisher through the openings. The fire was put out in three or four minutes by this means, with a damage amounting to only about \$25.00.

The extinguishers are of 2½ gallon capacity and of the usual type, which operate by breaking a bottle of sulphuric acid into a solution of bicarbonate of soda. The mixture produces carbonic acid gas, which by its pressure forces out the solution, charged with gas, through the nozzle. This gas is a very effective extinguisher of fire, far more so than water, and by its action smothers the flames. It is practically certain that without the use of this apparatus, the entire bunk-house would have been burned to the ground.

New Technical Report Out

Technical Report, Part VI, entitled "Contract Forms and Specifications," has been received from the printer and is now available for distribution.

The object of issuing this volume is to put into permanently accessible form the legal documents and specifications for building the dams and channel improvements, together with the information that was furnished to bidders, including itemized statements of quantities of work required in the various projects of the District.

The report is accompanied by an atlas, 15 by 11 inches, containing 139 selected contract and information drawings, illustrating the more important features of the work.

The price of the report is 50 cents and that of the atlas \$1.50.

Employees and others who have business at the Taylorsville Dam will do well to note that the Baltimore & Ohio Railway has now made Taylorsville a regular stop for trains 55 and 56. Train 56 leaves Dayton at 9:40 a. m., and arrives at Taylorsville at 10:05 a. m. Train 55 leaves Taylorsville at 2:45 p. m., and arrives in Dayton at 3:15 p. m. It is expected that employees will use this train rather than an automobile when the nature of their errand permits them to do so.

Erosion and Deposit of Sediment as Related to River Improvement

Remarkable Effects Produced by Changes in Sediment-Carrying Capacity Due to Changing Velocity of Flow.

The methods commonly followed in the improvement of the channel of such a river as the Miami in general consist in deepening the bed, in protecting the banks, and in building levees to restrain the heavier floods. To understand the reasons for the various features of such an improvement it is necessary to understand the principles which underlie a river's behavior. This is especially true in the case of streams like the Miami and its tributaries, which are subject to sudden flood, and which occupy broad flat valleys in which they wind back and forth in a sinuous and apparently aimless course. The aimless is only apparent. In reality the location and shape of the river channel are determined by a few fundamental laws which it is necessary to understand.

One of these laws is that stated in one of its common forms in the March Bulletin in the article on the "Action of the Retarding Basins." Put mathematically, it is that in general the carrying power of the water in a river, as exerted upon materials like the sand, silt, and gravel which compose its bed, varies approximately as the sixth power of the velocity. This means that if the current of a river, flowing at a certain velocity, is just able to pick up and roll along its bottom a pebble of a certain weight, and if the velocity of the water be then doubled, it will be just able to pick up and roll along a stone of approximately sixty-four times the weight of the pebble.

This result is arrived at by mathematical analysis. Observation and experiment indicate that the actual carrying power of water does not vary in quite so high a ratio to an increase in velocity. They do indicate, however, that the ratio is very high; so high that a slight increase in velocity will greatly effect the power of a river to transport sediment. Experiments show that with a bottom velocity of 6 feet per second, which corresponds to a stage in the Miami River of about 16 feet, the water will roll along its bottom stones approximating two inches in diameter. If we accept the mathematical law as above stated, an increase of the bottom velocity by only four-tenths of a foot per second, which would correspond to a rise of the river of something over 2 feet, would cause the river to roll stones along its bottom weighing one and one-half times more than the two-inch stones it was able to roll before.

Where the bed and banks of a river are made up of loose material, as is very markedly the case in the Mississippi, and to a less degree in the rivers of the Miami Valley, this law gives rise to remarkable phenomena. With every rise in the river the increase in velocity greatly increases the carrying capacity of the water, with the result that the loose materials along the banks and bottom are picked up and carried downstream. When the river falls this material is again dropped. Since the river is continually rising and falling as the rains come and cease, the river is continually changing the conditions of its channel, picking up material in one place and depositing it in another. Mississippi river

pilots, as is well known, may find a sand bar tomorrow where last week they found 15 feet of water.

A river tends continually to become more crooked. This follows from the basic law first stated. The water flowing around a bend in the river tends by centrifugal force to run into the hollow of the outside bank, and since the swifter it flows the more centrifugal force it has, the swiftest water concentrates against this outside bank, which will thus be dug away by the river more than any other portion of the channel. Swinging around this bend, the main current crosses the river into the hollow of the reverse loop, where a similar action takes place. Thus both pockets of the "S" become dug out more and more, the river channel swings further and further, first to right and then to left, running thus in an ever more crooked course.

It is aided in this by action of another kind on the inner side of the bend. The swifter water, running to the outside, leaves a mass of comparatively dead water on the inner side of the curve. Swifter eddies bearing sediment run into this mass of slower moving water and drop their load of material. This builds up on the inner side of the curve a broad bar. Thus the river builds up one bank, while it eats away the other.

In rivers like the Mississippi this tendency is carried to remarkable extremes. As the channel is thrown into deeper and deeper loops the land is left in narrow necks and peninsulas between them. Every now and then the river cuts off one of the necks and the peninsula becomes an island. Having cut across the neck, the river, of course, abandons the loop, which becomes a stretch of dead water. Eddies from the river running into the dead water at the ends of the loop slacken speed and drop sediment. These ends thus become eventually filled up, cutting the loop off entirely from the river, except at times of extreme high water. The loop thus becomes a new-moon-shaped lake. The valley of the lower Mississippi exhibits many of these lakes. The rivers of the Miami valley, in places exhibit the same phenomena.

The swift water running around the outside of a loop not only eats away the bank, but the adjacent bottom as well. But in cutting across the river to get from one bend into the hollow outside bank of the next, the water for a little distance must flow in an almost straight course. While so flowing there is little or no centrifugal force tending to throw it towards either one bank or the other. The course of its flow will be determined, in fact, by the nature of the materials in the river bed. When the river rises and the velocity of the water therefore increases, it will dig out the bend where these materials are softest. When the river falls again, it will deposit other material in this place. The next time the river rises it is likely to find the softer and less resisting material at some other part of the bed where finer particles have been deposited. In this manner, as time goes on, with successive rises in the river, the bed will be dug out first here and then there. Thus in the bends of the river the

erosive power of the water is always concentrated in one place; that is, at and next the outside bank, while in the straight portions of the channel between the bends, this erosive action will be directed first on one point of the bed and then on another. The result will inevitably be that in the bends the channel will be dug deeper than it is at the straight crossings. Observation shows that this is the case. The "thread" of the stream is always deepest next the outside bank of a bend and shallowest at the crossings.

Where the river widens out into a broad expanse it will form a bar or shallow, just as if it ran into a lake, as described in the article referred to on Retarding Basins. This bar may grow into an island.

It goes without saying that any improvement in the river channel should be carried out in such a way as to be as nearly permanent as possible. It is clear also from all that has been said that a river like the Miami has strong objections to being confined within any permanent channel whatever. It is always on the job digging here and depositing there. It behaves like some living thing, some burrowing animal which, whenever you shut it up, is perpetually seeking to dig out. In blocking these tendencies we must be guided by the laws which have been laid down in the foregoing paragraphs.

Thus, since the outsides of the bends are always weak places, and continually worn away, they must be protected. This protection can be obtained by lining these banks with stone or concrete. It is evident that the insides of curves do not need any such protection, because the tendency there is not to tear down, but to build up. In these places occasional dredging of deposited material may be necessary.

We have seen that at the crossings where it runs from one bend into the next, a river channel is shallower, while in the bends it is deeper. It is clear that in the improvement the channel in the crossings must be deepened. This will not only enable it to carry more water, but it will correct the tendency of the river channel to wander from side to side in the manner which has been described. Thus, once properly deepened, the channel will tend to maintain itself. The deep places in the pockets at the bends should be filled up so as to make the river channel throughout as uniform in shape and ability to carry the flow as is possible; because evidently under these conditions the tendency of the river to eat away and to deposit materials will be the minimum.

The same rule applies to wide expanses in the river. At these points a channel should be cut through of the standard shape and size, on a course which will lead from the originally narrower portion above to that below, by a route which is the most natural for flowing water to take between the two points. It is the following out of this rule which has led to questions, by people who have not understood the matter, as to why the new levee below Herman Avenue bridge in Dayton is built out from the old levee a considerable distance into the river bed. It is built out there so as to make the river bed at this point of the standard shape and size in order to secure the uniform conditions above referred to, thus to confine the water in its flow through the broad expanse extending from Herman Avenue bridge to below the mouth of Mad River, so that cross currents cannot lead to damage of the finished slopes and banks.



FIG. 131—STARTING UP RIVER WITH A LOAD. APRIL 21, 1919.

The steamer is of the standard Ohio River pattern and is pushing a loaded scow. The scow is 40 x 120 x 6 feet in depth. The load brings the deck within a foot of the water, being in this instance about 250 cubic yards of earth. The dragline excavator is just beginning to load a second scow, which can be distinguished behind the first. The material is unloaded by a second dragline similar to the one seen here, and dumped into one of the Mad River levees. (See Fig. 134.) The steamer can make about one round trip an hour under favorable circumstances. Work is carried on by both night and day shifts.

The reality of this danger will be clear to any reader familiar with the conditions in the Miami River bed in the locality referred to, as they existed before the flood of 1913. The irregular deposit of sediment, due to eddies in the current, had been carried to such an extent as to form islands of considerable extent, on which grew bushes, small willows, and even large trees. Some of these islands are shown in Fig. 129. The effect of such islands in damming up the river in times of flood, by the lodging of driftwood, etc., and in directing destructive

cross currents against adjacent levees, will be at once evident. With a channel brought to standard shape and size, which by concentration of flow will be more nearly self-maintaining, the growth of such dangerous obstructions will be impossible.

In this article the effects upon a river have been shown, due to changes, with varying velocity of the current, in its ability to erode its bed and to transport sediment. The laws governing variation in river velocity, and their direct effect upon the improvement, will be discussed in a later issue.

Improvement of the Miami River Through Dayton

Excavation by Draglines of More Than 2,000,000 Cubic Yards from River Bed.
Material is Moved by Scows and Steam Tug.

The flood of 1913 produced a maximum flow in the Miami River at Dayton of about 250,000 cubic feet per second, about $2\frac{1}{2}$ times the capacity of the old channel up to the top of the levees. To prevent such a flood in the future it was planned to build four dams on the river and its tributaries above the city, behind which the flood waters will back up, and to enlarge and improve the river channel through the city. The Stillwater flows into the Miami just at the northern limit of the city. Mad River and Wolf Creek also flow into the Miami within the city limits. This requires different channel capacities in different portions of the city to provide for the increments of flow thus received. These capacities are as follows:

Above Mad River 75,000 cubic feet per second.

Between Mad River and Wolf Creek 110,000 cubic feet per second.

Below the mouth of Wolf Creek 120,000 cubic feet per second.

To properly provide for the flow as regulated by the dams required that the river channel be deepened, that the irregularities in its course be replaced by smooth curves, and that the levees be made wider and higher. The work thus planned will extend for $8\frac{1}{2}$ miles along the river. The necessary excavation will amount to more than 2,000,000 cubic yards, about half of which will go into the improving of the levees, the remainder being used to fill in certain tracts of low ground behind the new levees. The present article will deal only with that portion of the work above the mouth of Wolf Creek. A map of this section is shown on page 152.

In accordance with the principles enunciated in the preceding article in this Bulletin, the shape of the improved channel is made as nearly uniform as is possible for each of the 3 sections of the channel indicated above. A typical cross section is shown in figure 132. It gives a total width from foot of levee to foot of levee of 600 feet, and a total height from the river bottom to the top of the levee of 28 feet. The bottom of the channel is level for a width of 75 feet on each side of the center line, then rises on very flat uniform slopes each way to the foot of the levee. With this section of channel a flood 40 per cent greater than that of 1913 will still fall 3 feet short of the tops of the levees.

The river channel before the flood of 1913 had been improved by various means, including levees, stone or concrete walls, and stone or concrete "revetments" to protect the inner slopes of the levees

in various places. Some of these old improvements had been so carried out that they could well be made part of the new plan, and this was done wherever it seemed best, in order to reduce expense.

In accordance with the principles of the river improvement discussed earlier, the channel bottom next the outside levee in the bends of the river will be protected by concrete "revetments." These revetments are really flexible concrete mattresses so constructed that if the river starts to undermine them at the foot of the slope, the mattresses will drop into the excavation to protect the threatened locality. This flexibility is obtained by making the revetment of concrete blocks 5 inches thick, 2 feet long, and a foot wide, these blocks being strung on steel wire cables so as to present a smooth, yet flexible, paving for the channel slope adjacent to the levee. The levee slope itself will not have the flexible revetment, but will be paved along its lower portion with continuous concrete pavement. The location of these revetments is clearly indicated on the map, figure 133, as are also the locations of the new and old levees, and the new and old walls.

The new walls just referred to are used in various places to carry up the old walls to a higher elevation, to top out the upper edge of the old revetment, or to top out and reinforce the new levee,

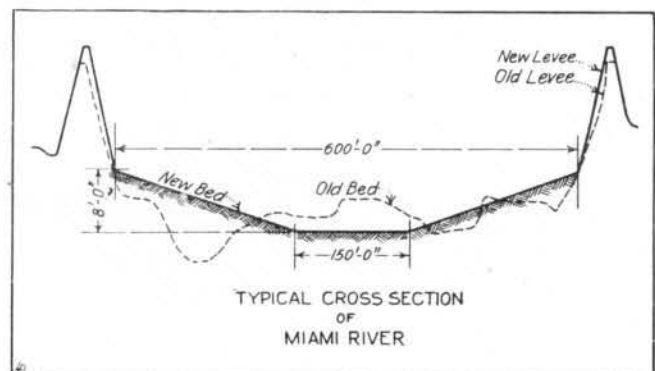


FIG. 132

The dimensions given all vary somewhat at different points in the river as demanded by circumstances. This is an actual section taken a short distance below Island Park. Below the mouth of Mad River and again below the mouth of Wolf Creek the width from foot of levee to foot of levee is successively increased. The 150-foot level strip of bed along the center is not varied, however, except in a few special instances. The standard depth from the bottom of the bed to the top of the levee is 28 feet.

that type of construction being adopted in each case, which, consonant with safety, will effect the improvement with the greatest economy.

The material constituting the improved channel bed and the river slopes of the levees is excellent, being mainly composed of gravel, which fortunately here occurs in the old bed of the river.

The machines used for the river excavation are two Class 175-B Bucyrus dragline excavators with $3\frac{1}{2}$ -cubic yard buckets, and booms of 125-foot and 135-foot lengths respectively. They are very powerful machines, weighing over 175 tons each and equipped with electrical machinery developing in all about 350 horse-power. They can excavate anywhere within a circle of about 300 feet in diameter, struck from the center on which the boom swings, and will excavate to depths as low as 50 feet below the level on which the machine stands. Their advantages for such work as river excavation were indicated in an article in the Bulletin of last October. They were selected after a careful comparison between all known methods of carrying on the proposed work, as being the best adapted and most economical and efficient for the purpose. Their chief advantages are their wide reach and their ability to dig far below the level of the machine, these characteristics especially fitting them for river work. In a river the size of the Miami, they can place a large part of the material to be excavated in its

final resting place in levee or bank by simply swinging the machine on its pivot and dumping the load. Where the distance from the point of excavation to the levee under construction is too great to be reached by simply swinging the machine, the difficulty can be overcome by handling the same material twice with the dragline. Thus below Herman Avenue Bridge, the dragline moved down the river parallel to and east of the center line, excavating the middle portion of the river channel and depositing the excavated material in a long windrow at the east limits of the boom's reach. The same machine later returned along a course parallel to and east of this windrow, picked the material up again and dropped it into its final resting place in the new east levee of the river. By such a process of double handling, these dragline machines can drop material over 500 feet from the point of original excavation; by triple handling between 600 and 800 feet. Such double handling saves the use of machinery for transporting the excavated material, such as scows, cars and engines, or teams and wagons, which would otherwise be necessary.

A considerable part of the material, however, cannot be thus disposed of near the point in the river from which it was excavated, due to the fact that through the main part of the city adjacent buildings, streets, or other improvements do not leave space for dumping the excavated material. This is true

for a large part of the distance from the mouth of Mad River to a point below the Washington Street Bridge. This material will have to be transported along the river and dumped on the low ground behind the levees at one or other of several places where such ground occurs. Various means of such transportation were considered, such as by hydraulic dredge, by dump cars and locomotives running on embankments built within the levees, and by scows and steamboat on the river. The latter plan is for Dayton the most economical and was accordingly adopted. To do the work three scows were built, 40 by 120 feet in size, and which draw, full-loaded, 5 feet of water. As the river at an ordinary low stage does not provide sufficient depth for these boats, a temporary dam has been built just above the mouth of



FIG. 133—MAP OF MIAMI RIVER IMPROVEMENT.

Wolf Creek, which raises the water at that point about 4 feet.

To transport the scows, a stern paddle wheel steamer of the ordinary Mississippi River type was built, 20 feet wide, 70 feet long, and 3 feet deep. Its double engines have 8-inch by 42-inch cylinders, developing about 125 horse-power, and supplied by a boiler carrying 175 pounds pressure. The steamer draws 24 inches of water.

The scows and the steamer were built in a dock yard on the left bank of the river just below Herman Avenue. An additional scow 30 feet by 68 feet in size is also being built here, on which a No. 9½ Bucyrus dragline excavator will be mounted for auxiliary work on the river.

For most of the excavation above Main Street, now nearly completed, the draglines have traveled on rails laid upon "mats," (timber platforms) in the usual manner, the mats being laid along the shore. Now and then the machines have had to cross the river, which they did by building up the bed into a moving island after the manner described in the Bulletin of last October. For most of the work which remains, the loading dragline will be mounted upon an additional scow, 40 feet by 80 feet in dimensions, by means of which it will be shifted along the river as the work proceeds.

The low places along the river behind the levees, which are to be used as dumping grounds for the excavated material, as stated above, are indicated on the map, figure 133, by shading. Such dumping grounds are technically called "spoil banks." The two largest of these occur at the mouth of Mad River. That on the north bank will be entirely filled in between the new and the old levees, and will be developed by the city as a park. The one on the opposite bank, which is much the largest of all, occupies a part of the triangular space between the Mad and the Miami Rivers at the mouth of the latter. There will not be sufficient material for filling all of this triangle up to the top of the levees. The unfilled portion will be filled by the city. This space, now a dumping ground for rubbish, will some day be one of the most beautiful places in Dayton. It will be developed by the city as a park. There are three other spoil banks along the river, which will be used later, one adjoining and opposite McKinley Park, the second on the north bank just above Wolf Creek, and the third on the left bank of Mad River, opposite its mouth.

The total amount of material excavated from the bed of the stream to date in the Dayton river improvement is 340,000 cubic yards, 238,000 cubic yards of which has been deposited in the levees and spoil banks. 192,900 cubic yards has been moved twice by the dragline in getting it to its final place in the manner explained above. This makes the total material moved by the draglines 532,000 yards.

The work is being carried on by C. A. Bock, Division Engineer, and E. L. Chandler, Assistant Division Engineer, under the general supervision of J. H. Kimball, Construction Engineer.

Price Brothers' concrete block factory is now in operation, and is expected to turn out about 1,000 blocks per day. The arrangements and some of the machinery were devised by Geo. R. Price.



FIG. 134—LOOKING UP BOTH STREAMS AT THE JUNCTION OF THE MAD AND MIAMI RIVERS, APRIL 21, 1919.

April Progress on the Work

GERMANTOWN

Concrete has been placed at a fair rate, the total poured to date being 12,000 cubic yards. There remains approximately 2,000 cubic yards to be placed before the concrete structure is completed with the exception of the permanent floor. It is planned that the permanent floor shall be placed after the hydraulic fill has reached such an elevation that there will be no danger from over-topping due to floods. At present, concrete is being placed principally in the inlet and outlet walls of the conduit.

Work on the "hog box" is progressing satisfactorily. The foundations for the monitor pumps have been placed, the pumps installed and the connections made.

The small dragline has been excavating the sump for the monitor pumps.

Pile driving along the permanent cut-off beneath the dam has been completed between the conduits and the creek, and this work has been temporarily discontinued.

The large dragline has practically completed the excavation in the outlet channel.

April 16, 1919.

A. L. Pauls, Division Engineer.

ENGLEWOOD

The outlet conduit has proceeded to the point where its completion this month can confidently be predicted. The retaining walls at the outlet are finished with the exception of a small portion on the westerly side. The retaining walls at the inlet are well under way and it is but a matter of a few weeks before they will be completed.

The large steam dragline excavating the cut-off trench at the easterly end of the dam has completed its work and is moving into position in the borrow pit to furnish earth material for the dredge pumps.

One electric dragline has been building the cross dam, from toe to toe, thrown up for the purpose of allowing the hydraulic fill east of the river to proceed in advance of the diversion of the streamflow into the outlet conduits.

The actual construction of the dam by means of the two 15-inch dredge pumps is now in full swing. Both pumps have been working during the day shift all the month. One of the pumps has also been operating a night shift since April 7. More or less tuning up has been going on and certain adjustments in the equipment have been made with the result that the plant is now working in an entirely satisfactory manner.

The camp grounds and roads have been given the regulation spring cleaning and overhauling, and the attractiveness of the camp thereby enhanced.

Work on the permanent roads, to replace those formerly crossing the damsite, has been in progress. About 3300 feet of 20-foot roadway has been graded, ready for gravel surfacing.

April 15, 1919.

H. S. R. McCurdy, Division Engineer.

LOCKINGTON

To date 25,000 cubic yards of concrete have been placed in the outlet structure, the work during the month having been principally in and around the hydraulic jump pool. The floor and steps of the pool are practically complete with the exception of the sections which form part of the partition wall.

The excavation for the outlet channel has been completed and the large dragline is working some of the surplus material northward into the dam. After this work the machine will dig that part of the cutoff trench lying between the outlet structure and the stream, and will then excavate the entrance channel.

Clearing and grubbing of the entire damsite has been finished. Some stripping is under way.

The sump for the dredge pumps is nearly excavated, the work being done by a stiff-leg derrick rigged as a dragline. The material is dumped into wagons through a portable hopper and hauled away to be placed in the dam, or for use in road building.

The foundation and floor of the pumphouse are completed and the pumps set for the monitor water supply. A culvert and head gate are being built to bring this water

from the M. & E. Canal under the track of the Western Ohio Railway and the supply water pipe has been distributed over the borrow pit ready for laying.

April 18, 1919.

Barton M. Jones, Division Engineer.

TAYLORSVILLE

The first cut on the outlet excavation at the lower end is now out to within about 30 feet of full width and 8 feet of grade.

The excavation for the lower end of the concrete track has been finished and the machinery has been installed on the gravel washing plant which is now about ready for operation.

The hydraulic sluicing was hindered considerably during the latter part of March on account of the rapid wear on the small 34-inch runners which came with the Morris pumps. We tried a 39-inch runner which gave very satisfactory service at low and medium speeds but overloaded the motor considerably at full speed. However, the desired head could be maintained without running full speed. A 37-inch runner was then tried and found to be very satisfactory. It has now been in service for about 100 hours, and judging from the head delivered at a certain speed it has worn but very little.

Road No. 13 has been finished, and a survey and paper location made for the proposed road leading from the east end of the dam to the National Road $1\frac{1}{2}$ miles north.

The grading is being done for a connecting track just south of Camp, from the present track of the B. & O. R. R. to the new location thereof.

The false work has been started for the new concrete arch highway bridge over the new B. & O. tracks at the center line of the dam.

April 16, 1919.

O. N. Floyd, Division Engineer.

HUFFMAN

The placing of concrete has been continued during the past month, a total of 4700 cubic yards having been poured to date. This completes the floor from the upper end down to the entrance to the conduits. Both walls upstream from the conduits have been built up to elevation 810, or ten feet above the lower berm. Forms have been built for the floor down to the lower end of the conduits and the warped forms for the walls at the conduit entrance have also been placed.

The electric dragline has completed the excavation across the deepest part of the hydraulic jump pool, that is, down to the point where the upstream submerged weir is to be built. About one-third of the area from this point to the end of the concrete has also been excavated down to grade. About 25,000 cubic yards have been taken out during the past month, all without moving the dragline.

The outlet from the end of the concrete to Mad River will be dug after the excavation for the concrete is completed.

Work has been slightly handicapped during the past month on account of rains.

April 19, 1919.

C. C. Chambers, Division Engineer.

DAYTON

Total channel excavation to date is 340,000 cubic yards. 238,000 cubic yards has been placed in levees and spoil banks. A total of 532,000 cubic yards of material has been handled to accomplish this work. Surfacing and seeding of the completed levee slopes have been continued below Herman Avenue and Webster Street.

A portion of the levee slope at the east end of Island Park Dam was washed out by the rise of March 16 and 17. This has been repaired by refilling with about 3000 cubic yards of gravel and covering this with a temporary protection of sand bag revetment.

Work above Island Park during the past month has been limited to dressing the new levee slopes.

Price Bros. have started making concrete blocks at their Idylwild Avenue plant, casting the first blocks on April 18. Construction of Scow No. 5 was started April 3. This

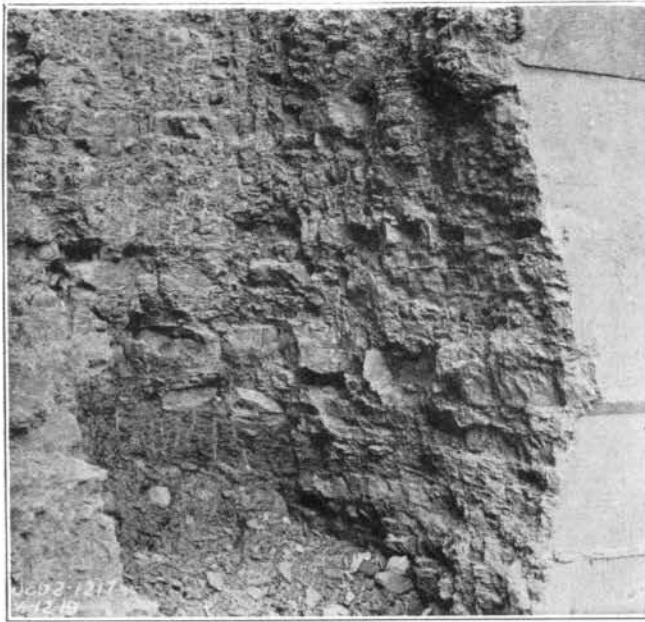


FIG. 135—JUNCTION OF ROCK AND CONCRETE,

Finished surface at right is the interior conduit wall. The rough surface just to left of it is the end of one section of the wall picked away for purposes of construction. The rough surface at the left is the natural rock excavation, parallel to the smooth conduit wall at the right. The bond between concrete and natural rock is so thorough that it is impossible to tell where the two join. Picture taken April 12, 1919, at Englewood.

scow will be 30 ft. wide and 68 ft. long and will be used for transporting the small dragline to different jobs on the channel improvement.
April 19, 1919.

C. A. Bock, Division Engineer.

HAMILTON

The Class 14 steam dragline is continuing work on the levee across the north spoil bank. This machine moved 31,000 cubic yards during March and will complete this work in about a week.

The electric dragline has completed a cut along the east bank along the east side of the channel south of the Columbia bridge, dumping same direct into the spoil bank. It has turned south at the bridge and will dig out a cut west of the channel and load on cars.

The sewer work on Buckeye Street has been completed with the exception of a small amount of backfilling. The derrick has moved to Wood Street and started work on the Wood Street sewer. A 4" centrifugal pump with 25 H. P. motor is being used to unwater the excavation. The outlet structure of this sewer will be built on piling.

The paving bricks have been laid on the new Black Street and part of the concrete walk has been laid.

Clearing has been started on the north spoil bank.
April 17, 1919.

E. C. Eiffert, Division Engineer.

RIVER AND WEATHER CONDITIONS

The heavy rainfall and comparatively high flood of March 14 to 19 were described in the April number of the Bulletin. At no other time during the month were the rivers high enough to interfere seriously with the construction progress. The total rainfall for the month at the Conservancy District's stations varied from 3.86 inches to 6.60 inches, a little more than half of the total falling in the above noted storm period. The total precipitation at the Dayton Weather Bureau station was 5.16 inches, or 1.71 inches greater than the normal for the month of March. This still leaves an accumulated deficiency from normal of 2.30 inches since January 1.

At the Dayton Weather Bureau station the mean tem-



FIG. 136—ENGLEWOOD ROCK EXCAVATION

The concrete side wall of the conduit abuts against this natural rock wall. The picture shows clearly the solidity of the rock foundation on which the conduits are built. Picture taken April 11, 1919.

perature for the month was 42.8° F. or 2.4° above normal; there were 13 clear days, 7 partly cloudy days, 11 cloudy days, and 13 days on which the rainfall exceeded .01 inch; the average wind velocity was 11.6 miles per hour, the prevailing direction being from the northeast; and the maximum wind velocity for five minutes was 46 miles per hour from the west on the 17th.
April 21, 1919.

Ivan E. Houk, District Forecaster.

RAILROAD RELOCATION

Big Four and Erie Relocation.—The Walsh Construction Company started night work on the 15th of this month and will therefore increase their normal output from about thirty to about sixty thousand cubic yards per month, so that their portion of the work may be completed in the early part of August. George Condon has started excavating near Fairfield with the steam shovel, and will also probably put on a night force in order to complete the work at the same time. The superstructure of the bridge at the west end of the Huffman Hill is being painted by the Big Four's own forces. The concrete work which was done by the District under F. H. Sprague's supervision and that of Frank Hill Smith, Inc., is entirely completed.

The grading on these railways is 65 per cent complete.

B. & O. Relocation.—The general contractors, Grant Smith and H. C. Kahl, subcontractors Condon & Smith, Vang Construction Co., and Kahl Bros. Construction Company are maintaining the monthly average of 60,000 yards per month. Condon & Smith started night work the latter part of March to expedite their work, which will not be completed as early as that of the other contractors. The latter are expected to finish about the 15th of May.

The grading on the B. & O. is 70 per cent complete.

Ohio Electric Railway.—The work on the Ohio Electric has been started by F. H. Sprague, one of the superintendents of the District. The excavation for the Mud Run trestle is under way as well as that for the railway embankment. J. C. McCann, who has the work of grading between Fairfield and Mud Run, will start in a very few days.

April 16, 1919.

Albert Larsen, Division Engineer.

The Power Transmission Line Used on the Conservancy Work

Seventy-Three Miles of Line Built for the Use of the District.

As has been stated in previous issues of this Bulletin, all of the electrical energy for light and power purposes at the Lockington, Englewood, Taylorsville, Huffman, and Germantown construction camps, and for the Dayton River improvement is supplied by the Dayton Power & Light Company. The reason for making such extensive use of electrical power in preference to operating many small isolated steam plants was made clear in the March issue of the Bulletin.

The provisions which were made by the Dayton Power & Light Company to provide for the future growth of the region which it is supplying made it possible for the Conservancy engineers to obtain the 10,000 or more horse power needed for the work of the District. The old plant of the Company generated approximately 26,000 horse power. When the new Miller's Ford central station was put into operation 35,000 horse power became available, and ultimately this plant will have a capacity of 140,000 horse power. The new plant, the construction of which was started in August, 1916, is located along the main line of the Big Four Railroad, and in close proximity to the Miami river at the southern corporate limits of the city of Dayton. The machinery is of the latest design, both as regards boilers and

generators. Two steam turbo-generators of 17,500 horse power each generate alternating current at 6600 volts. From the Miller's Ford station, transmission lines radiate in all directions through the Miami valley.

In order to supply electric energy to the various damsites, the building of additional transmission lines was required. Realizing the importance of the work of the District, and the necessity of furnishing power as soon as needed, practically the entire services of the engineers and construction forces of the Dayton Power & Light Company were engaged for months in planning and building the necessary transmission lines. All of the material had to be purchased, rights-of-way secured, construction camps prepared, labor secured, and gangs organized. The result was that current was available in June, 1918, at all of the damsites.

The line to Taylorsville was started first, on March 19, 1918, and by May 21, seven miles had been completed and energized. From Taylorsville, the work was pushed westward toward the Englewood camp, and by June 18 the District was able to put an electrically equipped dragline in operation at the Englewood damsite. In the meantime, work was progressing on transmission lines to the damsite on Twin Creek, near Germantown. This required a line 8½ miles in length, which was placed in commission on June 27. To reach the Huffman damsite a line was built connecting with the Osborn-New Carlisle branch of the Dayton-Xenia transmission line of the Dayton Power & Light Company.

On October 1, 1918, it was decided to build a transmission line from Taylorsville to Piqua, to connect with the line previously installed by the Conservancy engineers between Lockington and the power plant of the Dayton Power & Light Company at Piqua. This line was designed to carry not only all of the electricity required at Piqua, but also that needed at the Lockington damsite. It involved

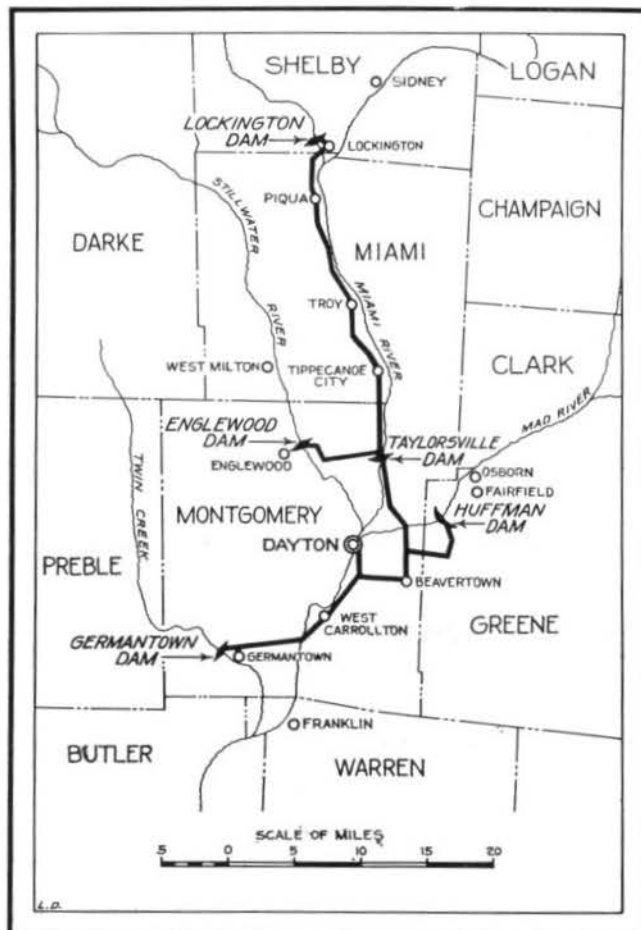


FIG. 137—MAP SHOWING ELECTRIC POWER TRANSMISSION LINES, D. P. & L. CO.

GET IN LINE

Have you got one? Look and see!
I mean the button with the V!—
The big, bold V in field of blue,
That should be found somewhere on you!—
The disc, that by the great horned goat
Should gleam from every vest or coat!

If you have not already bought,
Get busy!—you should not be caught
With slinking step and downcast eyes,
Avoiding all your fellow guys,
Because you failed, in time of need,
Your Uncle's call for help to heed!

Buy bonds!—for this is your last chance
To help our boys in far-off France!
Although sweet peace is on the way,
The soldiers' bills are yet to pay.
Buy Victory Bonds, and be twice blessed;
Dig!—Sport a button like the rest!

—Elldce.

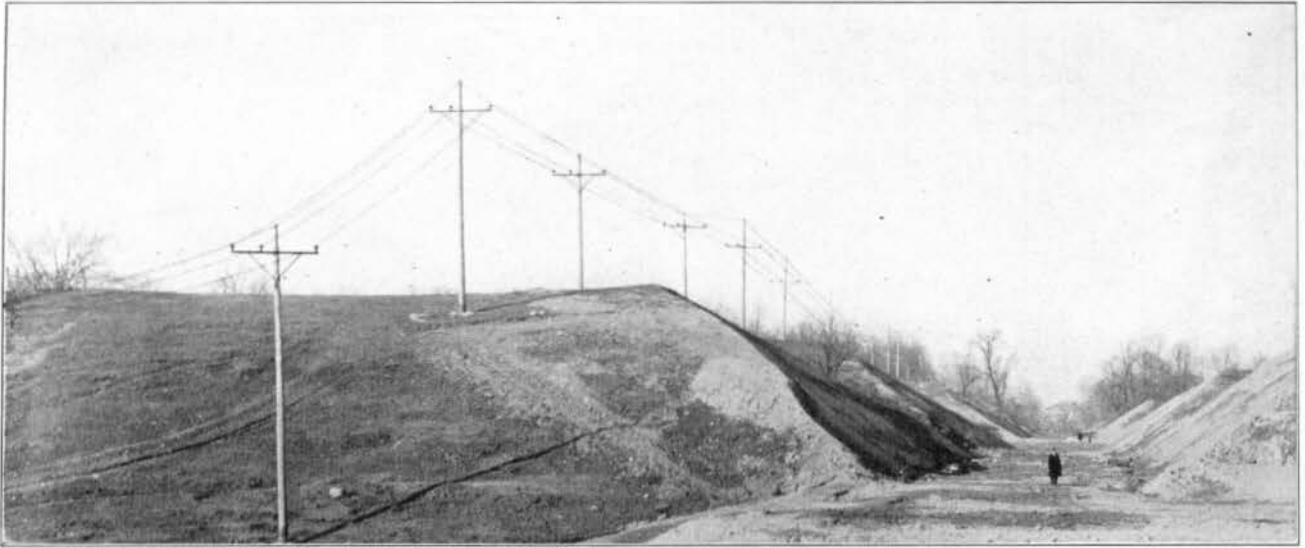


FIG. 138—POWER TRANSMISSION LINE BESIDE NEW B. & O. R. R. LINE, TAYLORSVILLE, JAN. 15, 1919.

The pole line here follows the new grade for the Baltimore & Ohio Railroad. The arrangement of the insulators which carry the wires, and the cross arms, is plainly seen. The fourth wire, which is fastened to the pole tops, is there to protect against lightning. At every fourth pole, it has metallic connection with the earth. The pole nearest in the view is so equipped.

the construction of 21 miles of transmission line which, in spite of unfavorable weather conditions and other obstacles, was completed in 3 months and 19 days.

As was explained in the March issue, a 3-phase, alternating current requires 3 separate copper wires for transmission; one to carry each phase. The wires must be kept a sufficient distance apart to prevent "arcing;" that is, the jumping of electric current from one wire to another. The wires are supported on heavy porcelain insulators to which they are fastened by means of short copper tie wires. This prevents the current from coming into contact with the cross arm and so establishing connection with the ground. To protect against damage and interference by lightning, a steel cable, known as the "ground wire," is strung over the tops of the poles, connection being made at every fourth pole in such manner that electricity discharged from the air can pass directly down the pole into the ground without being communicated to the transmission wires. The poles are set from 200 to 250 feet apart, averaging 25 to the mile. The copper wires are of different thickness, gaged to carry the current with the least practicable loss. On the trunk lines, a bare wire is used of 00 B. & S. gauge; on the branch lines the wires are usually No. 2 or No. 4 B. & S. gauge.

All told, the transmission lines built to furnish power for the Conservancy work, and including the Piqua transmission line, required the setting of 2016 poles, varying in length from 40 feet to 65 feet. These represent 25 car loads. More than 100 tons of steel was used in the shape of cross arms, bolts and other hardware. A total of 205 miles of copper wire of different gauges was used, besides 68.4 miles of copper-clad ground wire for protection against lightning.

Long distance transmission lines always carry current at very high voltages in order to reduce transmission losses to a minimum. This so-called

high "tension," or high "potential," in the case of the Dayton Power & Light Company's trunk lines, is 33,000 volts. At each construction camp of the District is a sub-station where the voltage is reduced, or technically speaking, "stepped down." The camp circuits carry current at 2300 volts, and this is again stepped down to 440 for use in the motors, and to 110 volts for lighting.

At the sub-stations the stepping down from 33,000 to 2300 volts is accomplished by means of large transformers, set up in groups, or so-called "banks." The principle on which the transformers work was described in the March Bulletin.

Among the interesting features at each of the electric sub-stations, is the 33,000-volt, outdoor meter installation. This consists of a double compartment, water-proof, steel tank, the rear portion of which contains a set of highly accurate current and potential transformers immersed in oil, and the front portion a neat slate panel upon which the meters and testing cut-outs are mounted. The meters are two in number; one the latest graphic, recording "maximum demand" meter, the other a poly-phase kilowatt-hour meter, both of the latest type and under the same cover. The clock which runs the maximum demand meter will run for 40 days with one winding. The record made by this meter is explained under figure 139.

R. F. Eastman Goes With Truss-Con Steel Co.

Lieutenant R. F. Eastman, recently of the United States Coast Artillery at Sandy Hook and Fortress Monroe, and who recently returned to his old work with the District, has resigned his position, the resignation taking effect April 19. He has entered the service of the Truss-Con Steel Company, of Youngstown, Ohio. His work will be in charge of design in the company's Dayton office. The Bulletin wishes him every success in his new work.

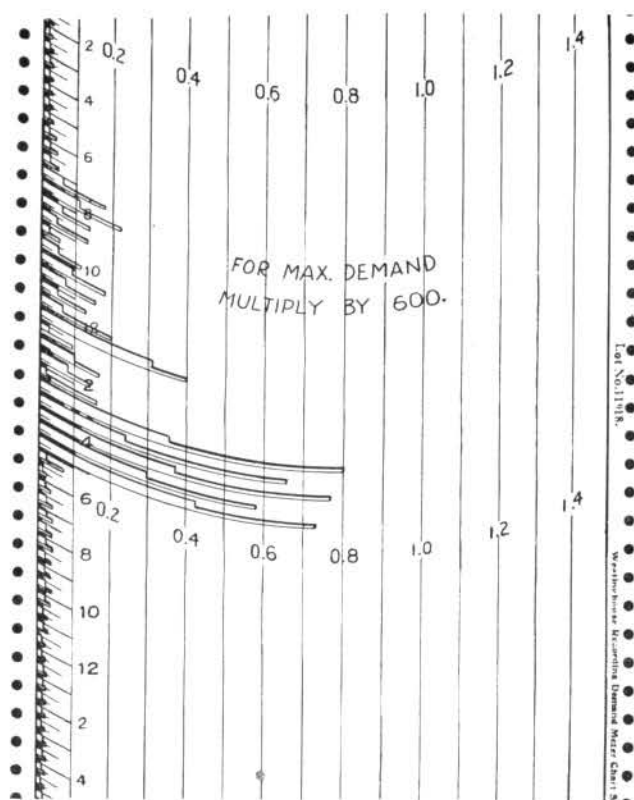


FIG. 139—MAXIMUM DEMAND CHART.

This is the actual chart of electrical power used at the Taylorsville dam on October 26, 1918. The vertical column of figures at the left indicate the time of day, 2 o'clock, 4 o'clock, 6 o'clock, etc. The jagged line at the left, swinging to the right on a circular arc, and then dropping back, indicates the maximum demand for electric power during the half-hour period indicated by each swing. The figures 0.2, 0.4, etc., extending in a circular arc across the chart, are for use in calculating the maximum power used. Thus on this chart, the maximum swing to the right of the jagged line just reaches the vertical line marked 0.8. Multiplying this figure by 600, we get 480, which is the maximum "kilowatts" of power used on October 26 at Taylorsville. Four hundred and eighty kilowatts equals 536.2 horse power.

The jagged line showing maximum power used is drawn on the paper by a pen which is actuated by electro-magnetic mechanism inside the meter. The paper strip on which the record is drawn is wound on a brass cylinder which rotates, driven by clock-work, the paper being driven by studs on the cylinder which engage the perforations shown in the picture on each edge of the paper strip. The clock is a special clock which will run the drum accurately for 40 days with one winding.

Besides the chart showing maximum demand during each half hour of the day and night, as shown above, the total "kilowatt hours" of electrical energy consumed at Taylorsville is measured by a second meter mounted beside the first. The amount of electricity paid for is measured by the second meter, but the amount to be paid per kilowatt hour will depend upon the irregularity of the maximum demand current. Suppose a motor uses but a few hundred units

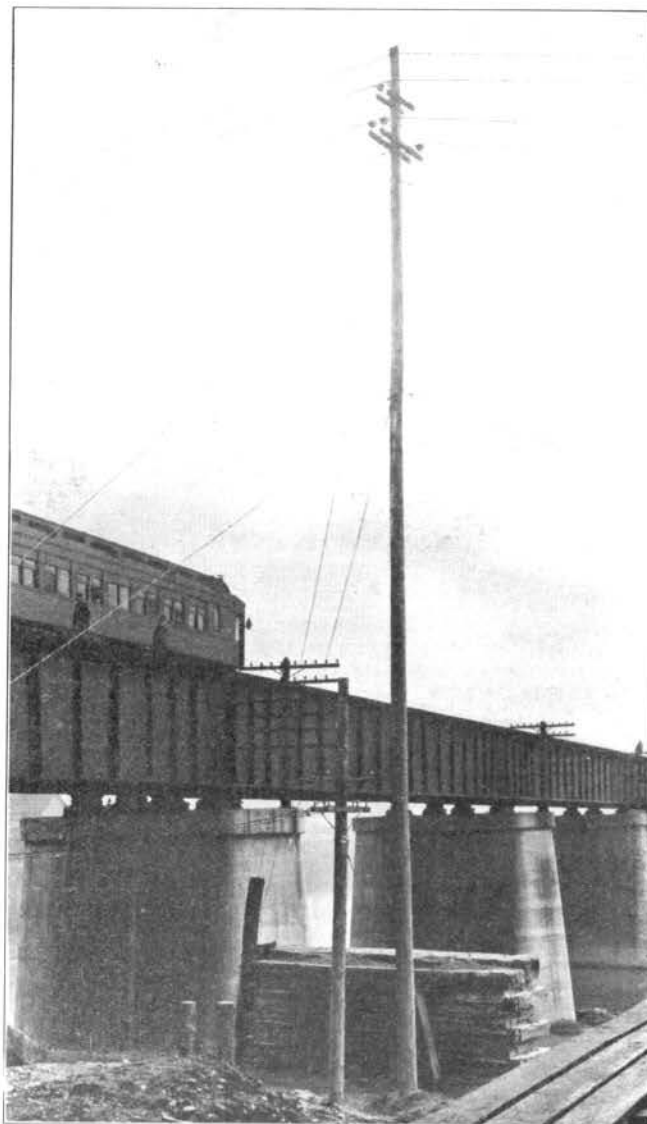


FIG. 140—THE TALLEST TRANSMISSION LINE POLE, JAN. 23, 1919.

A 65-foot pole was required at the Pennsylvania Railroad bridge at Piqua in order to carry the high tension wires 35 feet above the track, as required by law.

of energy during the day, but for brief periods requires to use a very great amount of energy. The power company must keep reserve electrical energy in store to supply that sudden demand, which reserve cannot be used for other purposes. Additional charge is made for this necessary reserve power, even though it be not used.

Major Watson Returns from France

Major W. P. Watson, formerly Director of the Tractor Artillery School of the American Army, near Paris, France, and an old Conservancy man, has resigned his commission and returned to Dayton. He returned overseas on the Otsego, American transport, formerly the famous German raider, Prince Eitel Frederick. He is soon to be married to Miss Emilie Wuichet of Dayton. Miss Wuichet is a sister of Mrs. C. H. Shea, wife of our Assistant Division Engineer at Lockington. Major Watson's friends are all very glad to welcome him back.

The Conservancy Technical Reports

The interest which was shown by engineers in the list of Technical Reports on the work of the District, which was published in the last issue of the Bulletin, has been so evident that we think it worth while to repeat the publication of the list. These reports when completed will include all published data of permanent value relating to the work of the Miami Conservancy District. The following volumes may now be obtained.

PART I—THE MIAMI VALLEY AND THE 1913 FLOOD.

By Arthur E. Morgan,

Chief Engineer of The Miami Conservancy District.
128 pages, 6" x 9", 44 illustrations, paper covers; price 50 cents net, postpaid.

This volume is introductory to the series of Technical Reports, but is not in itself, however, of a technical nature. It contains a vivid description of the flood of March, 1913, which caused great damage in the Miami River Valley, and as a result of which the flood control works now being built were undertaken.

PART II—HISTORY OF THE MIAMI FLOOD CONTROL PROJECT

By C. A. Bock,

Division Engineer of The Miami Conservancy District.
194 pages, 6" x 9", 41 illustrations, paper covers; price 50 cents net, postpaid.

This is a recital of all events of interest in the history of the flood prevention movement in the Miami Valley. Its chief value lies in the fact that it describes the steps necessary and the difficulties usually encountered in initiating and carrying out a great public engineering enterprise of this nature.

PART III—HYDRAULIC JUMP AND BACKWATER CURVES.

By Sherman M. Woodward, R. M. Riegel and J. C. Beebe.
111 pages, 6" x 9", 88 illustrations, 12 tables, paper covers; price 50 cents net, postpaid.

The first part of the book, entitled "Theory of the Hydraulic Jump and Back Water Curves," sets forth the theory of these complex phenomena, and is written by S. M. Woodward, Professor of Hydraulics and Mechanics at Iowa University, and Consulting Engineer for The Miami Conservancy District.

The second half of the book, entitled "The Hydraulic

Jump as a Means of Dissipating Energy," is devoted to a description of the experiments conducted by J. C. Beebe and R. M. Riegel of the Engineering staff of the District, to determine the properties of the hydraulic jump and its utilization in stilling the water which will issue at high velocities from the outlet conduits in the dams now being built by the Conservancy District.

PART IV—CALCULATION OF FLOW IN OPEN CHANNELS

By Ivan E. Houk,

Hydrographer of The Miami Conservancy District.
283 pages, 6" x 9", 79 illustrations, 48 tables, paper covers; price 75 cents net, postpaid.

This is a report describing how the maximum flow of the Miami River and its tributaries during the disastrous flood of March, 1913, was determined by subsequent measurements of the river channels and flood elevations. A large part of the volume is devoted to a discussion of different formulas, many of them of foreign origin, used in computing stream flow.

PART V—STORM RAINFALL OF THE EASTERN UNITED STATES.

By the Engineering Staff of The Miami Conservancy District.

310 pages, 6" x 9", 114 illustrations, 11 tables and appendix, paper covers; price 75 cents net, postpaid.

This book sets forth the results and investigations made to reach safe conclusions as to the probable size and frequency of severe floods in the Miami River. Its most noteworthy feature is a study of the relations between the areas covered by different depths of rainfall and the duration of such rainfall for each of the 33 largest storms on record in the eastern half of the United States.

PART VI—CONTRACT FORMS AND SPECIFICATIONS

By the Engineering Staff of The Miami Conservancy District.

192 pages, 6" x 9", 3 diagrams, paper covers; price 50 cents net, postpaid.

This volume has been issued to meet the continued demand for copies of the standard specifications and contract forms in use by The Miami Conservancy District, in the construction of the large earth dams and the protection works along the river channels.

ATLAS OF SELECTED CONTRACT AND INFORMATION DRAWINGS TO ACCOMPANY PART VI.
10 pages of text, 15" x 11", 139 plates, paper covers; price \$1.50 net, postpaid.

The Atlas contains 139 representative selections of plans made preparatory to the letting of contracts.

Departure of Mr. Porter-Shirley

We are sorry to note the departure of C. W. Porter-Shirley, our Camp overseer, to accept a call to a Unitarian pastorate at Genesee, Ill. He came to the District from a pastorate at Barre, Mass., in February, 1918, drawn by his interest in the human problems presented by our construction camps. He had much to do with bringing the camps to their present high morale and efficiency of organization.



FIG. 141—STEAMBOAT USED FOR MIAMI RIVER WORK IN DAYTON.

The boat is of 20 feet beam, 70 feet in length and 3 feet in depth. She is a regular Ohio river steamer of the stern wheel type and was built in a shipyard beside the Miami River especially for the Conservancy work. Dorothy Jean, the baby of Division Engineer Bock, and after whom the steamboat was named, is seen surrounded by the steamboat crew, and evidently for the time being superseded Captain Welcome (at the left) in command of the boat. Picture taken March 29, 1919.

SIXTY-SIX THOUSAND American boys lie dead beneath the soil of France; coffinless, buried in the khaki they fought in; alone in some corner of a stubble field by Chateau Thierry; or in rows, by hundreds, by thousands, under the torn trees of the Argonne forest, or by the banks of the Meuse.

There they lie—66,000 of them—boys with fathers and mothers, sisters and sweethearts—American boys who loved life as you love it—66,000 of them—dead beneath the soil of France.

—That was the price *they* paid.

—What price have *you* paid?

THE MIAMI CONSERVANCY BULLETIN SUPPLEMENT

"The News Letter"

To Promote the Conservancy Spirit on the Work

May, 1919

ENGLEWOOD

FOURTH OF JULY IS ENGLEWOOD'S DAY. SAVE FOURTH OF JULY FOR ENGLEWOOD. Announcement is made thus far in advance in order that there may be no conflicts on this date. Englewood has selected the Fourth of July as its day to entertain all the employees of the District as its guests in a big outdoor picnic and celebration. More detailed announcement will be made later. Be sure and save the Fourth of July for Englewood if you want a big time.

Iced Fruit Punch and Other Good Things

The work of the Riverside Community Association has continued to make very satisfactory progress during the past month. Our new Community Hall, of which we are very proud, was opened informally the evening of Saturday, April 5th. Dancing was enjoyed in the main hall, while tables for cards were provided in the ladies' and men's club rooms. Refreshments of iced fruit punch and wafers were furnished by the entertainment committee. A large crowd was present and many complimentary expressions were heard with reference to the adaptability of the building to all community purposes and to the excellence of the dance floor. A player piano and a billiard table have been purchased by the Association, the former for the hall, and the latter for the men's club room.

Spring Fever Among the Fans

Spring fever is rife in camp and the boys may be seen any evening when the weather permits limbering up their arms for the coming baseball season. We are hoping to receive favorable answers soon to the challenge published in the last Bulletin. It has been called to our attention that only the other camps of the District were included specifically in the challenge and not the Dayton headquarters. The oversight was entirely inadvertent and we take this opportunity to extend the challenge to Headquarters.

Othello + Sandwiches + Doughnuts + Pep = \$20.00

A benefit for the Children's Playground was held at the Mess Hall Friday evening, April 4th. An evening both pleasurable and of educational value was supplied by the movie version of Shakespeare's "Othello," provided thru the kindness of Mr. Hauck. The girls of the Domestic Science Class of the Camp School prepared and served delicious refreshments of sandwiches, doughnuts and hot chocolate. The voluntary contribution for the playground fund netted considerably over twenty dollars.

Ladies Also Get Busy

The ladies of the camp have organized themselves for the purpose of stimulating women's activities and to co-operate more effectively in the social activities of the camp and in the other work of the association. The comfortable rooms which have been provided in the Community Hall for the exclusive use of the ladies in camp will be of great value and assistance in this work.

Oldest Inhabitant Departs

One of the first residents of the camp, Mr. C. W. Porter-Shirley, left the middle of April for Geneseo, Illinois, where he will resume his work as a Unitarian minister. Mr. Porter-Shirley and his son made the trip to their new home by automobile, while Mrs. Porter-Shirley remained behind for a few days' visit with Mr. and Mrs. J. L. Southworth. The best wishes of their friends in camp go with them in their new work.

Ford Fever Rampant

Fred Gibson and J. H. Gerecke have bought themselves machines—or rather Fords—recently. Pete Haskell has been heard to express a similar intention. Fords seem to be contagious.

Mr. Arthur H. Kent, Camp Overseer, spent a week-end visiting his parents in Chicago.

Several new faces are to be seen among the occupants of cottages in camp, among them being "Bill" Heller, Carl Winnewisser and Charley Miller, dragline runners, and Al Hawkins, pumpman. Don Henry and Jack Owens have changed their locations during the month.

Jazz?

We expect soon to have the advantage of our own music in camp. George Saltmarsh and Bert Werts are busily engaged in organizing an orchestra and whipping it into shape.

Growing Greener Every Day

Many things have been done during the past month which have added greatly to the appearance of the camp and which will enhance the natural beauty of the camp site. The camp has been thoroughly cleaned up under the direction of the camp overseer. Nearly two hundred young trees have been planted along the camp streets. A large number of vines and shrubs have been purchased and put in by residents around their cottages. Grass seed is coming up in many of the new lawns. A majority of the people in camp are doing their share toward Uncle Sam's food campaign by planting gardens.

TAYLORSVILLE

That Celebrated Banquet

On Saturday evening, March 22nd, our new Community Hall was formally opened with a banquet and dance. Invitations were extended to the residents of all the Conservancy projects, and the employees of the Dayton office and shops, and each place was well represented. Guests to the number of 225 were seated at the table, and after dinner Mr. O. N. Floyd, toastmaster, called on many of the guests, who ably responded with interesting and enthusiastic toasts. About 10 o'clock all repaired to the Community Hall, where dancing was enjoyed until an early hour. Both halls were beautifully decorated and music was furnished by a Dayton orchestra. Taylorsville is very proud of the success of this occasion, which we hope to make an annual affair.

Daubenspeck in New Role

A dancing class with Mr. Daubenspeck as instructor and Mrs. Guthrie as pianist has been started with 18 members. They meet every Monday evening in the Community Hall.

The lower floor of the Club House has been arranged for a pool room, reading room and barber shop. Two pool tables were paid for by money received in the camp and have been installed, and a soft drink and ice cream stand will be started soon. This will add much to the convenience and pleasure of the community.

Keep Right On Sewing

The ladies of the Camp have been meeting every Thursday afternoon doing Red Cross sewing. As they have finished this work they continue to meet and bring their own sewing, believing that these meetings will do much towards encouraging the community spirit and make them better acquainted with each other. On Thursday after-

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noon, April 17th, they held a very enthusiastic meeting in the Community Hall. Refreshments were served by Mrs. Trowbridge, Mrs. Tedrick and Miss McCarthy. A pleasant afternoon was enjoyed.

Cinderella from Ebenezer

On Thursday evening, April 3rd, an amateur company from the Ebenezer Methodist Church presented the play, "A Southern Cinderella," in our Community Hall. A large crowd was present and the play was enjoyed by all.

As Green as Englewood

During the past month much work has been done towards beautifying the Camp. Trees have been planted along the streets, shrubbery and rose bushes set out in many yards, grass seed sown in most of the yards, and everyone is busy getting his garden ready. The Association is glad to have the opportunity of co-operating, and appreciates the interest the community in general has shown in this work. All the nursery stock that was purchased was paid for by private individuals.

Religious

Rev. Le Fever of the Bonebrake Theological Seminary, Dayton, was with us on Sunday afternoon, March 23rd, and preached a wonderful sermon on the death of Christ.

Rev. Zimmerman of Vandalia preached a very interesting sermon on Sunday afternoon, April 6th. At both of these meetings the choir gave special numbers.

Society Notes

Mrs. Guthrie entertained Dr. and Mrs. Sayler and daughter of Huffman on Sunday, March 23rd.

Mr. and Mrs. W. W. Cole visited friends in Germantown on Sunday, April 13th.

Cletus Holahan was in Richmond, Ind., April 13th, visiting Mr. and Mrs. Kohnle.

We regret very much that we have lost from our midst Mr. and Mrs. Omer Hifton. They were leaders among the young folks and their presence will be greatly missed. They have gone to their former home in Celina.

Mrs. B. H. Petty has just returned from a two weeks' visit with her parents and friends in Indiana.

Mr. and Mrs. D. J. Holahan drove to Richmond, Ind., Sunday, April 6th, to visit her brother's family.

Tuesday evening, April 8th, Mr. Hauck, Camp Inspector, favored us with a very interesting picture show. Mr. Hauck has been very kind in securing pictures and assisting us in our community affairs, and his efforts are very much appreciated.

We have had more sickness in Camp the past month than at any time previous, but we are glad to report that all are rapidly improving.

HUFFMAN

Sinn Fein Celebration

A very pretty St. Patrick's party was given by the Social Committee in the Community Hall on Monday evening, March 17. As the guests entered the hall, a shamrock with the order of dances printed upon it was passed to each one as a unique favor. The hall was artistically decorated in shamrocks and green streamers, while a table laden with lemonade, fancy crackers, and potato chips proved a most popular spot all the evening. The Gyrating Orjazztra of Dayton furnished music and a most enjoyable evening was spent by all.

When Dorothy Was Two Years Old

Saturday, February 22, being the second birthday of little Dorothy Clawson, a charming birthday party was given in her honor by Mrs. Clawson, from 1:30 to 5 p. m. Mary Alice Mark sang "Happy Birthday" as she presented Miss Dorothy with a child's silver set from her little camp friends. Following games and a peanut hunt, delicious refreshments were served. The children found their places at the dining table, designated by small baskets of candy which served as favors. The table was beautifully decorated in pink and white, with a large birthday cake in the center bedecked with two pink candles. A most enjoyable afternoon was spent by everyone.

Heavy Rainstorm Can't Stop Sunshine Club

On March 26, Mrs. Verne Clawson entertained the Sunshine Club at her home. Not as many of the ladies were present as usual owing to the heavy rainstorm. Delicious refreshments were served.

An April Shower Helps to Open Orange Blossoms

When it was learned that wedding bells were soon to

ring for Miss Louise Megley, a shower was given in her honor at the Sunshine Club on Wednesday afternoon, April 9. Mrs. Dubois entertained and had prepared delicious refreshments for the occasion. One corner of the Community Hall was gaily decorated in red, two large hearts pierced by an arrow being hung across it. Beneath the hearts was a large red basket containing gifts, all of which were both pretty and useful. While unwrapping her presents, Miss Megley received frequent showers of rice and confetti. We shall regret to lose her from our camp circle and our very best wishes will go with her.

We Also Hand It To Taylorsville

All of the Huffmanites who attended the splendid banquet and dance given at Taylorsville on March 22 heartily thank the people of that camp for the exceptionally pleasant evening spent with them. Although we could never fully repay them for all they did for us, we hope to give them a good time at our Camp on some future day.

Taffy

An old-fashioned taffy pull was given in Community Hall, March 31, 1919. Games were enjoyed by the children and a spelling match by the grown-ups (in which the words were spelled backward), while the taffy was being made. Everybody took a hand in the taffy pulling and a great deal of fun resulted. A large number attended and a pleasant evening was enjoyed by everyone.

Social Doings, Etc.

All of the Huffman campites are very glad to welcome Mr. and Mrs. Minton into our community life.

Mesdames E. S. Dubois, W. B. Hodge and J. M. Sayler were guests at an afternoon party given by Mrs. Durkin at the Walsh Camp in honor of Mrs. Durkin's mother, Mrs. Johnson, and Miss Smith of Brazil, Ind., on Thursday, March 19.

On March 12, sixteen ladies of the Sunshine Club were delightfully entertained at Community Hall by Mrs. Frank Bratton. Light refreshments, consisting of pie and coffee, were served.

Mr. and Mrs. Steadman, who have been spending the winter with their daughter, Mrs. Verne Clawson, left camp for Virginia on March 27. All of their camp friends regret to lose them.

E. S. Dubois was called to Kansas City, Mo., on March 21, owing to the death of his brother. We all extend our heartfelt sympathy to Mr. Dubois and his wife.

On each Sunday afternoon during this month, church services have been held in our Community Hall. Ministers and music have been furnished by the Dayton Y. M. C. A.

GERMANTOWN

Shakespeare at Germantown

On April 2 a candy sale was given by the school children. It was a huge success, and with the money raised they purchased a volley ball, and net, bats, and playground balls.

Following the sale the moving picture "Othello" was shown by Mr. Hauck. The senior students and several members of the Germantown High School enjoyed the evening with us.

Middletown Also Entertains

On Friday evening, April 11, an entertainment was given in the school house by four young ladies from Middletown. Following the entertainment dancing was enjoyed until 12 o'clock. Ice cream and cake were served by the committee in charge.

Personal

Mrs. Clara Bliss of Hyde Park was a week-end guest of her sister, Mrs. Chris Foehr.

Mrs. Clarence Heckman and children and Miss May Turner spent Easter with friends in Cincinnati.

Mr. and Mrs. Verne Clawson of Huffman were guests of Mr. and Mrs. A. L. Pauls on Easter Sunday.

On April 13, Mr. and Mrs. C. O. Shively and Mr. and Mrs. Henry Wehrley and children drove to New Paris and spent the day with friends.

Wednesday evening, April 9, Mr. and Mrs. Richard Carlton entertained at their home in honor of their son who had recently returned from over seas.

Sunday, April 13, Mr. and Mrs. Austin Philpott entertained Mr. and Mrs. A. L. Pauls, Miss Long and Mr. Ralph Lehman at dinner.

Mr. and Mrs. Alex MacKinnon spent the week end of April 12-13 at Mr. Porter-Shirley's home in Englewood.

THE MIAMI CONSERVANCY BULLETIN

EDITORIAL

Board of Editors

Germantown	Miss May Turner, C. O. Shively
Englewood	Mrs. C. W. Porter-Shirley, D. W. Henry
Lockington	C. H. Shea
Taylorville	Miss Coral Benedict, W. D. Rogers
Huffman	Miss Mildred Goss
Hamilton	R. B. McWhorter

The Dandelion

We have all seen dandelions by the million, but how many of us have ever used our eyes on them? Did you ever notice that a dandelion will never stick its head up higher than it has to to reach the sun and the wind? On a shaven lawn the blossom squats close to the ground. In tall grass it will grow on top of a stem 2 feet high or more. It wants to reach the wind which blows its seeds away to fresh fields.

Did you ever notice that the plant lifts its blossoms straight up to the full height of their stems when they first open? When the petals wither and the seeds begin to swell, the blossom shuts tight and stoops to the ground, the stem bending low to bring it there. It stays thus closed and crouched until the seeds are ripened, then straightens up again to the full height of the stem and opens up its feathery sphere for the seeds to sail away on the wind.

Finally, did you ever notice that a dandelion shuts its blossoms up and goes to sleep every evening, opening them up again to the sun on the following morning?

We have all seen a million dandelions. How many of us have used our eyes on them? How many of us have ever seen these things which have gone on under our eyes thousands of times?

The story has its moral. If you have never seen these performances of the dandelion, the commonest flower that blows, isn't it likely that there are lots of things about your work which you haven't seen and which it would pay you to see?

LOCKINGTON

Another for Taylorville

The Taylorville party of last month set such a high mark as a camp entertainment that it will be difficult for any other camp to make a better record. Those who attended report the affair as nearing perfection.

Does Englewood Want a Goat?

A goat has been presented to W. J. Smith, Jr., by some of his admiring friends in the bunk house. What to do with it became a question until someone suggested that it be made the baseball team's mascot. If that Englewood bunch think they can "get" it, let 'em come on.

Looks Like Lockington Again

The Victory Liberty Loan campaign is being conducted in conjunction with the Shelby County Organization. Speakers from the Piqua district addressed the men at a noon meeting Tuesday, April 22. The sales for the first day totaled \$4650, and the indications are that Lockington will again have a record sale.

Jones' Birthday Celebrated With Epicurean Collation

On April 12, while Mr. Jones was quietly celebrating his birthday at his home, the office force and their wives dropped in to help him, presenting a small gift as a remembrance. Mrs. Jones had not been forewarned but rose to the occasion with a lunch fit for old Epicurarius.

Matrimonial Mystery

Rumors that are not denied have convinced the camp that one of the men in the office is to be married in the near future. Such little details as the time, the place, and the girl have not been published, but it is hoped that next month's issue of the Bulletin will clear up the mystery.

Knocking Chip Off Englewood's Shoulder

The rainy weather has interfered with the ball players' practice but has not dampened their enthusiasm. A diamond has been staked out and will be used as soon as the weather will permit. Englewood's challenge will not have to be sent to the whole world to be taken up. When the organization has been completed Lockington will be glad to book games with Englewood or any Conservancy team.

Personal

Mr. Roland West, Resident Electrician, has resigned to

go into business in Sidney. His place has been taken by Mr. C. M. Gudgeon, who has been transferred from the Dayton work. Mr. Gudgeon moved his family to Lockington last week.

HAMILTON

Three Excited Men

Messrs. Schrader, Davis and Roush were highly excited last week by a rumor that there was a house for rent in Hamilton. It was only a ruse.

Two More Population Notes

Mr. and Mrs. Fred Hill are the proud parents of a nine-pound boy, born recently at Mercy Hospital.

Primore Taliaferro, derrick runner on the drainage work, is the very enthusiastic father of an eight-pound girl, which arrived the latter part of March.

Social and Personal

Division Engineer and Mrs. C. H. Eiffert were hosts at a delightful entertainment given at their home on North "F" Street the evening of April 1st in honor of Miss Gladys Truesdell of Chicago, a sister of Mrs. Eiffert. The event was greatly enjoyed, a large number of guests being present.

Mrs. R. H. Tweedy, of Courtland, Ala., is visiting her daughter, Mrs. R. B. McWhorter, on Elvin Avenue.

Timekeeper Harry V. Waer has returned to duty, after having been laid up with the flu for several days.

The bowling meet of April 15th was featured by two 200 scores, Schrader rolling 211 and Eiffert 201. Schrader's score is the high score of the season, which honor has heretofore been held by Mr. Eiffert with a score of 206. The season will end April 29th.

Our night superintendent, John D. Allen, was painfully though not seriously injured in a traction accident which occurred between Hamilton and Cincinnati on the 13th instant.

OUR JUNIOR EDITORS

The contributions immediately following are from our Board of Junior Editors, representing the various camp schools. They beat us old hands—don't you think?

Huffman

Our Candy Sale. We did not have any school yard furnishings, so we decided to earn the money by a candy sale, and buy them.

The girls worked in groups at three different houses. Twenty pounds was the result of two afternoons' work. There were several different kinds of candy made and each pound sold contained a mixture of all. We charged sixty cents a pound for the candy.

The boys sold the candy. They made posters to put on the bulletin board so that every one would know about it. Several of the smaller boys went around the camp telling people of it. We had the sale Thursday evening, April 3, at 7:30. At the same time we had "Othello," a moving picture. Seventeen dollars and thirty cents was cleared.

Elizabeth P. Mark, Fifth Grade.

Taylorville

A School Hike. During the second week of April the children took a hike over the works and back through the woods. They were very much interested in the sluicing and drilling. On the hillsides were scads of wild flowers. We found and identified anemone, spring beauties, violets, dog-tooth violets, jack-in-the-pulpit, Dutchman's breeches, and trilliums.

Thursday morning, the school gave an Easter Party for all the children at Camp, at Community Hall. Ice cream and beautifully colored eggs were served by the Domestic Science Girls. The children enjoyed their new playground balls, and had several contests with them.

Agnes Hinton, Fifth Grade.

Dayton

Talking about "scads of wild flowers," the Dayton editor was also out walking last Sunday afternoon and found 4,356,000 dandelions in one field, by actual count. Particulars next month.

G. L. T., Fifth Grade.

Englewood

Old Clothes Campaign

One of the most interesting events of the past month was the Old Clothes Campaign. The girls of Camp Engle-

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wood School collected 81½ pounds of old clothing and the boys collected 35½ pounds. Besides that the girls collected \$12.02 for overalls and shirts for the Belgians.

Caryl Rupe, Sixth Grade.

School Gardens

Fifteen children have started school gardens. They, with those who have home gardens, will wear badges given them by the government, which means they belong to the United States School Garden Army. Prizes will be given to the best gardeners.

Kenneth Swallow, Seventh Grade.

Swat the Fly

Now that we have conquered the Germans, we must tackle another enemy. We should swat the fly every opportunity we have. In order to encourage the killing of flies, we are awarded a good citizen star for killing and bringing to school ten flies.

Ivy Saltmarsh, Seventh Grade.

Germantown

A School Breakfast. The past few weeks the girls in the Senior Cooking Class have been preparing dishes suitable for breakfasts. We thought it best to let our mothers and friends be judges as to our ability as future cooks, so we invited them to a sample breakfast.

On March 27 three of the girls entertained Mrs. Heckman, Mrs. Wehrley, Mrs. Vulich, and Miss MacDonald. Yellow and white was the color scheme. Jonquils were used for table decoration.

The following menu was served:

Cream of Wheat	Grape Fruit	Cream
Puffy Omelet	Coffee	Toast
Cream	Sugar	

We are now preparing luncheon dishes.

Florence Heckman, Seventh Grade.

Clean-Up Day. Wednesday, April the ninth, is a day long to be remembered by the school children of our camp. That morning we came to school armed with brushes, pails, and scrub rags, for it was Clean-Up Day at the school. Each child was assigned duties. The small children wiped the woodwork, while the older children washed the windows and scrubbed the porches. My! how we all worked. By noon the school room was all spick and span.

In the afternoon the doors were closed and our whole attention was turned to cleaning the yard. The yard was raked and the waste material picked up.

We then went into the woods to gather wild flowers and ferns and came back tired but happy.

Bertha Vulich, Eighth Grade.

DAYTON

La Junta Begins Study of Portuguese

La Junta held a special banquet at Henricis on the evening of April 11. About 25 were present, the wives of members being included among the guests. The programme of speeches and music which had been arranged by Professor Woodward and Mr. Matthes was entertaining, the only draw-back being the difficulty which certain members experienced in distinguishing Spanish from Portuguese. They attribute the difficulty to the Bolshevism of the editor's pronunciation.

Herbert A. Bell, who went abroad last August with the Army, returned to his home in Dayton on April 18. He was with the 83d Division, his work being connected with the postal service at headquarters at Le Mans, France. His wife was one of the patriotic women who entered the service of the Conservancy during the shortage of help in the headquarters office last summer. Her work was in the drafting department.

Miss Erma Heater, pillar of the Paymaster's Department, is to be married on May 14 to Mr. E. C. Brumbaugh of the Dayton Savings and Trust Co. As a near neighbor of Miss Heater for many weeks past, we are able to state that in the matrimonial lottery, Mr. Brumbaugh has drawn one of the prizes.

An interesting letter from Sergeant Harold Drake of the A. E. F. in France, has been recently published. Sergeant

Drake is a nephew of Marc Bridge of the Legal Department.

Englewood Imagination Equals Its Pep

Englewood, jealous of the Great Germantown Fish Story, published in our last issue, sees Germantown and goes her one better. It is a mud turtle this time, "a ten-inch turtle." McCurdy claims that one of these "critters" was scooped up by a dragline bucket in the Englewood borrow pit, dropped into a car, dumped into the hog box, washed into the sump, whirled through the dredge pump and a thousand feet of pipe, and blown from the discharge pipe into the hydraulic fill pool, where it calmly rolled over, swam ashore and walked off. The yarn does credit to its source. Come on, Taylorsville, you're next.

An unusual bit of work at the Huffman Dam was the removal of 25,000 cubic yards of rock by the big dragline from one set-up. The rock cut here at its deepest place, the bottom of the hydraulic jump pool, will be 60 feet deep.

An interesting matter connected with the selling of five million dollars' worth of Conservancy bonds, noted not long since, concerns the manual labor of signing those documents. It is very great. To sign each bond singly in the ordinary way, in the case of the ten million dollars' worth originally sold, it is estimated, would take the labor of the president and secretary of the Board of Directors each nearly one week, working eight hours a day. To reduce this labor an ingenious machine has been invented, called the "Signagraph." The business end of it looks not unlike an old-fashioned tooth-harrow, the teeth of the harrow being some eighteen writing pens, which move simultaneously following the movement of a master pen, held in the fingers of the officer who signs the bonds, and which reproduces his signature eighteen times at once. Eighteen separate bonds are slipped under these eighteen pens, one under each, by young women attendants of the machine. Handling the master pen is a little different from working an ordinary one, but the knack is soon acquired, though the signatures are not quite as smooth and clear as the ordinary signatures of the writer. It took Mr. Kuhns, Secretary of the Conservancy District, two and one-half hours working with this machine to sign ten million dollars' worth of bonds, the amount of the first Conservancy issue. The headquarters of the controlling company, called the "Signagraph" Company, are on Broad Street just off Wall Street, New York, where they occupy one floor of the building, operating several machines. They do no advertising, permit no photographs, and sell no machines.

At Lockington

The patient "dinky" snorts and grunts,
As up the grade it gamely shunts
The dump car loaded to the brim
With gravel—to the hopper's rim,
Where Big Boy at attention stands,
With steel bar gripped in ebon hands,
And at the given signal swings
The heavy bar, and bams and bings—
(His swarthy brow with dew-drops flecked)—
The hooks that hold the load erect
Until it totters, creaks and sways
And grumbles, groans and shrieks and brays—
Till, suddenly, with grinding roar,
Like sound of big guns in the war,
Sideways it rocks, with added din,
And dumps the gravel in the bin!

—Elldée in Dayton News.

Many were interested in the exhibit of pictures showing the Conservancy work during the past year, which was shown recently in the windows of the Rike-Kumler Company in Dayton. The exhibit was made at the suggestion of Mr. Rike of the Company. The selection and arrangements were due to G. H. Matthes and Louis Dubois. The exhibit attracted much favorable comment. The thanks of the District are due to the Rike-Kumler Company for their suggestion and for their co-operation in the carrying out of the plan. The exhibit is being shown in the other cities of the valley.

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EXCAVATING FOR THE HYDRAULIC JUMP POOL AT TAYLORSVILLE, MAY 13, 1919.



FIG. 143—BIG FOUR AND ERIE RAILROAD BRIDGE OVER MUD RUN, MAY 5, 1919.

This bridge, situated a little northeast of Osborn in the Huffman Basin, has a total length of 126 feet. It has two end arches of 25-foot, and a center arch of 40-foot span, and provides for two separate tracks 60 feet apart. In reality there are two separate bridges side by side, one for each track, the two connected by the sloping wing walls at the ends. At the left hand end the two structures appear entirely separate, the junction of the wing walls between them being below the surface of the ground. The total width of the double structure is 126 feet. The piers and abutments are supported on 25-foot piles spaced 2 feet 9 inches apart. The bridge contains 2560 cubic yards of concrete and 46,000 pounds of steel reinforcement.

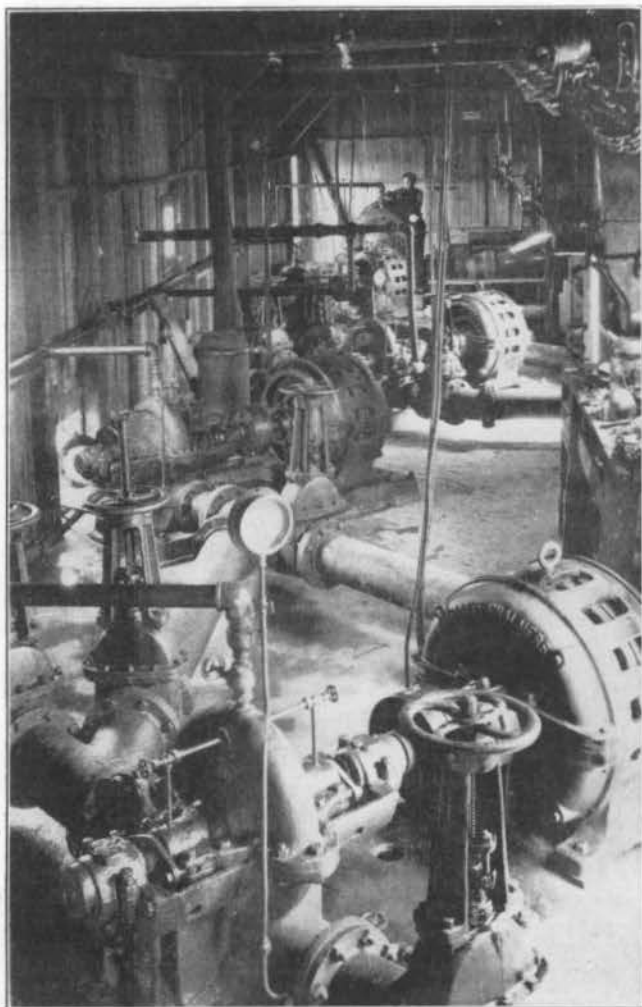


FIG. 144—PUMPS AT TAYLORSVILLE

There are four 6" Allis-Chalmers centrifugal pumps, connected to give 2800 gallons per minute, and 300-foot head as maximum capacity. They are driven by Allis-Chalmers alternating current, 60 cycle induction motors, direct connected to the pump shafts. They supply the 2½" Hendy "monitor" excavating for the hydraulic fill in the borrow pit. A fifth pump (the farthest) supplies the 15-inch low pressure sluicing line. Taken May 15, 1919.



FIG. 145—CONCRETING TOWER, ENGLEWOOD

The concrete from the mixer, seen below at the left, is hoisted in a self-dumping bucket to the projecting platform just below the top, where it is discharged into the chute; and thence by gravity to the forms below. The chute is supported by a steel cable running from the top of the tower to a "dead man" in the ground (out of the picture) at the right. The work is for the concrete inlet channel to the conduits. Taken April 29, 1919.

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THE MIAMI CONSERVANCY BULLETIN

PUBLISHED BY THE MIAMI CONSERVANCY DISTRICT

DAYTON, OHIO

Volume 1

June 1919

Number 11

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Subscription to the Bulletin is 50 cents per year. At news stands 5 cents per copy. Business letters should be sent to L. F. Wilcock, Assistant Engineer, Miami Conservancy District, Dayton, Ohio. Matter for publication should be sent to G. L. Teeple, Miami Conservancy District, Dayton, Ohio.

The Completion of the Germantown Conduits

The concrete conduits at Germantown, with their connected inlet and outlet structures, were finished on May 10. They were the first of these structures to be completed at any of the dams, but will be followed closely by both Englewood and Lockington, at both of which places this work will be completed probably by the first of June.

The length of the entire concrete structure is 840 feet. Its maximum width, which is at the outlet, is 108 feet. The conduits proper are two in number, side by side, and 546 feet in length. The total number of cubic yards poured was 15,368. The work of placing the concrete was begun on October 5, 1918. It thus covered a period of 7 months and 5 days. During this period there were only 23 working days in which concrete was not mixed and placed. Four days were lost because of high water during the flood of March 14-19. Two days the power was off on the electric transmission line, due to transformer troubles. Only one day was lost on account of cold weather, an indication of the unusual mildness of the winter season, during which a large part of the work was carried on. The concrete has been placed with great care, with the result that it is of unusually high grade, especially in the barrels of the conduits. It should be noted that this work does not include the spillway structure, which is entirely separate and will be done at a later stage in the operations. A full account of the work on these conduit structures will be published in an early issue of the Bulletin.

Victory Gardens

The National War Garden Commission appeals to all Victory Gardeners—and this means us of the District—for special effort to make good the loss of fruit in the cold wave of some time ago. The State Horticultural Commission estimates that the loss in Ohio alone by that frost was two million dollars. The appeal is for vegetables to take the place of the destroyed fruit.

"Drop in a few beans, potatoes, and onions"—"plant more vegetables."

Then don't forget to use the hoe on weeds.

Remember also that it pays to use the hoe regardless of weeds, just to keep the ground moist and mellow. It's the "dust mulch" on top which keeps in the moisture that comes up (like oil climbing a lamp wick) from the ground water below.

It is a good plan also to exercise your brain on your garden as well as your hoe. Sweat your forehead on the inside as well as the outside.

Victory Loan Drive

The result of the Conservancy Victory Loan Drive was unexpectedly gratifying. In spite of the unusual attractiveness of the Victory notes as a financial investment, it had not been hoped, with the let-down in public feeling since the armistice, that the figures of the old loan could be approached. The quota set was the same in both drives, \$100,000. This figure in the Fourth Loan was liberally exceeded. The Fifth Loan workers scarcely expected to reach the top. They simply set a high mark to climb toward.

The early showing, due to unavoidable causes, among which was the necessary absence of Mr. Sibley who had charge of the drive, was not such as to change the expectation of those interested. In the Fourth Drive \$70,000 had been subscribed at the end of the first week. In the Victory Drive the figure at the end of the second week had only reached \$52,750.

The third week, however, told a different story. Dayton, for instance, went from \$11,900 to \$26,700 during that week, Huffman from \$5,350 to \$12,500. Germantown, relatively, showed the greatest improvement of any project, running from \$1,500 at the beginning of the week to \$10,300 at the end. The greatest credit, however, must fairly be awarded to Englewood, not only for the last week's record, but for the entire drive. Division Engineer McCurdy, in charge, pulled off in fact a characteristic stunt. He had discovered the value of Englewood pep concentrated in a mass meeting during the Fourth Loan Drive, and he applied the scheme again with even better results than before. He held the mass meeting at one o'clock on Wednesday, May 7, and had every man on the Englewood job at the meeting. It went like an old-fashioned revival, with McCurdy in the pulpit, exhorting the sinners to come forward and save their souls. McCurdy is some exhorter, and in less than fifty minutes had jumped the Englewood subscription, which stood at \$4,250, to more than \$20,000. By Saturday, pay day, the interval being devoted to rolling up the snow ball still bigger, the Englewood total had reached \$27,350. This figure placed Englewood not only at the head of the Conservancy projects in total amount subscribed, but also in the amount contributed per employee, the latter figure being \$82.13. Lockington, however, on the per capita basis is a close second, and on the two drives together, is still well in the lead.

The following table shows the figures for the various projects:

Job	Total Employees	Total Per Capita
Englewood	\$27,350 333	\$82.13
Lockington	16,750 210	79.76
Taylorville	16,450 221	74.43
Dayton	26,700 442	60.40
Huffman	12,500 281	44.41
Germantown	10,300 261	39.46
Hamilton	5,650 191	29.58
R. R. Relocation	11,400	
Total.....	\$127,100	

The per capita for the Railroad Relocation is not figured on account of the fact that the railroad work, where the construction is being carried out by contractors, presents conditions which would make the comparison unfair to the latter. The average per employee of the Conservancy District, excluding the railroad work, was \$57.26, the total for the drive \$127,100. This exceeded the mark set by \$26,150, and the amount expected by a considerably larger sum. The number of persons contributing totaled over a thousand.

The thanks of the District and of the country are due to the patriotic men on all the Conservancy projects, who put their shoulders to the wheel for this fifth and last loan. Special thanks should be

rendered to Mr. Sibley, who led the drive, to Mr. Hauck, the Camp Overseer, who gave much time in operating moving picture machines, and especially to Mr. T. N. Wilson, editor of the Dayton Town Talk, who helped greatly by speaking at several meetings.

The Electric Equipment at Englewood

The leading place in the present issue is devoted to a description of the electrical layout at the Englewood dam. For the matter presented the editor is very largely indebted to Mr. Frank Harvey, the Chief Electrician for the District, and to Mr. Kneer, in charge of electrical work at Englewood. Also to Mr. B. M. Jones, Division Engineer at the Lockington Dam.

Track-Laying to Begin Soon on the Railway Relocation Work

The work of grading on the various relocated railway lines has reached a stage so advanced that track-laying will begin in the near future. There are four of these railways which, on account of running across one or other of the retarding basins created by the building of the Conservancy dams, have been shifted up the valley slopes. On the Baltimore and Ohio 725,000 cubic yards of earth has already been moved, and about five miles of new sub-grade are completed on which track-laying will begin soon. The new track will be of 100 pound steel. The grading on this road has been done by H. C. Kahl, general contractor, represented on the ground by W. J. Hayes. The railway is represented by A. H. Griffith, Engineer of Construction, and P. A. Callahan, Assistant Engineer.

On the Erie and Big Four Railways and the Ohio Electric, grading for all of these being conveniently carried on together, 935,000 cubic yards of excavation have been moved, a large portion of which has been rock from the heavy cut in Huffman Hill. The Erie and Big Four will be located side by side as a double track. About four miles of this sub-grade has been finished ready for the track, which will be of 90 pound steel. Walsh Brothers have been the general contractors for the grading of this work, with W. A. Durkin as Superintendent, the two steam railways being represented by G. P. Smith, Consulting Engineer, and W. Hodge, Resident Engineer. In all about 55 miles of new track will be built, calling for about 165,000 ties. The Ohio Electric, represented on the work by Mr. O. Minnich, will be laid with 70 pound steel. The track-laying on all the roads will be done by contract. The work has been well handled as a whole on all the lines, and will be pushed forward rapidly during the coming season. Much of the grading has been done, working double shift, and the same system will be continued. The interests of the Conservancy District are being looked after by Albert Larsen, Division Engineer.

There were cut in the Marquart Woods in Huffman Basin last winter six of the largest oak logs which have been cut in Ohio in recent years. They are to be used for "spud" timbers for the scows on the Miami River. Three of these timbers are 24 inches square by 24 feet in length. The other three are 21 inches square by 24 feet in length. The largest tree cut was 4 feet in diameter at the base and probably 95 to 100 feet high.

Electrical Equipment at the Englewood Dam

The electrical equipment at Englewood has been selected for description because it is typical, including practically everything found at any of the dams. The advantages of electrical equipment as applied to such work were given in the March Bulletin and will appear more clearly in the present article.

The nature of the Englewood power problem is indicated by the map, figure 147. This dam is the largest of the five to be constructed. Its length, shown in dotted outline, is 4660 feet; its thickness at the base, 740 feet. 3,500,000 cubic yards of earth must be excavated, transported, and placed to form the main structure. The "borrow pit" supplying this earth extends up the Stillwater valley (northward) about three-fourths of a mile. The valley floor averages about a half mile wide. To all of this area, power and light must be delivered. Power and light must also be made available at the camp southwest of the western end of the damsite and for the camp water supply north of the damsite.

This power must be delivered to many different machines of highly varying sizes and for many purposes. There are two powerful electric dragline excavators, taking 280 H. P. each, one working in the

borrow pit, another on the damsite just east of the river. There are two centrifugal dredge pumps, taking 500 H. P. each for pumping the mixed mud and water from the hog box to the hydraulic fill pool. Later, when the dam has risen to a height of about forty feet, two similar machines, of 500 H. P. each must be used as "booster pumps" to help the first two. Two 100 H.P. centrifugal pumps wash the earth from the "hog box" into the "sump." There must be other smaller motors for running the shops, the air compressor, the derricks, unwatering pumps, the gravel washer, etc. In all, some 29 power outlets, totaling 3200 H. P., can be counted.

It is a peculiarity of such construction work also that a number of these power outlets do not "stay put." The draglines, unwatering pumps, etc., must be moved from point to point as the work progresses.

The source of power is the 33,000 volt high tension line of the Dayton Power & Light Company, tapped from the company's main line at Johnson Station, 7½ miles from the Englewood dam. For use, this high pressure is "stepped down" at the Englewood sub-station to 2300 volts. The six

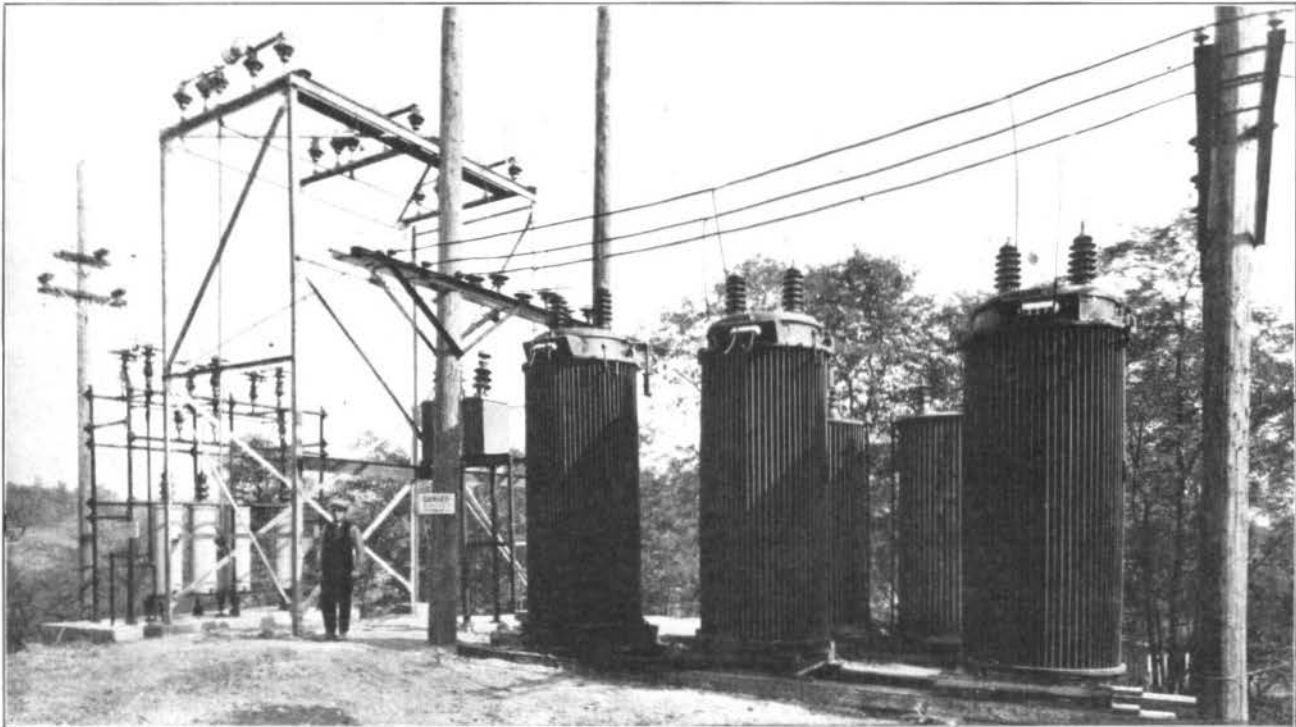


FIG. 146—THE ELECTRIC SUBSTATION AT ENGLEWOOD DAM, OCT. 4, 1918.

This is a transformer station taking its power from the 33,000 volt high tension line of the Dayton Power and Light Company. This is a highly dangerous voltage and to make it safer the current is "stepped down" to 2300 volts in the "transformers," which are contained in the five large tank-like structures seen at the right. (There are now six of these.) The transformed current passes to the work over the heavy wires seen directly over them. For use in the motors it is stepped down in a second set of transformers to 440 volts; for the house lighting to 220 volts. The box-like looking piece bolted to the pole just at the left of the transformers contains the electric meters for measuring the power used on the work. (About 3200 horse-power.) The apparatus mounted on the iron frame work to the left is the lightning arrester, an effective but complicated piece of apparatus described elsewhere. (See page 174.) The apparatus at the top of the high iron frame work consists of three "choke coils" and three "air break" switches to cut off the transformers from the high tension line. The "choke coils" are for the purpose of "choking" the lightning discharges which might come in off the main line, and sending them harmlessly through the cylinders at the left (a part of the lightning arrester) to the ground. (See Fig. 154 and description.)

"transformers" affecting this deliver a maximum of 3217 H. P. The sub-station is located on the hill slope just north of the damsite (see figure 147), far enough up the hill to be safe from flood during construction, while at the same time conveniently near the work.

From this sub-station a pole line, as shown on the map, extends westerly across the Stillwater River and south along the conduits. From this main line, "feeder" pole lines are tapped off to supply the camp and camp water supply; also the dragline excavators, the dredge pumps, and the other motors previously enumerated. The details are given on the map and in the description under it.

From the feeder running north up the center of the borrow pit, cross feeders are run at intervals of 1,000 feet. From these feeders electricity is bought to the draglines by heavily insulated flexible copper cables laid along the ground. These cables are 500 feet long, thus enabling the excavator to work to that distance each side from any of the cross feeders. The cross feeders being 1,000 feet apart, the excavators are thus able to do the work anywhere within the limits of the borrow pit.

These various pole lines at the dam all carry the electric current at a pressure of 2300 volts, except the lines to the camp and camp water supply pump. These carry it at 440*volts. For use in the motors the 2300 volts, which is a dangerous pressure, is transformed to the safe pressure of 440 volts. For house lighting at the camp the pressure is further reduced to 110 volts, the usual figure. The four powerful dredge pumps are an exception, taking current at 2300 volts.

Special precautions are taken to indicate not only danger, but the various degrees of danger and of safety. On the 33000 volt pole line the wire is carried on large brown porcelain insulators; 2300 volt current is carried by small brown porcelain insulators; 440 volt current by large, green glass insulators, and 110 volt current by "pony" green glass.

For inside work the 2300 volt wires are carried on porcelain cleats painted red; 440 volt wires on white cleats and 110 volt wires on round knobs. Thus the workmen can tell at a glance exactly what voltage any line is carrying. In addition "Danger" signs in red letters are hung or tacked upon all apparatus, such as transformers, motors, etc., where accident might occur.

Great Saving in Coal

To those unfamiliar with the subject, a comparison of the coal consumed in delivering power at Englewood from a big central station by electric transmission as against direct delivery by steam boiler and engine on the ground at the dam, may be interesting. It will also explain one reason why electric power was chosen.

A first-class modern steam turbine power plant like that of the Dayton Power & Light Company at Millers Ford, Dayton, has an efficiency of about 14.5 per cent; that is, the steam turbine delivers to the electric generator about 14.5 per cent of the energy

*Note.—14.5 per cent seems a low figure, but a steam engineer will tell you that it is a very high one for steam apparatus. The heat in the steam at the Millers Ford plant is so thoroughly used up, in the passages of the steam turbine, that it comes out actually cold—(75° F.). This

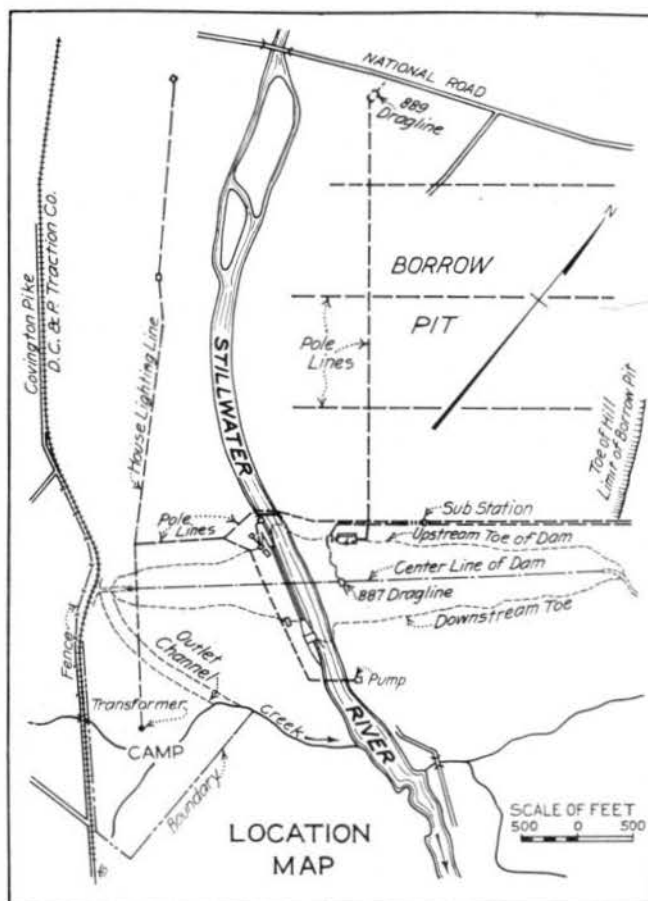
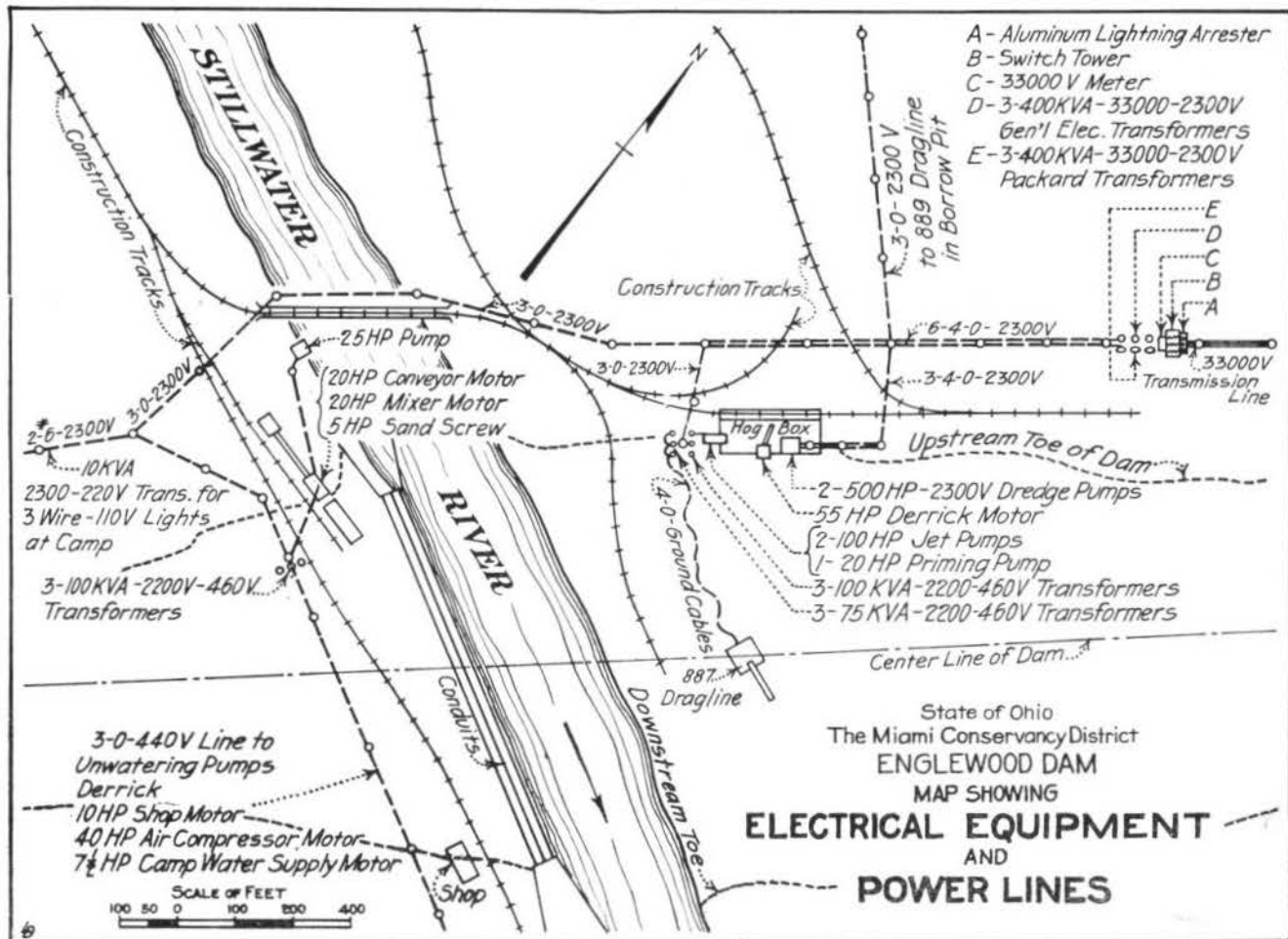


FIG. 147—LOCATION MAP, ENGLEWOOD

contained in the coal burned under the boilers.* The electrical generator converts the energy it receives to electrical energy and delivers it to a "transformer" which "steps" it up from 6600 to 33,000 volts and shoots it miles over the transmission wires to Englewood. The Englewood substation transformer takes it, "steps it down" again to 2300 volts and feeds it through the local wires to still a third set of transformers. These again step it down to 440 volts and deliver it to the electric motor. The motor again transforms it into mechanical energy, which it delivers to a pump or other machine to be used on the work at the dam.

The energy from the coal pile in Dayton to the pump at Englewood is thus passed, from hand to hand as it were, like the buckets at an old-fashioned fire, seven times (including the two steps—fire to steam and steam to engine shaft); but just as every time the fire bucket is carried, or passed from hand to hand, some water spills over and is lost, so with the energy in the Dayton coal. Some of it is lost at each change, till by the time it reaches the Englewood pump, only 11.8 of it remains. (Efficiencies of transmission at the various stages are as follows—coal pile to electric generator, 14.5 per cent; electric generator, 96 per cent; transmission lines and transformers, 92 per cent; electric motor, 92 per

thorough extraction is accomplished by making the steam exhaust into a very high vacuum (28" of mercury). In spite of this fact, 14.5 per cent only of the heat energy in the coal can be delivered by the turbine in mechanical form. Low efficiencies are in the very nature of steam equipment.



The 33,000 volt, 3 phase high tension current of the Dayton Power and Light Company comes in from the right to the substation ABCD. It is carried from this at 2300 volts over the pole lines as indicated in the drawing, excepting in the lines to the camp and houses, and to the camp water supply pump. These are 440 volt lines. Most of the details are indicated clearly on the map. The total power consumed will be over 3000 H. P. when the two booster pumps for the hydraulic fill (which are not shown) have been placed in operation. The greater part of this power will be consumed in the hydraulic fill operations. Two thousand H. P. of this will be taken by the two 500 H. P. dredge pumps at the hog box, and the two booster pumps of the same size. These are direct connected to Allis-Chalmers variable speed 2300 volt A. C. motors. The 16-inch jet pumps are direct connected to 100 H. P. Allis-Chalmers motors. All these pumps are primed by a 4-inch American centrifugal pump direct connected to a 20 H. P. Wagner motor. The dredge pumps are 15-inch pumps. Each of the electrical draglines has a 200 H. P. Westinghouse slip-ring, variable speed motor connected to the hoist cable, and a 75 H. P. similar motor connected to the swing gearing; also a 3 H. P. air compressor motor for working the air brakes and friction clutches. The dragline seen on the damsite, east of the river, will later be placed in the borrow pit with the other. These dragline motors take their power at 440 volts from transformers which can be transported and placed at any point needed next the pole line. The connection of dragline to trans-

former is through three 500-foot cables of No. 0000 B. & S. gage, stranded, flexible wire, with 3/64" rubber insulation heavily varnished and covered with two braids of seine twine saturated with insulating compound. These cables are laid on the ground and can be carried through the borrow pit pools of water without injury. They permit the draglines to operate, with the pole lines spaced as shown, anywhere in the borrow pit. The draglines load the excavated material, much of which is below water level, into dump cars which are transported by 40-ton steam locomotives to the hog box over the construction tracks as indicated.

Minor outlets for power are the shop with its 10 H. P. motor and 40 H. P. air compressor motor, the camp water supply pump motor ($7\frac{1}{2}$ H. P.); and the camp lighting system. There are also motors to pump water to wash the gravel (25 H. P.), to run the gravel belt conveyor and sand screw, and to run the concrete mixer.

The substation is protected from lightning coming in over the main line by a standard General Electric alternating current, aluminum lightning arrester described elsewhere, and on the other side by a standard General Electric multipath transformer lightning arrester. The power is metered by a standard Westinghouse 33,000 volt integrating watt-hour meter, combined with a graphic maximum demand meter which registers the demand during each half hour of service throughout the twenty-four. Charge is made on the basis both of current used and of the maximum demand for current during the month.

cent. The successive multiplication of these factors will give the 11.8 per cent delivered to the Englewood pump.)

With a boiler and engine on the ground at Englewood directly connected to the pump, the last five

steps in the above process of transmission are cut out, leaving only two, to wit: fire to steam and steam to engine shaft. Yet so great is the heat loss in even the best construction boilers and engines in practical use on such work as that at the Englewood dam, that only 4 to 5 per cent of the energy in the



FIG. 149—EXCAVATION FOR OUTLET WORKS BELOW CONDUITS AT THE HUFFMAN DAM, MAY 1

coal is delivered to the pump. The remaining 95 to 96 per cent is unavoidably thrown away.

Thus by steam-turbo-electric-transmission from Dayton to Englewood our pump gets 11.8 per cent of the energy in the coal; by boiler and engine plant right on the job it gets as an average $4\frac{1}{2}$ per cent; a ratio in favor of the steam-turbo-electric-transmission of 262 per cent. Or, putting it another way—the steam-turbo-electric system will deliver at Englewood as much energy from one pound of coal as the boiler and engine on the ground will deliver from 2.6 pounds.

It must be noted that the above figures cover coal consumption alone. They do not cover other factors like first cost of equipment, etc., which greatly reduce the relative advantage of the steam-turbo-electric-transmission system.

Looking at the power problem of a country in its larger aspects, this coal saving is extremely important. The figures given above will indicate why in England today 16 great steam-turbo-electric central stations are planned to be built at the mouths of English coal mines, in all the great manufacturing centers, from which electric power will be carried eventually to every city and village in Great Britain, at an enormous saving both in coal and in waste by coal transportation.

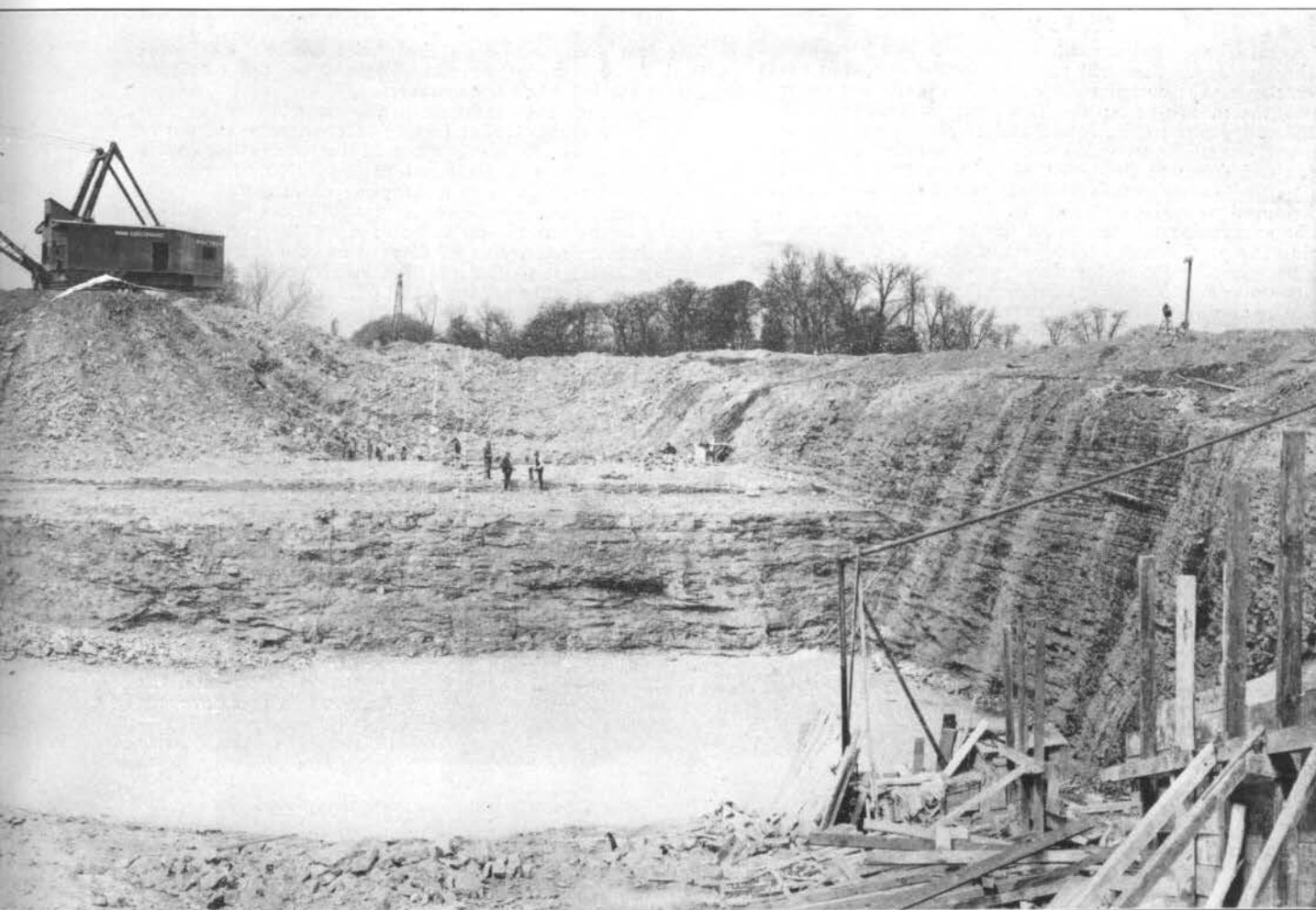
Superintendent F. H. Sprague Resigns

F. H. Sprague, Superintendent of Conservancy work on the Ohio Electric Railway, resigned his post, to take effect May 15, following a period of ill health. Mr. Sprague came with the Conservancy in April, 1918, and was superintendent of masonry on the Big Four Railway Relocation until that work was completed, when he was transferred to the Ohio Electric Railway construction. Mr. Sprague did excellent work and his departure is to be regretted. He expects to engage in his old work as a contractor with headquarters at Utica, N. Y. His place on the Ohio Electric will be taken by Leslie Wiley, who has been his efficient assistant on that work.



FIG. 150—CROSS-SECTION OF 33,000 VOLT ELECTRIC LINE TO ENGLEWOOD

The three round spots (a trifle over a quarter of an inch in diameter) show the exact size of the three wires which bring the high tension electric current to Englewood from the Dayton Power and Light Company's central station. The electrical pressure is stepped down from 33,000 to 2300 volts in the substation at Englewood (shown in Fig. 146). Thirty-two hundred horse-power of electrical energy will come into the Englewood substation, at maximum output, through the three $\frac{1}{4}$ -inch wires shown above.



MAXIMUM WIDTH OF EXCAVATION 220 FEET. MAXIMUM DEPTH 65 FEET. SEE ALSO FIG. 155.

May Progress on the Work

GERMANTOWN

On May 10 the last of the concrete was placed in the structure, excepting the permanent floor in the conduits, which will be placed in the future, after the earth work of the dam is completed. The total amount placed was 15,368 cubic yards. This marks a definite turning point in construction progress, as most of the work in the future will be confined to the hydraulic fill of the dam.

Considerable progress has been made on the hydraulic pumping plant during the past month. The dredge and monitor pumphouses have been erected and the equipment installed. Also the concreting of the dredge pump sump and "hog box" floor have been completed.

The cross-dam along the north bank of Twin Creek is in process of construction preparatory to placing the hydraulic fill. The earth is placed in the cross-dam by the large dragline. Men work on top of the embankment thus formed, armed with long pipes or nozzles connected to a water pipe and hose. With these nozzles they bore vertically down into the embankment, forcing the water, which is delivered under a high head, into the ground, thus forming a semi-hydraulic fill. At present this cross-dam is about two-thirds completed.

A semi-hydraulic fill is also being placed along the conduits. The earth is shoveled in by hand and water then pumped over the earth to insure a final settling and good bond between the earth and the concrete.

Arthur L. Pauls, Division Engineer.

May 15, 1919.

LOCKINGTON

To date, 27,700 cubic yards of concrete have been placed in the outlet structure, and it is expected that the con-

creting will be finished during the month except for the spillway weir and the bridge spanning the structure. These will be built when the dam has been practically completed.

The outlet channel is practically finished, both slopes having been graded and trimmed. The upper 200 feet is riprapped on both sides, while the lower part is surfaced with rock waste on the east bank and grassed on the west. A considerable amount of the excavated material has been worked into the dam, along the lower slope between the outlet structure and the creek.

The cut-off trench has been excavated from the outlet works to the creek and the material, being suitable, was used in the toes of the dam. The Class K dragline which has been doing this excavation is moving to commence the entrance channel. It is working both day and night shifts.

The installation of equipment for sluicing and pumping the hydraulic fill into the dam is proceeding satisfactorily. The monitor pump house is finished and the 15-inch monitor supply pipe has been laid. The foundations in the sump are ready to receive the dredge pumps. The floor and walls of the building have been concreted. Deepening of the supply channel in the bed of the Miami and Erie Canal north of Lockington is under way and will be completed about May 24. The 12-inch dredge pipe is on the ground and preparations are being made for laying it at once.

A stretch of the east end of Road 8 is practically completed. The 2300-volt power line has been extended to the west end of the dam for operating the Class K dragline when it is at work placing fill in the dam across the creek.

Barton M. Jones, Division Engineer.

May 17, 1919.

HUFFMAN

A total of 8600 cubic yards of concrete has been placed in the structures that will form the outlet for Mad River when the dam is completed. 4200 cubic yards were placed during the month of April. The floor in this structure is completed down to the lower end of the piers that form the conduits. The two side walls are completed from the upper end down to the point where they slope up to the top berm. Other sections below this have been started and poured to various elevations.

The excavation for the outlet works has been continued during the past month. The part of this work required to prepare the foundation for the concrete work is approaching completion. The part of the material taken out in the above excavation, needed in the fill for the relocation of the railroad, has all been placed, and at the present time the material is being placed below the dam, along the bank of Mad River.

Work has begun on the construction of the sumps and storage bins, from which the material for the main embankment of the dam will be pumped.

C. C. Chambers, Division Engineer.

May 17, 1919.

HAMILTON

The Buckeye Street sewer work has been completed. The street repaving over the trench will be done as soon as the backfilling has settled thoroughly.

The excavation for the Wood Street sewer has been completed for a distance of 300 feet from the outlet, and concrete has been placed in the apron and in part of the sewer.

The Class 14 Bucyrus dragline has completed the levees for the hydraulic canal across the north spoil bank, and a railroad embankment from the Pennsylvania railroad to the Ford tractor plant. This embankment will be used by the District for a dumping track to start the filling of the spoil bank. This dragline will now proceed with the excavation for the tail-race for the new hydro-electric plant of the Hamilton & Rossville Hydraulic Co.

The completed levees have been seeded to grass during the past month and top soil is being placed on the levee and berm south of the Columbia bridge.

Clearing on the north spoil bank has been completed.

The total amount of material moved to date by the two draglines, not including second handling, is 510,000 cubic yards.

C. H. Eiffert, Division Engineer.

May 14, 1919.

TAYLORSVILLE

The hydraulic sluicing during the last month made fair progress in spite of the fact that the working face in the excavation is crossing some comparatively low ground, where the depth of the earth on top of the rock runs from about twelve to twenty-five feet.

We are also using up the cast iron dredge pump runners that were on hand. This caused rather frequent changes of the runners. The average dirt removed per hour for the month of April was 119 cubic yards, measured in the excavation, or 146 cubic yards measured in the dam.

The Lidgerwood Dragline is making fair progress on the rock excavation in the outlet works. The face of the excavation is now about fifty feet high, and the Cincinnati a few feet back from the exposed surfaces, is found in rather thick, heavy, horizontal layers. A number of these run from three to five feet thick. These, of course, break up into very heavy blocks when shot, many having to be drilled and shot again before they will go into the dragline bucket. This makes the work of the dragline slower than it would be otherwise.

Most of the form work for the concrete arch bridge on the center line of the dam, over the re-location of the B. & O. R. R., has been finished, and the steel re-inforcement has been placed in the footings ready for the concrete.

Two more double houses and a number five cottage are under construction. The number four that was recently burned is also being reconstructed.

A location has been worked out for the proposed road from the east end of the dam, running north to join the National pike at the top of the bluff east of Tadmor.

O. N. Floyd, Division Engineer.

May 19, 1919.

ENGLEWOOD

The last arch section in the outlet conduit was completed April 30. Substantial progress on the retaining walls at the inlet has been made.

Work on the cross dam east of the river is steadily progressing, the embankment having reached a height above its base of about 25 feet. Material for this work comes from the main borrow pit, north of the dam, and is spread by means of a large electric dragline excavator.

One steam and one electric dragline are excavating material in the borrow pit to be used for the construction of the dam. Four trains of 12-yard air dump cars transport this material to the hog box where it is mixed with the requisite amount of water and pumped into the dam by means of 15-inch centrifugal dredge pumps. The progress on this work has been so satisfactory to date that it can confidently be predicted that the date of completion will be well within the schedule time. Furthermore, the character of the material in the borrow pits is fulfilling all expectations as to its quality for the construction of a hydraulic fill dam. Both pumps are operating 20 hours per day and averaging well over 4,000 cubic yards of embankment built per day.

Work on the new highways is proceeding as favorably as the rainy weather will permit.

H. S. R. McCurdy, Division Engineer.

May 15, 1919.

RAILWAY RELOCATION

B. & O. Relocation. The general contractors, Grant Smith and H. C. Kahl; subcontractors, Condon & Smith, Vang Construction Co., and Kahl Bros. Construction Co. excavated during the last month 85,000 yards, making the total excavation about 77% complete.

The steam shovel work from Tadmor to Miami River bridge is all done now with the exception of about 10,000 yards in cut at Stop 8 road.

The Vang Construction Co. have completed the big cut north of Johnson Station.

This completes all of their steam shovel work except the east railroad levee.

Condon & Smith have started a team outfit at the extreme north end of the work.

Their shovel is making good progress in the cut north of Tadmor. Preparations are being made to begin track laying. Material will soon be delivered for this work.

Ohio Electric Railway Relocation. All footings and columns have been completed for the reinforced concrete trestle over Mud Run northeast of Osborn. This work has been done under the direction of F. H. Sprague. He has also made a fine start on the 18-foot fill north of the Mud Run trestle, using a stiff leg derrick with 1-yard dragline bucket on each side of the fill. Clearing has been completed for the right of way over Smith Ditch and Mad River northeast of Osborn. Contractor J. C. McCann completed one mile of grade by using slip and wheel scrapers, and is arranging to put a small steam shovel in the heavier cuts.

Big Four and Erie Relocation. The Walsh Construction Company, encountering very hard material to excavate in the big cut at Huffman Dam, removed 37,300 cubic yards of rock during the month of April. George W. Condon has two elevating grader outfits at work cleaning up the light grading work on the line and also has his steam shovel working northeast of Fairfield. This shovel has taken one cut through the hill down to grade, moving, together with the grader outfits, a total of 44,700 cubic yards during April. Mr. Condon is now grading the highway change through Huffman Dam camp.

All the steel rails required for the entire Erie track have been unloaded in the Erie East Dayton yards.

Albert Larsen, Division Engineer.

May 19, 1919.

DAYTON

Total channel excavation to date is 395,000 cubic yards. A total of 275,000 cubic yards has been placed in levees and spoil banks. In accomplishing this work 615,000 cubic yards has been handled.

Dragline D-16, one of the large machines, has been placed on the 40 ft. x 80 ft. scow and has completed the channel excavation along the south side of Mad River below Webster Street. The material, after being placed on the north side of Mad River channel, was moved into the spoil bank by the other large dragline.

The small caterpillar dragline, D-19, has excavated a channel under Main Street bridge to afford sufficient depth for the passage of D-16 under the bridge at a later date. This machine is now building an earth cofferdam for use in constructing an extension to the storm sewer at McKinley Park.

The surfacing and seeding of the slopes along Van Cleve Park has been nearly completed. Tile pipe extensions have been made to sewers at Webster Street and at Van Cleve Park. Work of extending the 6 ft. diameter concrete sewer at Herman Avenue is now under way. A concrete wall has been constructed in the yard of the Central Fire Station at Main Street. Good progress has been made on the construction of scow No. 5. The closure of Sunset Avenue dam has been accomplished since the last report.

The work of trimming slopes and cleaning up on the work above Island Park is nearly completed.

At Price Bros. plant, concrete blocks for the flexible

revetment are now being turned out at the rate of about 1200 per day. The total output to date is about 20,000 blocks.

C. A. Bock, Division Engineer.

May 28, 1919.

RIVER AND WEATHER CONDITIONS

No serious floods occurred in the Miami Valley during the month of April. Although the rivers were swollen somewhat about the middle of the month, due to the rainfall of April 14 to 16, inclusive, dangerous stages were not reached in any of the streams. The rainfall at the District's stations varied from 3.33 inches to 4.60 inches. The total precipitation at the Dayton U. S. Weather Bureau Station was 3.57 inches, or .67 greater than normal.

At the Dayton U. S. Weather Bureau station the mean temperature for the month was 51.4° F., or 0.2 of a degree less than normal; there were 7 clear days, 8 partly cloudy days, and 15 days on which the precipitation exceeded .01 of an inch; the average wind velocity was 11.4 miles per hour, the prevailing direction being from the southwest; and the maximum wind velocity for five minutes was 36 miles per hour from the north on the 24th.

Ivan E. Houk, District Forecaster.

May 21, 1919.



FIG. 151—DRAGLINE ON SCOW, DAYTON, MAY 14, 1919.

The scow, 40'80"x7' in dimensions, has two 12" and four 6" longitudinal bulkheads extending the entire length of the scow and dividing it into five longitudinal compartments. These bulkheads are built up by 12"x12" and 6"x12" timbers respectively, forming built-up beams 80 feet long by 6 feet in depth. These bulkheads are braced longitudinally by 6"x6" diagonals extending between the floor and deck cross timbers and bolted to the bulkheads. These bulkheads rest upon nine 12"x12" floor timbers extending from side to side across the scow, with 18 6"x12" intermediate floor timbers spaced between. A similar system of deck timbers is used. These floor and deck timbers are braced by double cross-diagonals 6"x6" in size. The deck planking is 3"x8" and the bottom planking 3"x12". The four spuds are 24"x24"x20'. They are driven by Wagner alter-

Dragline on Scow

The dragline as shown weighs about 200 tons. The vertical timbers in the foreground are the "spuds." There is a spud at each corner working up and down through the hull, driven by electric motors. Forced thus against the bottom of the river, they keep the scow steady while the dragline is excavating. The picture shows the scow, canted about six feet out of level (by thrusting down on the two right hand spuds), so that the men on the raft can recalk the joints between the side planking, the tilt being sufficient to raise the lowest joint out of the water. By canting first one way and then the other, both sides were thus recalced.

nating current induction motors of 3 phase, 60 cycle type, carrying current at 440 volts, developing 20 H. P. at 725 R. P. M. The drive to the spud rack is through three sets of gears and pinions.

The base frame of the Bucyrus Class 175 B dragline is about 25 feet square. This base rests on stiffening trusses run lengthways of the scow, the propelling trucks of the dragline being removed. The stiffening trusses are simple triangular (king) trusses, 12 in number, each formed of a 50-foot 12"x16" southern pine timber laid lengthwise upon the deck of the scow, with a 2 1/4" tension rod running from the timber ends to the bottom of the scow below the center of the timber, the center post of the truss being formed by timber crib work built between the floor and the deck timbers.

Departure of W. R. Yount

The Bulletin regrets to record the departure of W. R. Yount of the Railroad Relocation Division, who goes on June 1 into the employ of the Frank Hill Smith Co., Inc., to be one of their superintendents of construction. His work for the present will be in Dayton. Mr. Yount came with the Conservancy August 12, 1918, and has been assistant engineer on the Big Four and Erie construction work.

A small granite boulder about 7 inches long and 6 inches square, was recently caught in the circular intake chamber of one of the 500 H. P. dredge pumps at Englewood and ground off by the revolving runner in a groove 3 inches wide and an inch deep. What causes wonder to the uninitiated is to see a stone of such a size (it weighed 33 pounds) sucked up the nearly vertical intake pipe of a pump. Many stones somewhat smaller go through regularly

Six Months Progress of the Camp Community Associations

It is now nearly six months since the first Camp Community Association was organized at the Taylorsville damsite. Since that time the idea has had a fertile development, and a report of what has been achieved is well worth presenting.

The fundamental idea was that the government of the camp community should not be imposed by those who had charge of the construction work at the dams, but should be democratic, initiated and carried out by the workers themselves, the camp citizens. The story of its inception and early development at Taylorsville is given by O. N. Floyd, the division engineer in charge there, as follows:

"As soon as we began planning our construction camps, Mr. Morgan expressed a hope to see the people of the various camps work out for themselves some sort of camp government that would be responsible for all the activities of the community life and co-operate with those in responsible charge for the District in the matter of schools and other accommodations which must be provided by District funds.

"Following this suggestion of Mr. Morgan, as soon as our camp began to form, Mr. Daubenspeck took a very active interest in the subject, and got some books from the Dayton Public Library on governments for small towns and on the various forms of commission government. These forms of government were discussed frequently with the men on the job who were living in camp, or who expected to live in camp, so that before any definite action was taken we were fairly well agreed that we wanted a commission form of government without a manager. Mr. W. D. Rogers (the superintendent of carpenters at Taylorsville) also took a very active

interest in getting our organization started and the enthusiasm with which it was received in the beginning was due largely to his work among the men.

"On November 22, 1918, a preliminary meeting was held and committees were appointed to draw up a constitution and by-laws. Credit for the clear, short form of our constitution and by-laws is due largely to Mr. A. O. Aulabaugh, who was then our field clerk. The constitution and by-laws were accepted, with a few minor changes, on November 29, 1918, and officers were elected at the same meeting. It is not stated in our constitution that those in responsible charge for the District are not eligible for

office in the Community Association, but this was understood and so stated at the time the constitution was adopted. We are convinced now that this was a very wise policy."

The Taylorsville constitution provides for government by five elected commissioners, in charge respectively of Community Service (camp improvements, gardens, transportation, religious and relief activities); Social Service (entertainments, sports, etc.); Education (including circulating library); Records and Finance; and Safety, (health, sanitation, fire, police, etc). There is no manager. The commissioner receiving most votes becomes chairman, a presiding officer only.

The association at Taylorsville was highly popular from the first, and launched into a number of activities, notably those of a social, religious and educational character. These will be noted in relation to some of the other camps where many of the same things were done.

The results have been marked. "The general spirit



FIG. 152—RESIDENCE OF A. F. McCARTHY, TAYLORSVILLE, MAY 20, 1919.

Taken May 20, 1919. Horticulture is a religion with Mr. McCarthy. He worshipped one Sabbath day in this yard and garden (with rake, spade and wheelbarrow), from 5 a. m. until 9 p. m., with brief stops for meals. The rear door yard gets as careful attention as the front lawn,—“for the horticultural gods see everywhere.”

of our community has been excellent,” says Mr. Floyd, “and very democratic. We are all very proud of our camp and every one is doing what he can to make it a pleasant place to live in, and for our visitors to look at and enjoy.” One of the notable achievements was a banquet, with scores of guests, invited from all over the Conservancy District, and carried out with an enthusiasm which made Taylorsville the talk of every other camp and “boosted” the camp community idea (the vulnerability of the human stomach as an avenue to the will and intellect being well known), as perhaps nothing else could.

For the idea had not caught at once in the other camps. It took time. In the end, however, it proved irresistible. Englewood, for instance, where it was the last to get started, has carried it, in some directions, farther than any other camp, and is developing it with great vigor and vitality. Englewood grafted onto the original scheme the idea of the city manager (at Englewood called the "Association Manager"), making the Commission a legislative body pure and simple. But the spirit is the same and the results have been striking, due in large part, perhaps, to the fortunate selection of the first manager elected, Mr. Arthur E. Kent. Much has been due also to the co-operation of Mr. McCurdy, the division engineer. Some of the results achieved, as reported by Mr. Kent, are given below.

"An old farmhouse in camp has been remodelled into a very attractive Community House. Club rooms are provided for the ladies upstairs and for the men on the lower floor. One end of the building constitutes a good sized hall for dances, entertainments and motion pictures. There is also a booth for a motion picture machine. In addition there is a small kitchen for use in preparing refreshments, etc. The Association has purchased a good player-piano for the hall and a pool table for the men's clubrooms. A travelling library has also been secured and placed in the Community House. The latter, besides affording a place for dances and public entertainments, provides a gathering place for people in camp desiring recreation and informal good times..

"Paramount-Artcraft pictures, the best on the market, are shown every Wednesday evening. Englewood was the first of the camps to secure this service. The Association has hired an operator and a Powers machine belonging to him which is installed in the booth. Most excellent service is thus obtained. The player-piano provides music in connection with the pictures. The pictures shown are equal to anything to be found at theaters in Dayton, showing such stars as Fairbanks, Hart, Marguerite Clark, Mary Pickford, Elsie Ferguson, etc.

"Among the most pleasurable features of the social life in camp are the dances. Regular dances are held at the hall on Saturday evenings on an average of twice a month. In addition a dancing class under the direction of Miss Elizabeth Jordan, is held every Monday evening. The class is well attended and very popular, particularly among the younger people in camp. A nominal fee is charged and the proceeds go to the piano fund.

"Englewood started the ball rolling in the baseball line by being the first to challenge the other camps of the District to a series of baseball games for the championship of the District.

"The school children have planted school gardens under the direction of Mrs. Everdell, camp school teacher. There are seventeen gardens in all, uniform as to size, and in the kind and amount of seed planted, etc. Accurate and careful records are to be kept of amount of produce from each garden and cost of time, labor, and materials put into each one. Prizes will be given to the children having the best gardens.

"A great deal of work has been done in camp toward making it more beautiful and attractive. The residents have responded to the movement in a most commendable way and have expended both money

and labor in beautifying their cottages with shrubbery, vines, flowers and lawns. The only thing provided by the District to the residents of the camp cottages was grass seed. Everything else has been at their own expense and will not only do much to enhance the natural beauty of the camp, but will add to its value in dollars and cents. Several have gone out and cut sod where they could find it and made a sod lawn for themselves. There is much competition between residents of cottages as to who will have the most beautiful place. In March nearly two hundred young trees, elm, hard maple, basswood, oak, and ash were dug in the woods and transplanted in avenues along the streets in camp."

The Association at Huffman Camp was not started until January 21, nearly two months after Taylorsville organized, but here too, once started, the idea has proved very fruitful, and has developed in characteristic ways, as the following notes, contributed by Miss Mildred Goss, in charge of the Huffman school, and by Mr. C. C. Chambers, the Division Engineer in charge, will show.

"The Library and Reading Room (in the Community Hall which was fitted up by the Association) was opened on February 23. In addition to writing facilities, the room is equipped with about twenty different magazines and periodicals, and two daily and Sunday papers. A travelling library of fifty volumes has been secured through the State Travelling Library Department.

A piano has been purchased for the Community Hall.

A night school has been opened for the foreign laborers.

Fire apparatus has been placed in the village and a small house built as a fire station. All bunkhouses have been equipped with fire extinguishers. (These recently proved their worth in putting out a bunkhouse fire which without them would inevitably have burned the building to the ground.)

A Domestic Science room and a Manual Training room has been built in the Community Hall, and classes started in both subjects.

Flowering plants have been ordered from a Dayton florist, to be used in beautifying our yards.

A tennis court and a baseball ground are being laid out.

A park and playground is being fitted out, with swings, slides, and a wading pool for the children.

A community lawn mower has been purchased.

Probably the biggest thing the Association has done (which cannot be definitely expressed as an item of work), is the creation of a spirit of co-operation for the intellectual, social and physical improvement of the citizens in the camp."

The outstanding contribution to the Association idea evolved at the Germantown Camp has been the Germantown Club, an amusement organization within the Association proper, centering its activities in a clubroom. Similar clubrooms have been organized at the other camps, but nowhere else has this feature been so fully and successfully developed. A sketch of it is furnished through Mr. C. O. Shively, to whom especially its success has been due.

"This idea was an outgrowth of a desire on the part of the commissioners of the Association to furnish amusement and entertainment to the employees at Germantown Dam during their idle hours, and also to serve as a means of financing the Associa-

tion. Consequently a vacant bunkhouse was selected and the interior suitably remodeled for a club room.

"The club room was furnished with the idea of giving the greatest variety of entertainment possible. A portion of the room was set aside for a pool table; a portion for a reading and game room and still another portion was set aside for the refreshment counter where ice cream, soft drinks, cigars, candy, tobacco, etc., are sold.

"The problem of managing the club house was solved by employing a club house manager, who gives his entire time to the task. It is the duty of the manager to handle all sales, maintain orderly conduct, and keep the club room in good condition. Supplies for the refreshment counter are purchased by the purchasing agent of the Association.

"When the Association was formed its membership was solicited and \$275 was raised. On this small amount a pool table and supplies were purchased. This drained the treasury nearly dry. However, the sales began to grow rapidly from the very start and all anxiety on the financial score was dissipated. The pool table alone (at 2½ cents per cue) averaged \$3.00 per day, which is enough to meet all overhead expenses. In the first seven weeks the club house cleared about \$100 over and above all expenses. The average daily sales amount to about fifteen dollars. The monthly profits will average between fifty and sixty dollars. This, however, we expect will increase as the weather becomes warmer. Many visitors add materially to the sale of ice cream and soft drinks on Sundays. We feel that financially the club has proven a success, which will enable the Association to accomplish many things on a large scale, such as a Fourth of July celebration, Christmas entertainment for the children, etc., which would otherwise have been impossible.

"To what extent has the club benefited the employees and the community at large? It has reached the foreigner as well as the laborer. Not only do all classes of laborers congregate at the club in the evenings to play pool, read or enjoy one another's company, but also the foremen and the engineers meet and mingle with those present.

"The club house had eliminated the "nothing-to-no-place-to-go" spirit which had invaded every bunk house in the camp prior to the opening of the club. It has proven itself worth while."

Toward the financial expenditures made by these Associations it needs to be said that the Conservancy District contributes no money whatever. It does contribute the use of the Community Hall at

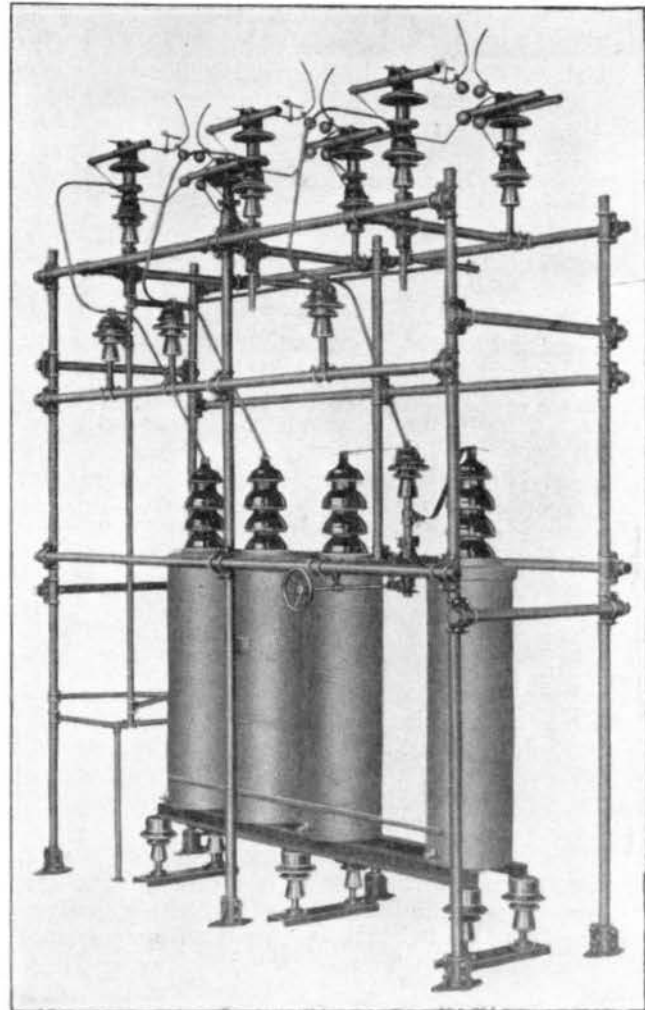


FIG. 153—LIGHTNING ARRESTER, ENGLEWOOD

The view is incomplete, not showing the "choke coils," nor the "ground plate" which is buried in the earth below. One of the three choke coils can be seen in Figure 146. It is the highest piece of apparatus at the near end of the higher iron frame work in that figure. For explanation of Lightning Arrester see below.

each camp, with the necessary light and heat, considering that the gain to the District in the morale of its workers, which is unmistakable, more than repays its expense. The cost of all the activities of the associations, excepting the item mentioned, is borne by the voluntary contributions of the camp citizens.

The Alternating Current Lightning Arrester at Englewood

The discharge is so directed that instead of passing through the expensive apparatus of the substation, it is led harmlessly, along a by-path provided, into the earth. The essential parts, in order, beginning at the top (Fig. 154), are the "choke coil" (AB), the "spark gap" (CD), the aluminum cell (E), and the ground plate (F) buried in the earth. The copper wire connections are shown by broken lines. Supposing the line working as usual. The current comes from the line at A and passes through the choke coil to B and on to the transformer at the substation. It cannot get from C to D because to do so it would have to jump across an air gap, either from one sphere to another or across the "horns" at H.

When a discharge from lightning comes in over the transmission line, however, the action is quite changed. The choke coil, which is simply a coil of heavy copper wire shaped like an old-fashioned bed spring, has the peculiar property that it resists the tremendously sudden rush of the lightning discharge, just as a very heavy door resists an attempt to suddenly open it. Checked at the choke coil, the discharge jumps one or other of the gaps provided between C and D and on through the aluminum cell E to the ground at F, where it dissipates harmlessly. The gap between C and D, once bridged by the lightning discharge, the regular line current is able to follow. The aluminum cell, however, has the property of resisting very

A Word About Our Technical Reports

That the work of the Conservancy District is beginning to attract wide attention is well known, and is indicated by the many requests for information concerning it, and by the ever increasing number of visitors to the sites of the work.

It is not so well known, however, that this interest has gradually spread to quite remote parts. To be told that the University of Saskatchewan possesses the complete series of our Technical Reports down to the very latest number; that the universities at Melbourne in Australia, Pei Yang in China, and St. Martial College on the Island of Haiti have these reports on their shelves, is to say the least, startling. Such is the case, nevertheless, and many other distant localities could be cited, but the list is too long.

Since the cessation of the war, renewed interest in the work being done by the Miami Conservancy District has manifested itself from every civilized corner of the globe except Europe. Many orders for Technical Reports have been received since the first of the year. Frequent letters express gratification at the excellent presentation of the matter in the reports, and its value to the engineering profession and to the public generally.

The list of subscribers contains not only professional engineers, but many institutions of learning who find in these reports valuable material for instruction; also many concerns who find in them matters of direct interest in connection with undertakings of their own, which though unlike the Miami Conservancy work, frequently possess points in common with it.

Over one thousand individuals, corporations, and institutions have thus far purchased Technical Reports, most often in the form of complete sets. Among them are found the names of more than 150 well-known consulting engineers, 41 city engineers and county surveyors, 69 colleges and universities, and 27 public libraries. The latter number represents probably less than half the libraries which have actually obtained Technical Reports, as the libraries of colleges, universities, government and state institutions are not included in this number.

Institutions of public and semi-public character number 72. Conspicuous among them are the United States Government offices in the War, Navy, Interior, and Agricultural departments, state institutions, such as departments of health, conservation commissions, reclamation departments, flood control districts, highway departments, and railroad commissions. One bureau of the U. S. War Department purchased 75 sets. The U. S. Office of Public Roads and Rural Engineering bought 30 copies of the Report on Great Storms. Eighteen prominent railroad companies through their chief engineers or presidents appear on the lists; also 19 water power companies.

Particularly gratifying is the ever increasing interest in the work of the District shown by residents of foreign countries. Chief among these are naturally our Canadian neighbors, who live in a country abounding with hydraulic problems. From them more than 60 orders for reports have been received. Other countries represented are: British India, Japan and China with 7 each; Australia, Cuba, Hawaii and the Philippines with 5 each; Great Britain with 3; Chili, Haiti, and Tasmania with 2 each; and single subscribers in Argentina, Brazil, Guatemala, Italy, New Zealand, Norway, Nova Scotia, Panama, Peru, Porto Rico, Rhodesia (South Africa), and Sweden. In British India the chief engineers of public works departments or the secretaries to the government of 14 provinces possess the technical reports. This list includes 8 foreign universities and colleges. To the figures quoted for China and Japan might be added a number of orders received from Chinese and Japanese students taking technical courses at American universities.

It will be noted that the European countries are conspicuous by their absence or poor representation. The war period and the unsettled conditions resulting from it are mainly to blame for this. We hope that after lasting peace has been restored there the interest in civil and scientific pursuits, including the work of the Conservancy District, will be revived.

Gerard H. Matthes.

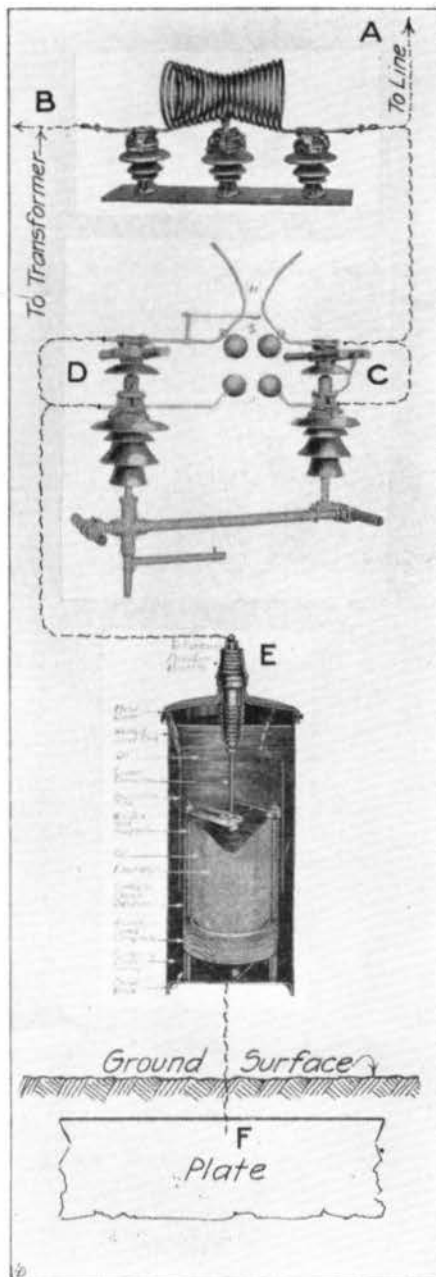


FIG. 154--LIGHTNING ARRESTER PARTS

strongly the line current, (while permitting the lightning discharge to pass readily). Meanwhile the white hot "arc" of heated air which carries the current across the gap from C to D creates a violent uprush of air, (precisely as at a fire), which blows it up the diverging horns at H, until it is finally blown out at the top, (as a candle is blown out). This breaks the path to earth entirely and the line current resumes its old course through the choke coil to the transformer at the substation.

The entire apparatus is shown in Fig. 153, except the three "choke coils," for which see Fig. 146 and caption thereto. Fig. 153 and the parts of Fig. 154 are reproduced by courtesy of the General Electric Company's office in Dayton.

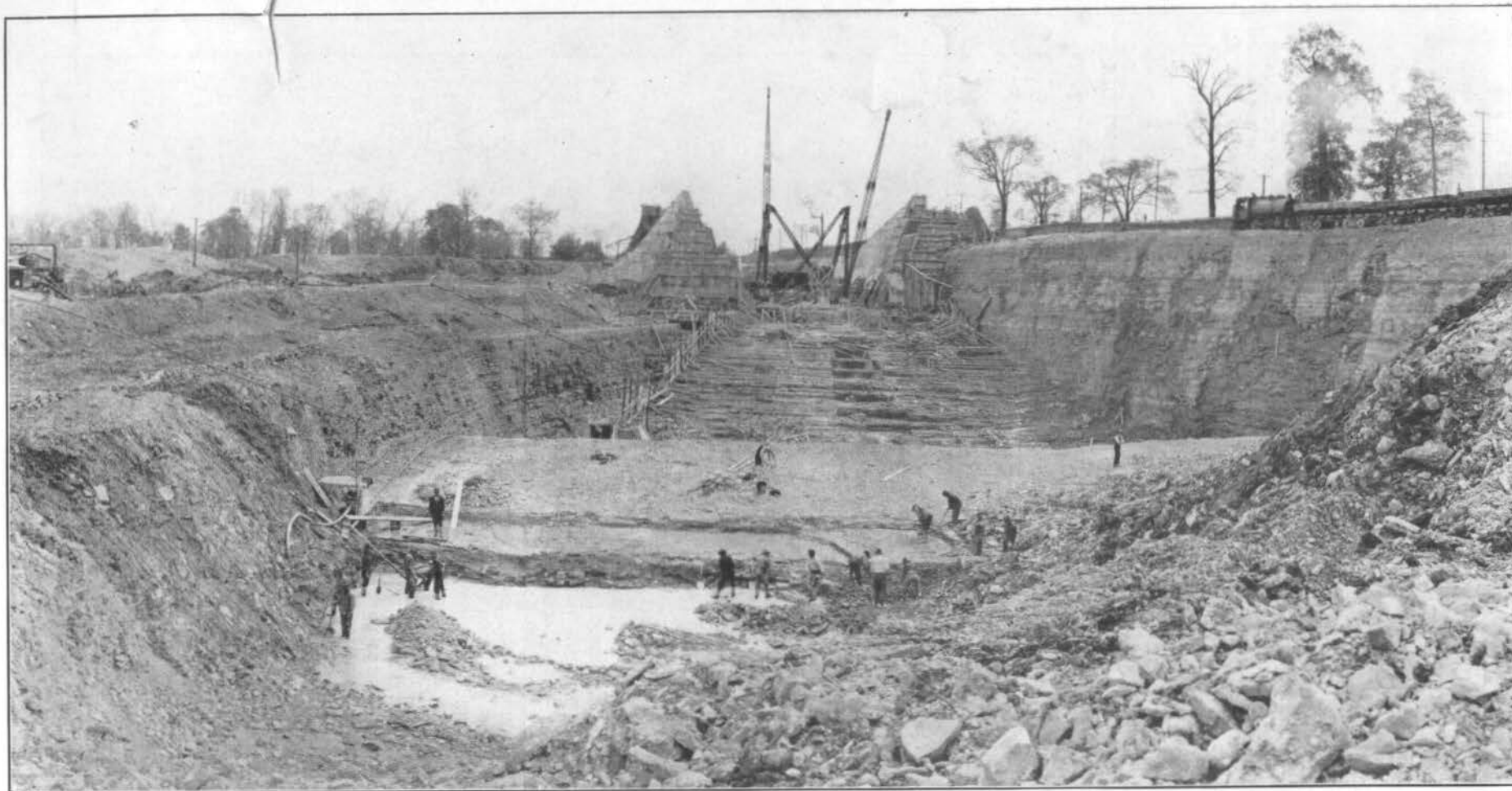


FIG. 155—HUFFMAN OUTLET EXCAVATION, AND CONDUIT AND SPILLWAY STRUCTURE WALLS, MAY 15, 1919.

The picture is taken from a point beside the dragline excavator seen in the center of the double page picture, Figure 146. The structure is being built in the old bed of Mad River, which has been diverted and now flows several hundred feet to the left outside the picture. The river will be turned back again and come down between the walls as seen. The space between the walls will be blocked by a cross wall, which also supports the "spillway" crest or "weir" to carry excess water in times of heavy flood. Three concrete conduits built side by side will pierce the cross wall at the bottom and take the ordinary river flow. The general plan is the same as that at Lockington, described in a previous Bulletin.

The dam, of earth, will be built to the right and left of the walls as seen, across the valley, the top of the dam being about 20 feet above the highest point of the walls, as shown in the picture. The slope of the walls follows what will be the slope of the earthen part of the dam. The left hand wall has a base thickness of 45 feet, narrowing to a thickness of three feet at the top. It is founded on solid rock. The right hand wall, 12 feet in thickness at the base, is built on rock bottom and against the solid rock wall at the right. From the top of this rock wall

it rises uniformly with the left hand wall to the same top thickness. Between the walls the concrete floor is 5 feet thick on rock foundation. The distance between the walls widens as they come downstream, following the descending rock stairway which appears.

The concrete was mixed at the gravel washing plant seen just behind the left hand wall in the distance and brought to the work in $1\frac{1}{4}$ -yard dump bottom buckets, carried on small platform cars pushed by a gasoline locomotive. The buckets are lifted and dumped in the forms by the double electric derrick seen in the center of the picture. The booms are 100 feet in length and are used also to move the concrete forms.

All the rock in this excavation seen in this picture and in Fig. 146 was drilled and blasted and then removed by the dragline excavator seen in Fig. 146. This machine did remarkable work. At one setting it removed 25,000 cubic yards of rock. It excavated the bottom of the pool in Fig. 146 from approximately the same level as that on which it stands in the picture, a vertical distance of 60 feet. It is a Class 24 Bucyrus electric dragline with 85-foot boom.

THE MIAMI CONSERVANCY BULLETIN SUPPLEMENT

"The News Letter"

To Promote the Conservancy Spirit on the Work

June 1919

GERMANTOWN

May Day Party

A very pretty May Day party was given by Mrs. Arthur L. Pauls at her home on Thursday afternoon, May 1. The house was artistically decorated with lilacs and spring blossoms. A unique May basket hung from the ceiling of the living room and was filled with pretty gifts for the honored guest, Mrs. Clarence Shively. Guessing contests furnished the afternoon's entertainment, and a delicious luncheon was served. The guests included the ladies of the Camp and Mrs. C. W. Faber of Dayton, Mrs. David Benadum of Reynoldsburg, and Miss Minnie Foehr of Mt. Auburn, Cincinnati.

It's the Gay Life at Germantown

On May 2 the Social Committee gave another one of their delightful dances. Mr. Harnish and Mr. Dressel furnished the music for the evening. Light refreshments were served. They again entertained the Camp at a dancing party on May 16th. A candy sale was held during the evening by the school children and ladies of the camp. The Italian orchestra furnished a few selections which were thoroughly enjoyed by all present.

Amongst the Children Also

On Saturday, May 3, a delightful party was given by Mrs. Walter Somers in honor of Miss Dorothy's tenth birthday. A delicious dinner was served, the table being beautifully decorated in pink and white, with a large birthday cake bedecked with ten pink candles. Many pretty gifts were given Miss Dorothy by the following little guests: Misses Carol Bacon, Francis Spader, Eylene Davis of Franklin, Martha Kern of Germantown and Lucille, Berndetta and Jesse Carlton.

On Thursday afternoon Miss Berndetta and Lucille Carlton entertained their little playmates. The hours were from 4 to 8 p. m. A delicious supper was served and a most enjoyable time was spent by all the children.

Sunday School Class

May 4 Mr. and Mrs. Shively entertained at a Sunday dinner Mr. and Mrs. Bruce Lloyd, Mr. and Mrs. Don Wallace, Mr. and Mrs. G. E. Faber, Mr. and Mrs. Steve Malone and Mr. and Mrs. Clifford Lamb.

And Ohio Not Yet Dry

Mr. Chris Foehr and P. W. McGinnis spent the weekend in Cincinnati.

Mrs. Cecil Sandiford was called to Chicago, Ill., on May 11, owing to the death of her sister. We all extend our heartfelt sympathy to Mr. and Mrs. Sandiford.

On Monday evening, May 5, a Victory Loan Jubilee was held in the Mess Hall.

All of the Germantown campites are glad to welcome Mr. and Mrs. Harnish, Mr. A. P. Naumann and Mr. Geo. Baker into our community life.

HAMILTON Engineering Notes

An electric signal system has been installed at Hamilton to control operation on the construction railroad. These signals were designed and installed to protect loaded trains on the steep grade and curve between the dragline and

spoil bank, and are operated by brakemen on both in and outgoing trains.

Mr. Price, of Price Brothers, Dayton, visited the Hamilton work May 17, and looked over sites suitable for the manufacture of concrete blocks for the flexible revetment.

Sure It Wasn't a Blind Pig?

Since Germantown and Dayton have had their freak tales, now comes Hamilton with one over which you can have either a horse laugh or a nightmare. The electric dragline recently removed a horse from the channel. The animal being blind, again walked into the river and was again removed. On the next swing of the bucket a complete motorcycle was landed.

Look Out, Englewood!

Hamilton's bowling team closed its season April 29, at which time J. E. Faist rolled the high score of the season, 213. Schrader has second high score with 211, and Eiffert third with 206.

Now that bowling is over, Hamilton expects to convert her talent into a fast baseball team. Englewood, take notice.

LOCKINGTON

Smith Leads Victorious Campaign

The subscriptions to the Victory Liberty Loan amounted to \$16,450, exclusive of the amounts taken by our men in other loan districts, figures for which are not available. This amount represents \$1.02 for every dollar on the pay-rolls for the period covering the loan campaign. The amount sold per capita was \$79.20. The Shelby County loan committee has awarded us a large honor flag, as the amount credited to us is over 60% of the quota for the entire township in which our camp is situated. The flag is now flying between the walls of the entrance channel. W. J. Smith, Jr., led the salesmen with a total of \$5700.

Lockington Belle Belled

On April 30, Miss Elizabeth Raffery and Lawrence J. McWilliams were married at Newark, Ohio, and after a short honeymoon came to their home in the camp. A few nights after their arrival their friends brought out all the noise-making instruments in this part of the country and proceeded to have an old-fashioned "belling." Mr. Dave Haldane acted as master of ceremonies and as soon as he could make himself heard, presented the happy couple with a living room table, the gift of their friends on the job.

Hauck Brings Price of Peace

Bad weather cut down the attendance at the movie when "The Price of Peace" was shown. Those who were able to attend, appreciate the kindness of Mr. Hauck in coming through a severe storm to furnish the entertainment.

ENGLEWOOD

Kansas Cyclone and Then Some

The Victory Liberty Loan Campaign at Englewood ended with a whirlwind finish which resulted in an over-subscription of nearly fifty per cent of our quota and put Englewood first in the Conservancy District, both in total amount subscribed, \$27,350, and in per capita subscription, \$82.13. After a thorough personal canvass of the camp had been made by the members of the loan committee, arrangements were made for a mass meeting and drive immediately after dinner on Wednesday, May 7. A platform

THE MIAMI CONSERVANCY BULLETIN

was built in front of the store and a dial divided into twenty sections, each standing for a thousand dollars was drawn on beaverboard and suspended above the platform. Five sections were filled with red and blue color to represent the amount raised by personal canvass. An orchestra from the Englewood High School played some patriotic airs and the National Anthem to start things off. Next came a snappy, straight-from-the-shoulder, inspiring talk by Mr. McCurdy. Following this, subscriptions were started and rolled in in a flood. Men subscribed not only once but four or five times. When the drive ended less than fifty minutes after it began, the dial was not only filled but over a thousand dollars in addition, a total of over \$16,000 for the drive, or around \$350.00 per minute. Subscriptions continued to come in surprising volume for the balance of the week and enabled Englewood to make a record of which it feels it can be justly proud.

We'll All Be There

Plans are progressing for the Fourth of July celebration here. Hand bills will be sent out to the other camps with program, etc., for the day some time in advance of the Fourth.

Miss Jordan Teaches Terpsichoreans

A dancing class has been started in camp under the direction of Miss Elizabeth Jordan and meets every Monday evening at the Community Hall. It has proven very popular, particularly with the young people, and from forty to fifty are in attendance at every meeting.

First Blood for Englewood

Our baseball team is busy at practice every evening the weather permits. A good diamond has been laid out. Games with Taylorsville and Germantown have already been booked. Our first game of the season was with an outside team, Phillipsburg, and resulted in a victory for Englewood to the tune of 8 to 1.

The ladies are planning a box social and dance and other social events for the near future. They have been enjoying a social hour every Thursday afternoon, in connection with business meetings, the different ladies taking turns as hostess.

Baby No. 1, an A No. 1, and a Donovan

Mr. and Mrs. C. W. Donovan are rejoicing in the arrival of an eight and one-half pound boy, born May 14. Mother and babe are doing nicely. Mrs. Donovan is the daughter of Mr. and Mrs. P. D. Haskell. Baby Donovan has the distinction of being the first baby born in the Englewood Camp.

Sorry to See You Go, Mr. Rupe

Mr. H. H. Rupe, Carpenter Superintendent here, has severed his connection with the District to accept a similar position on the construction of a large hotel in Sioux City, Iowa. His departure has been delayed by the serious illness of his thirteen months old child with double pneumonia. We are glad to know that the baby has recovered and is now out of danger. Everyone regrets the departure of Mr. and Mrs. Rupe and wishes them well in the new work.

Englewood Sees Stars

Mr. Kent, camp overseer at Englewood, has been enabled to secure for the camp movies, the very best pictures on the screen. The list includes such stars as Douglas Fairbanks, Marguerite Clark, Mary Pickford and others of like calibre. While ordinarily these pictures are rented to individuals only in consideration of a substantial deposit and at a rental charge that would be prohibitive to the management of one of our construction camps, in this case the cost is so reasonable that expenses can be comfortably cleared with an admission charge that is within the reach of all.

After showing at Englewood the pictures are sent to the Taylorsville camp.

The Paramount Artcraft pictures every Wednesday evening at the Community Hall are being greatly enjoyed.

HUFFMAN

Another Wedding Belle

On Wednesday evening, April 16, twenty-three of our campites, armed with tin cans, whistles, and other means of making a noise, gathered surreptitiously at the home of Mrs. R. M. Mark. About 8:30 all silently proceeded to the

home of Mr. Megley, where a "belling" was given our new bride and groom.

After a gun salute the bride appeared at the door and invited the party in. Several brought small joke gifts to the newly weds, which afforded much merriment. Delicious refreshments were served and a pleasant hour was spent by all.

Mr. and Mrs. Carpenter left next day on their honeymoon. They will reside in Cambridge, Ohio.

Mother Goose Visits Huffman

The Huffman School was closed on Friday, May 9, to enable any who wished to attend the big Mass Day held at Fairfield High School. All the schools in Bath Township closed for the summer on that day. An excellent Mother Goose Pageant was given at 9:30 in the morning, a basket lunch was enjoyed at 11:30, and the Eighth Grade Graduation took place at 1:30.

Four Generations of Chambers

Mrs. V. M. Chambers and Mrs. Sarah Cleaver were guests at the home of Mr. C. C. Chambers during Easter week. Four generations of the Chambers family were represented.

Association Pep

At a meeting of the Huffman Community Association on Wednesday evening, May 7, it was voted to organize a baseball team, to start an ice cream parlor and pool room, and to award prizes to the children for their school gardens.

Nomination of officers to be elected at the June meeting took place. Mrs. Chambers was elected to take charge of the Bulletin Notes for July and August, while Miss Goss is at home on her vacation. A librarian is also to be elected by the Education Committee to substitute for her during those two months.

A lawn mower has been purchased by the Association for the use of the campites and better electric car service is expected soon. We are to have a post office here and a committee is now deciding upon a name for it.

Dr. Sayler was appointed as a committee to call a meeting of the men and organize a baseball team. This he has since done.

Our school gardens have been planted and three prizes have been offered the children by our Community Association.

Social

We deeply regret that we have lost Mr. McMillen's family from our midst.

On Wednesday afternoon, April 23, the ladies of the Sunshine Club were delightfully entertained at the home of Mrs. C. C. Chambers. Ice cream and cake were served for the hostess by the Misses Geneva Sayler, Betty Mark and Jeannette Swerking.

On Wednesday afternoon, May 7, the Sunshine Club met at the Community Hall, Miss Mildred Goss being the hostess. Refreshments were served by the Domestic Science Class under her direction.

On Thursday afternoon, May 8, Miss Betty Mark gave a party in honor of her eleventh birthday. Games were played by the children and candy was served. Everyone had a very pleasant afternoon and wished Betty many happy returns of the day. The hostess received many useful and pretty gifts from her little friends.

On Monday evening, April 21, a Hard Times Party was given in the Community Hall. Everyone came dressed in the most threadbare clothes they could find and many good laughs were enjoyed as first one, then another, entered the hall. Excellent music was furnished for dancing by a Dayton orchestra, and everyone had a good time.

Mr. J. S. Gena is on his vacation at the home of his parents in Wellsville, N. Y. Mrs. Gena left us on April 23 to spend the summer there. Mr. Ray Jackson from the city office is substituting for Mr. Gena while he is away.

TAYLORSVILLE

Mr. Cole at Large in a Ford

W. W. Cole drove into camp a week or so ago in a Ford, saying that now he intended to see the country. He made a good start, for the following Sunday he took a party of six to visit the Germantown Dam.

THE MIAMI CONSERVANCY BULLETIN

EDITORIAL

Board of Editors

Germantown	Miss May Turner, C. O. Shively
Englewood	Mrs. Wm. Heller, D. N. Henry
Lockington	C. H. Shea
Taylorville	Miss Coral Benedict, W. D. Rogers
Huffman	Miss Mildred Goss
Hamilton	R. B. McWhorter
Dayton	Miss Mayme McGraw

Macbeth's Dragline

We mean the Lidgerwood machine at Lockington, the one that loads gravel trains at the stock pile. The Lidgerwood people call it a "Class B." That's a mistake. It's a Class A. Or Double A. It's the best kept dragline we have seen. The Old Dutch Cleanser Lady, who "chases dirt" with a stick, has nothing on Messrs. Macbeth and Ennis. They would rather sweep than eat. And when they're not sweeping they're scrubbing and wiping up. The steam boiler—it's an upright—gets a bath twice a week in black engine drippings. It shines like a new plug hat. The hoisting drum gear casings get it twice a day—reg'lar. You could eat off the floor and relish the meal. They don't keep count on floor sweepings—it's "as often as necessary"—and then some. And they don't get cross grained when you track in and muss things up. They seem to enjoy it; it gives them another "whack" with the broom, not at you but at the floor. At any rate, Mr. Macbeth keeps a sign hung out (across his countenance we mean)—"Visitors Welcome,"—through muddy weather and all. He apologized for a few crumbs of sand on the floor of the drum pit—the accumulation of an hour from the loading cable.

And the machinery is kept tuned up as taut as the floor is neat.

We Have Paramount Pictures Also

We are now running moving pictures every Thursday night. On May 1 we had Wm. S. Hart in "Shark Monroe;" May 8 Chas. Ray in "The Hired Man;" and May 15 Mary Pickford in "Rebecca of Sunnybrook Farm."

Our First Fire

One of the cottages occupied by Mr. J. J. Helmer, burned Thursday, May 1. This is the first fire we have had in camp.

Death of Mr. Larkin

Mr. B. F. Larkin died Wednesday, May 7, at the hospital at Cincinnati, and was buried Friday, May 9, in Highland Cemetery, Covington, Ky. He is survived by his wife, a daughter and two sons.

But What Was the Score?

Taylorville ball team played Englewood Sunday, May 18, at Englewood.

On Saturday evening, May 3, a benefit dance was given in Community Hall by the Ball Team, the music being furnished by a Dayton orchestra, and ice cream and lemonade served. After all expenses were paid \$59.00 was left to put in the treasury.

Sergeant McCarthy Returns

On May 14, Sergeant F. H. McCarthy, of the Ordnance Dept., returned from Camp Lewis, Washington, where he was instructing classes regarding machine guns and rifles. His last month in the service was spent driving a large truck on a recruiting trip through Washington, demonstrating machine guns. Now that he has returned to civilian life, he will drive the delivery truck for his father, A. F. McCarthy, our chief steward.

Religious

Easter Sunday we had two fine religious meetings. In the morning the children gave a very interesting program. Mrs. Petty sang a beautiful solo, and Mr. Floyd gave a short talk on the lesson. In the afternoon Rev. Shannon, of the Bonebrake Theological Seminary of Dayton, preached an interesting sermon, which was followed by a testimonial and song service. A large crowd attended both meetings. Rev. Zimmerman preached to us Sunday, May 4th.

Twenty-six people from Taylorville attended the evening services at the United Brethern Church at Vandalia, on Mother's Day.

Sergeant Wayman Gives Victory Loan Talk

On Thursday evening, May 8, Sergeant Wayman, of the Canadian Army, gave a Victory Loan talk in Community Hall. Sergeant Wayman saw active service on many of the fronts in France, and his experiences were very interesting.

Social and Personal

Thursday evening, April 24, we had a Community Indoor Picnic. The ladies of the camp furnished the supper, which was very much enjoyed by everyone; indeed so much so that one man alone consumed eight pieces of pie. After the supper everyone danced, the music being furnished by an orchestra from Dayton. We all just hope there will be more indoor picnics like this one.

The ladies have held meetings every week during the past month. Mrs. B. H. Petty presided as chairman at the first meeting. Those who have presided since then are Mrs. W. W. Cole, Mrs. Hobert Axsom and Mrs. D. J. Holahan.

OUR JUNIOR EDITORS

Taylorville

Gardening. The Taylorville school children are very much interested in gardening. Twelve children are eagerly working for the prize. Lettuce and onions are up. But this everlasting rain is discouraging to us farmers.

Ernest L. Rogers, 8th Grade.

Victory Loan. Taylorville is not a very large place. There are not near as many people as there are in Dayton. But there were enough to buy Victory loans to bring our soldiers back home again.

John Yancik, 5th Grade.

Study. It's awful to study in hot weather and we sure are studying at Taylorville. Our hard study shows as our school work is improving. Fractions and decimals were worse than the Germans, but we've gone over the top, and I think we all know them backwards and forwards.

Agnes Hinton, 5th Grade.

Germantown

School Window Boxes. The boys in the Manual Training Class have made window boxes for the school building. The children in the third grade planted phlox and climbing nasturtiums in them. We water and take care of them.

Kenneth Wehrly, Third Grade.

The Indoor Picnic. On May 8th the Germantown Camp School was invited to a mass meeting and picnic at the State Road school house. Because of the heavy rainstorm it was necessary to postpone it.

We decided to have a picnic anyway. We had a picnic dinner at school that noon. The Domestic Science girls spread a large table and served cocoa with our lunch. After lunch we played games and had a pleasant afternoon regardless of the weather.

Stella Heckmann, Sixth Grade.

Our School Gardens. On April 21 we started the school gardens. Our plots are ten by fifteen feet. We planted radishes, lettuce, beets, carrots, peas, and potatoes. At the end of the school year the gardens are to be judged and prizes awarded. We all hope to make our gardens a success.

Martha Hancock, Sixth Grade.

Englewood

A Playlet. Some of the girls of Englewood school entertained the other pupils Friday afternoon, May 9th, to a play entitled "City Ignorance."

—Characters—

Isabel Williams	}	Country Maidens
Capitola Mitchell		
Ivy Saltmarsh		
Myra Saltmarsh		
Mary Williams		City Girl

The country girls expected a great deal from the girl coming from the city, but discovered she was as ignorant

THE MIAMI CONSERVANCY BULLETIN

to country ways as they were to city ways. This was a pleasant ending for a rainy week.

Myra Saltmarsh, Third Grade.

A Debate. The seventh grade in our school has had two debates in the last month. The first one was, "Resolved, That the Amazon River will be of more importance in the future than the Mississippi."

Affirmative—Ivy Saltmarsh, Glenn Gibson.

Negative—Mary Williams, Kenneth Swallow.

The affirmative won.

Chester Patrick, Sixth Grade.

Huffman

School Garden. We made our gardens May 15th. They were fifteen feet long and ten feet wide. We had whatever we wanted to plant in them. Each person was given potatoes, lettuce, cabbages, and tomatoes free.

I planted lettuce, radishes, beets, peas, beans, onions, and twelve hills of potatoes. There were nine gardens altogether. The rows ran north and south.

We had to cut our own potatoes to plant in our garden.

Three prizes have been offered for the best gardens by the Community Association.

Edward Swerking, 7th Grade.

DAYTON

Echo

When April steps aside for May,

Like diamonds all the rain-drops glisten;

Fresh violets open every day;

To some new bird each hour we listen.

—From Delco Doings.

The Imagination of McIntosh

Our big master mechanic stopped long enough one day in his usual rush pass the Bulletin Office door to favor the editor with the following:

It relates to a pair of robins which he claims built their nest on the top end of the boom of the steam dragline working on the levee at Middletown. Now that dragline has been "booming" in at least two senses—Mr. Donald Jeffrey, the contractor, moving a thousand yards a day with a yard and a half bucket, three trips a minute to and fro, the end of the boom traveling back and forth over an arc about 120 feet long—which makes over 700 feet a minute. Such little difficulties don't faze these robins of McIntosh at all. They build their nest, the mother lays her eggs and calmly sits on them amid the uproar of the dragline drums and engines, while she and her nest and eggs sail through the air. At last accounts this dragline was being dismantled, the work at Middletown being completed and the machine starting for Huffman on another job. Whether these heroic robins succeeded in raising their young our Big Chief was unable to state. Severe cross questioning failed to shake the above story in any particular.

That will do for a robin's nest. The editor has a sparrow's nest up his sleeve which, if space permits, he will bring forth next month.

P. S.—Later: In dismantling the dragline, the nest was placed by the men in the fork of a nearby tree, but the old birds were unable to understand, and never went back to it.

R. C. Weber of Dayton, the original Office Assistant at the Headquarters' Office, who went into the army in July of last year and who has been at St. Maixant, France, in the air service, returned home on May 5. He recently favored his old associates of the office with a call.

La Junta

Every Friday noon sees a good proportion of La Junta at Elder & Johnston's, where a lunch, fellowship and some Spanish are enjoyed. Progress is being made in the study of grammar, about one-fourth of Hills and Ford's "First Spanish Course" having been covered to date.

Mr. L. F. Wilcock has resigned as Secretary-Treasurer on account of not having the necessary time to devote to the duties of this office. Mr. D. E. Field was unanimously elected to fill this vacancy.

The club is growing also, now having a total membership of twenty-one. Of the fifteen charter members, three have resigned because of leaving the employ of the District, or being transferred to work outside of Dayton. Ten

other members have been elected since the formation of the club. One of these has resigned.

La Junta has subscribed to five magazines, specifically for the use of members. These are kept on a table in Mr. Matthes' office and may be borrowed at any time. Three of these, "Ingenieria Internacional," "Boletin de la Union Panamericana" and "El Norte Americano," are in Spanish. The other two, "Bulletin of the Pan-American Union" and "The South American," are in English. All are very interesting and instructive.

We learn with regret that two of the young men on the engineering force at Germantown are obliged to watch their step these days with uncommon care. The vigilant marshal of Germantown village has his eye on them.

Mr. Johnston, Assistant Electrician for the District, informs the editor that the tall transmission line pole at Piqua, shown in the May Bulletin, is 85 instead of 65 feet high as given. Some skyslick.

W. M. Caye, who was captain in the U. S. Field Artillery in the A. E. F. in France, has resumed his work with the District. He is at present Assistant Engineer under Mr. Kimball in the Dayton Office, but engaged on the Hamilton work. He left the Conservancy in July, 1916, to enlist in the National Guard, in which he saw service on the Mexican border. He went overseas September 1, 1918, and was fortunate enough to get to the front on the famous Chateau Thierry sector.

Ladies Take Notice

Olaf Froseth of the Railway Department recently bought a magnificent automobile horn—and a Ford to run it. He goes by people like a rat terrier, baying to beat a bloodhound—real dangerous.

E. E. Neukom, District Photographer, has charge of the window display which was seen last month in the Rike-Kumler Company's window in Dayton, showing progress of Conservancy work during the first year of construction. These pictures are being shown in the other cities in the valley. Mr. Neukom's name should have been mentioned in our last issue, with Messrs. Matthes and DuBois, as one of the original architects of the display.

Making a Garden

The shades of night were falling down,
As Parsnip Pete, who lived in town,
Pushed back his chair and dried his chin,
Rolled up his sleeves and sighed, and thin
Arose and cleared his throat and said,
"Now here's where I spade up that bed!"

And suiting action to the spiel,
He rustled up with eager zeal
His trusty spade and in one bound
Soared from the house and reached the ground,
And stabbed the festive turf with joy—
Then pried and pried and pried—oh, boy!—
Until at last with mighty heave,
His biceps swelling in his sleeve,—
Clink—clank—he threw up on the sod
A china gaboon from Cape Cod!

"By blank!" cursed Pete, his feelings hurt,
"I thought for sure that patch was dirt!"—
"Oh, well"—again he stabbed the muck,
And once again his spoon got stuck.
He gamely worked this way and that
And brought to light at last a hat;
And followed with a freight car spring,
A hitching post, a teething ring,
A cave man's shaving mug, a nail,
The wishbone of a jaybird's tail,
An eave spout and a pair of sox,
A brick and 57 rocks!

"Pe-tee—Pe-tee!"—in tinkling tone
A sweet voice chimed, "Come in, my own!
It's time to hit the fragrant hay;
Tomorrow is another day!"

—Eldee.

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THE MIAMI RIVER AND THE NEW LEVEES

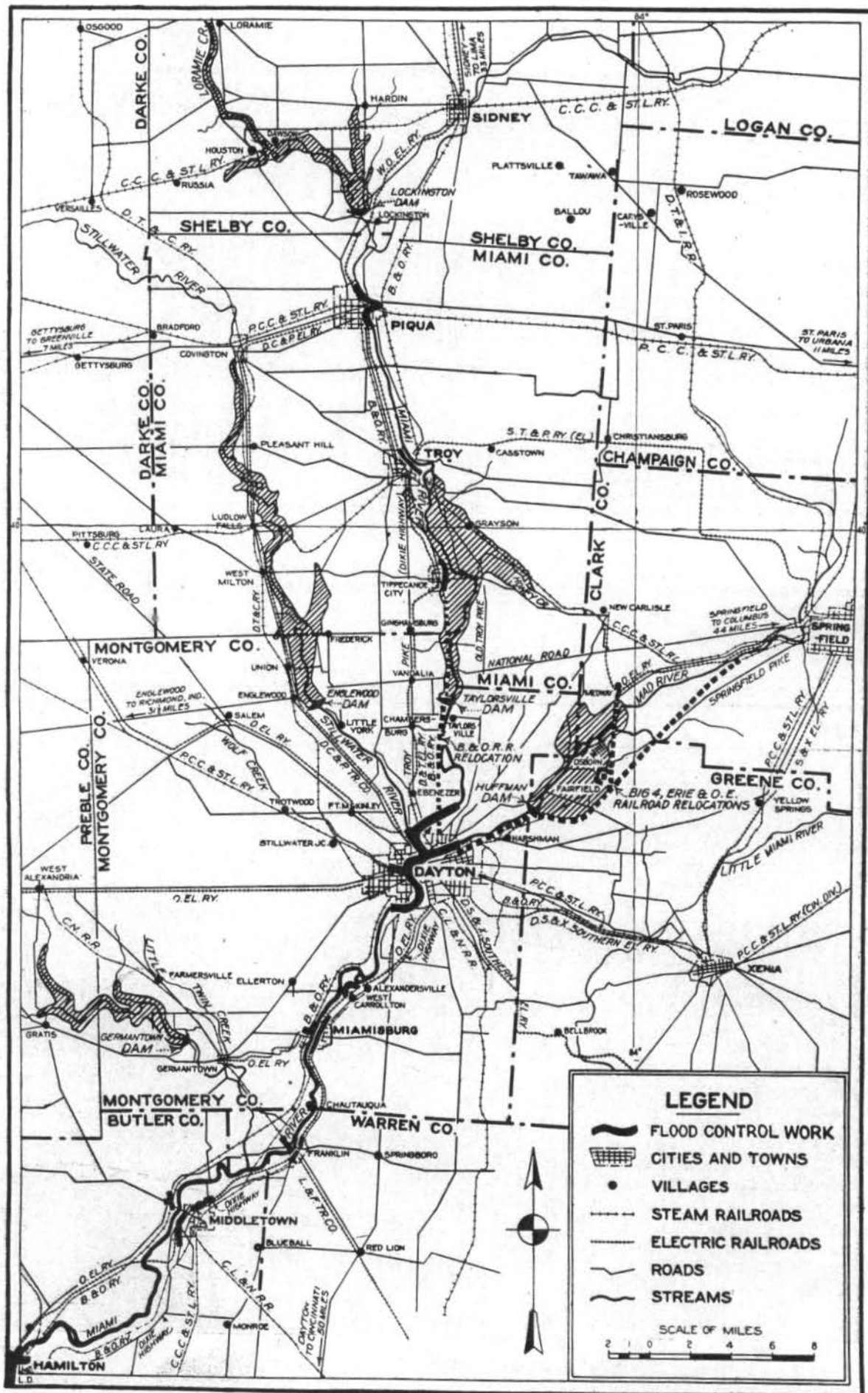


FIG. 157—MAP SHOWING WORK OF THE MIAMI CONSERVANCY DISTRICT

BOARD OF DIRECTORS
Edward A. Deeds, President
Henry M. Allen
Gordon S. Rentschler
Ezra M. Kuhns, Secretary

Arthur E. Morgan, Chief Engineer
Chas. H. Paul, Asst. Chief Engineer
C. H. Locher, Construction Manager
Oren Britt Brown, Attorney

THE MIAMI CONSERVANCY BULLETIN

PUBLISHED BY THE MIAMI CONSERVANCY DISTRICT

DAYTON, OHIO

Volume 1

July 1919

Number 12

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Subscription to the Bulletin is 50 cents per year. At news stands 5 cents per copy. Business letters should be sent to Office Engineer, Miami Conservancy District, Dayton, Ohio. Matter for publication should be sent to G. L. Teeple, Miami Conservancy District, Dayton, Ohio.

Visit of Representative Engineers

The District recently had a visit from a group of representative engineers who came as guests of the Flood Prevention Committee. The object of the visit was to inspect the work in progress and to observe the character of the construction. This particular time was chosen on account of the completion of the concrete conduit outlets at Germantown, Englewood, and Lockington, referred to in another editorial. For the two first particularly, since they will soon be covered up with the earth fill, the present time offered the best opportunity for examining the character of the concrete construction. At the same time the hydraulic fill had progressed to a point where the stability of the earth dams was also in evidence.

The visitors included men who in the past had served in a consulting capacity for the Miami Conservancy District, together with a few other prominent engineers who had been particularly helpful to the District with advice and suggestion. Coming as guests, they were not asked to express any opinions as to their impressions concerning the character of the work. The value of their visit to the District lies in the fact that as representative engineers with personal knowledge of the character of the work being done, their visit will inevitably lead to a more widespread confidence in the integrity of the construction and in the consequent security of the Miami Valley.

While it seemed wise to extend a special invitation to this particular group of men at this time, representative engineers are always welcome. They are encouraged to visit the District at any time, and in fact seldom a week passes without one or more prominent men coming from a distance to examine the work.

The group of men referred to included the following engineers: Mr. Morris Knowles, Col. J. A. Ockerson, Mr. James H. Fuertes, Mr. Harrison P. Eddy, Brig. Genl. Wm. H. Bixby, Mr. T. W. Jaycox, Mr. Daniel W. Mead, Mr. L. L. Hidinger, Mr. John W. Alvord, and Mr. J. Waldo Smith.

It included also Mr. E. J. B. Schubring, Counsel for the District on the Conservancy Law.

Completion of Three of the Five Conduit Structures

The completion, within the space of a month, of the conduit outlet structures at the Germantown, Englewood and Lockington Dams, marks a very distinct step in the progress of the flood prevention project. This work at Germantown (completed May 10,) is described at some length in the present issue.

The work at Lockington was finished on May 27, and the water turned into the new channel on June 11. The outlet and spillway here are most economically built as one structure, 525 feet long, 128 feet in maximum width (at the hydraulic jump pool) and 84 feet in extreme height from the rock foundation to the top of the spillway walls. The work of pouring was started Aug. 10, 1918. It took 206 actual working days, with an average force of 137 men. The total quantity poured was 28223 cubic yards. The maximum quantity poured in a day was 367 cubic yards; in a week (October 14-19) 1570 cubic yards. The average cement per cubic yard was 1½ barrels, the walls being massive and, except the partition walls between the two conduits, requiring no reinforcement. The work is excellent in quality and has been done at an expense below the estimated cost. An article describing it will appear in the

next Bulletin. The conduit arches and the spillway base and apron remain to be finished after the earth embankment of the dam is completed.

The pumping of the hydraulic fill material at the dam began June 12, marking a new stage in the work there.

The work of pouring the concrete at Englewood began on August 10, 1918, the same day as at Lockington. It was completed on June 7. The spillway here, as at Germantown, will be a separate structure, to be built later. The conduits are two in number and similar in design to those at Germantown, illustrations of which appear elsewhere in this issue. The general method of doing the work was much the same at the two places. The length of the conduits proper is a little over 700 feet. The entrance and outlet sections extend this to a total of about 1050 feet. The total concrete poured was 19,000 cubic yards. The concrete averages 1.57 barrels of cement per cubic yard, a richer mix than at Lockington, made necessary by the difference in design. Here as at the other dams, foundation is carried down to solid ledge rock. The favorable winter weather made it possible to maintain the progress of the work undiminished during the winter, precautions against frost being similar to those described for Germantown. By the time these lines are read, the Stillwater River will have been diverted through the new conduits and preparations begun for extending the earthen embankment of the dam, now under construction, westward across the stream bed.

The hydraulic fill at Englewood was begun in February and has now reached a total of 300,000 cubic yards of solid material.

The Salvation Army Drive

The Conservancy Committee in charge of this drive deserve much credit. The drive throughout the city and county, as is well known, worked at a disadvantage due to the fact that it came long after all war activities had ceased and following a number of successive drives upon the pocketbooks of the people. The Conservancy Committee worked under the additional handicap in the short notice that was given them to work up their personnel and organization. Under the circumstances they are to be congratulated on the results obtained.

The drive began on Monday morning, May 26. There were speeches at the Dayton Shop and Headquarters Office by Mr. Morgan and by Captain L. P. Maier, and speakers were also sent at other times to Germantown, Englewood and Taylorsville, who did good work in helping the drive. There were committees also at these places and in Dayton. The drive came to a close on June 3.

The amounts contributed are as follows:

Dayton	
Headquarters, Engineering and Construction	\$224.50
Headquarters, Farm, Administration, Legal, and Real Estate Departments.....	115.00
Channel Corps	185.75
Taylorsville	100.10
Englewood	53.00
Germantown	32.45
Total	\$777.80

Montgomery County and Dayton on this drive raised \$25,000.00, which was 18% of their quota. The Conservancy raised of its quota 33%, a much better showing. It is expected that the drive will be continued in the autumn, when the full quota will be raised.

The Conservancy drive was in charge of K. M. Brower of the Purchasing Division, who deserves the thanks of us all for the way in which he carried out his work.

New Men on the Railway Relocation

The work of railway relocation on the B. & O. R. R., heretofore in charge of Wm. Kramer, will be taken the last week in June by Mr. W. E. Duckett. Mr. Duckett comes to us from Minneapolis, where he has been in charge of work for the Chicago, Milwaukee & St. Paul R. R. He has been engaged in railway work for the past fifteen years, most of the time for the road just named. Mr. Kramer takes Mr. Yount's place on the Big Four and Erie Relocation. L. F. Wilcock, formerly assistant to the Office Engineer at Dayton Headquarters, will be in charge of track material in the North Dayton railway yard. With this added personnel, it is expected that the work of track construction, now about to begin, will be much facilitated.

The Salvation Army

The total for the Conservancy Salvation Army Drive was \$777.80, almost exactly one-third of the quota set. This is much better, in fact nearly twice as good a showing, as Montgomery County and Dayton made, but it is one which we are sure does not represent the good will of the workers of the District toward the Salvation Army and their determination to see a successful drive go through. The sum mentioned, we are sure, represents in the minds of all of us only a beginning. If there was one organization during the war which did its work and was where it belonged, it was the Salvation Army. If there was one organization that won the hearts of the boys over there, it was the Salvation Army. On the streets of Dayton, and on the streets of every city in this land, they are doing a work which no other organization does. We have never heard of any one who had anything but a good word for the Salvation Army, and we are sure that next fall, when the drive to finish our quota again begins, we shall more than contribute the share we are called upon to give.

Improvised Dragline Excavators

Master Mechanic McIntosh of the Conservancy Shop has improvised several dragline excavators which have been doing excellent work, one at Lockington, the others on the Ohio Electric Railway Relocation work. The machine is built by taking an ordinary stiff-leg derrick, rebuilding the boom, and rigging it with a dragline bucket. The machine pulls itself forward on timbers and rollers. The boom swings by the usual bull-wheel, the arc traversed being about 240°—quite sufficient for many purposes. At a later date the Bulletin expects to publish drawings and full description of these machines. They make an inexpensive and easily improvised mechanism which should be of valuable application on many construction jobs.

The Concrete Conduits at the Germantown Dam

Two Openings, Side by Side, Each 9 x 12.3', Will Carry Water of Twin Creek Under 100-Foot Earth Dam.

These conduits, finished last month, were the first to be completed at any of the five dams of the Conservancy District. They thus derive additional interest as marking a step in the carrying out of the project.

The Germantown Dam, as may be seen by referring to map, inside front cover, is located on Twin Creek about 16 miles southwest of Dayton, and is designed to aid in the protection of the cities of Middletown and Hamilton, and the lower Miami Valley below the mouth of the creek. With a flood like that of 1913, the area submerged in the retarding basin behind the dam will be 2950 acres, the water stored 73,000 acre-feet, and the maximum discharge from the conduits 9300 cubic feet per second.

twice as deep as they will be finally, the additional capacity being desirable to guard the unfinished earth structure of the dam from floods during construction. The lower half, after the dam embankment is completed, will be filled with gravel and floored with concrete. In its present condition the structure contains 15,368 cubic yards of concrete. The spillway, built to safeguard the structure against extreme floods, will be a separate structure, several hundred feet north of the dam.

The layout and general plan of work of construction will be made clear by an inspection of the map, figure 161. Excavation for the conduits was carried into the solid rock in the Cincinnati formation on the valley floor a little north of the creek. This



FIG. 158—ENTRANCE TO GERMANTOWN OUTLET CONDUITS, MAY 26, 1919.

The view is downstream. Twin Creek, at the right, now flows through the two openings. The series of cut-off walls can be seen at right angles to the length of the conduits, and built integrally with them, to prevent seepage along the outside of the barrel of the conduits, when water backs up behind the dam. The lower head wall is seen opposite the dragline excavator (the same machine that excavated for the conduit foundations). The dam will be of earth, built between the two highest transverse walls (head walls), and rising about 100 feet above the level of the railway tracks at the right. See also Figures 159, 160.

The dam is 1210 feet long, over 700 feet thick at the base, and 100 feet above the general level of the valley floor.

The two conduits, which pierce the base of the dam, are 546 feet long, built in one structure side by side. Thus either one can be closed for examination or repair while the other remains in use. Each conduit is 9 feet wide and when finished will be 12.3 feet high. In their present condition they are about

work was done by a Lidgerwood electric dragline, with 2½-yard bucket and 100 foot boom, supplied with alternating current from the Dayton Power & Light Company's 33,000 volt transmission line. The general features of the electrical layout are similar to those at Englewood, as described in the last Bulletin. The excavation was begun at the downstream end and carried on simultaneously with the concreting, the dragline keeping well ahead of

the latter operation. Part of the excavated material was suitable for incorporation into the earth structure of the dam and was deposited by the dragline practically in its final place. The remainder was deposited by dump car trains in a waste bank up the valley.

The general layout for handling materials for the concreting is shown on the map, figure 161. The gravel for the aggregate was excavated on the creek bottom just north of the stream and a few hundred feet above the damsite. Excavation was done by a Marion steam dragline with $1\frac{1}{2}$ -yard bucket and 40-foot boom, which stripped the top soil and wasted it along the creek edge, and then loaded the gravel on 12-yard dump cars drawn by 40-ton standard gage locomotives. These carried it to the gravel washing plant on the north slope of the valley, adjacent to the cement shed. The cement was hauled by truck from Germantown village $2\frac{1}{2}$ miles away.

The Smith $1\frac{1}{4}$ -yard concrete mixer took sand and gravel by gravity, through measuring boxes, from the bins above it in the gravel washing plant.

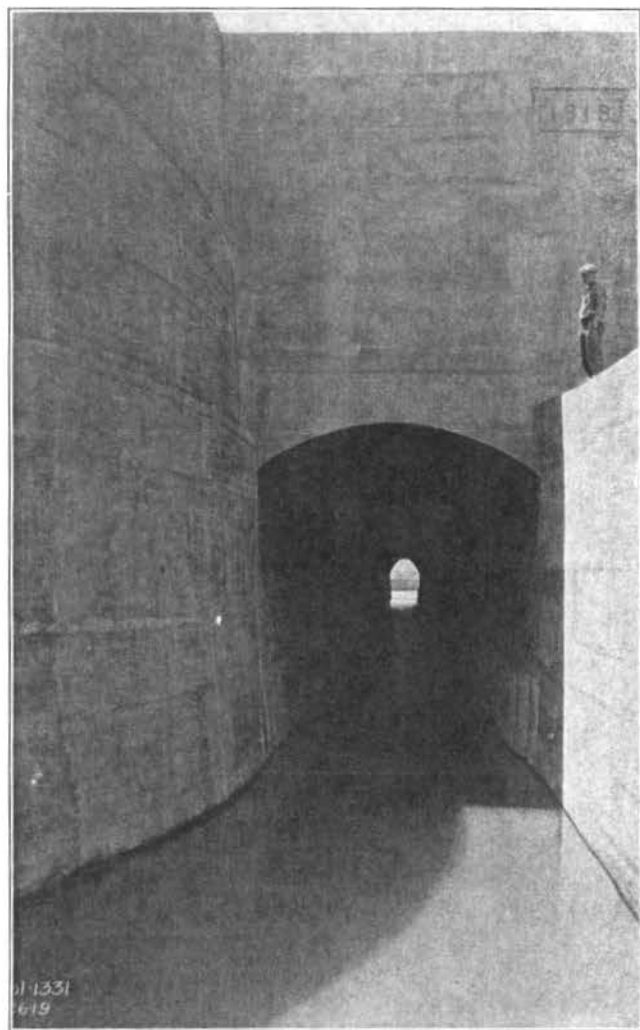


FIG. 159—LOOKING DOWN ONE CONDUIT

A similar conduit adjoins it at the right, the two being separated by the wall on which the man stands. Present height (inside) about 23 feet. The lower half, after dam is completed, will be filled with gravel and floored with concrete. The present double capacity is to prevent floods overtopping the unfinished dam. See Fig. 158. Taken May 26, 1919.

The cement was wheeled to it by hand. The mixer discharged into hopper-bottom side-dump cars. These were transported by a 3-ton gasoline locomotive along the concrete track (see figure 161) built on a shelf cut out of the valley slope at such an elevation that the concrete, when discharged from the cars, would flow by gravity through an inclined chute to the forms in the excavation below. The elevation of the gravel washer was made such that loaded cars ran down grade to the work.

The entire concrete structure, including inlet and outlet, is about 840 feet in length. It being necessary to discharge concrete at all points in this length, special means facilitating this operation were provided. The apparatus consisted of two traveling scissor trusses straddling the excavation and carrying suspended from them the concrete chutes. The trusses were supported at each end by A-frames borne upon flanged wheels riding upon light rails, the rails resting on timbers laid on shelves cut in the rock on each side of the excavation. The slope of the rock outcrop in the valley made it necessary to place the north rail about 10 feet higher than the other. By the arrangement described practically all of the 15,368 cubic yards of concrete was discharged directly into place through the inclined chutes.

Everything having to do with the quality of the finished concrete was looked after with the greatest care. The cement, supplied by the Peninsular Portland Cement Company, was tested periodically throughout the work of construction. The tests were for 7-day, 28-day, and 3-month periods, and results in every case have met standard specifications.

The quality of both sand and gravel was excellent. The cars coming from the gravel pit dumped into a hopper at one end of the washing plant, whence the material was carried on an inclined belt, driven by an electric motor, to the top of the washer. (See the April Bulletin). Here it was passed through conical revolving screens separating the coarse aggregate into two sizes, one including stones from 1" to $2\frac{1}{2}$ " in diameter, the other pebbles from $\frac{1}{4}$ " to 1" in diameter. Stones above $2\frac{1}{2}$ ", up to about 5", were for the most of the work thrown into the coarser aggregate. Stones above 5" were rejected by hand at the foot of the conveyor belt. The two sizes of coarse aggregate were stored in separate bins, the larger constituting about 43% and the smaller 57% of the total. From each bin it passed through a chute to the concrete mixer by gravity, measuring boxes being inserted as part of the chute. No attempt was made, in mixing the concrete, to keep the quantities of the two sizes of coarse aggregate in any exact proportion. The separation was made simply to keep the coarser material from occurring in pockets in the mixture; in other words, to secure reasonable uniformity in each batch, and to enable the coarser parts of the aggregate to be rejected in mixing concrete where an especially high grade of product was required.

In screening the material from the gravel pit all sizes finer than $\frac{1}{4}$ " dropped through the third screen to the sand bin, whence, like the coarser sizes it passed through a chute and measuring box to the concrete mixer by gravity. Both sand and gravel were thoroughly washed, as they passed through the revolving screens, by powerful jets of water thrown in at the bottom of the screen, the silt and refuse being carried away by the wash water.

The quality and grading of the sand were very satisfactory, although the finer sizes of grains occurred in somewhat larger percentages than in an ideal sand. The finest grains were at first carried away in the excess wash water. By permitting the wash water, however, to run through an auxiliary tippie which was added to the apparatus, these finest grains were enabled to settle at the bottom, whence they were periodically removed. By holding this fine sand in the mix it could be used to fill in part the voids between the coarser sand particles, which otherwise would have to be filled with cement. An unnecessary waste of cement was thus prevented.

For convenience the cement was measured into the mixer in bags, five or six or seven or eight bags to the batch, according to the strength desired in the resulting concrete, this strength naturally varying according as the concrete was to be used in the foundations, in the conduit walls or in the conduit arches. The quantity of sand per batch was always the same—12½ cubic feet. The coarse aggregate, like the cement, varied with the location for which the mix was intended; for the arches 14 cubic feet of small to 11 of the large, for floors and walls 16 of the small to 12 of the large. The resulting proportions of cement, sand and coarse aggregate were as follows:

5 bag mix	.....	1	to	2.66	to	5.96
6 " "	.....	1	to	2.22	to	4.97
7 " "	.....	1	to	1.90	to	4.26
8 " "	.....	1	to	1.66	to	3.32



FIG. 160—OUTLET OF SOUTH CONDUIT

Half the water of Twin Creek now comes through this opening and on down the concrete steps to the "hydraulic jump pool" at their foot (not seen). The steps widen as they go down and are notched as seen, in order to spread and break up the swift current during flood. The pool of water below makes a liquid cushion which will neutralize all destructive energy the water still possesses. See Fig. 159. Taken May 26, 1919.

The water, on account of wetness of materials in the bins, could not be accurately measured into the mix, and was controlled by the man in charge, who gaged it by the consistency of the fresh concrete. This was kept as stiff as possible and still permit the material to run down the chutes into the forms. The mixer ran normally 10½ revolutions per min-

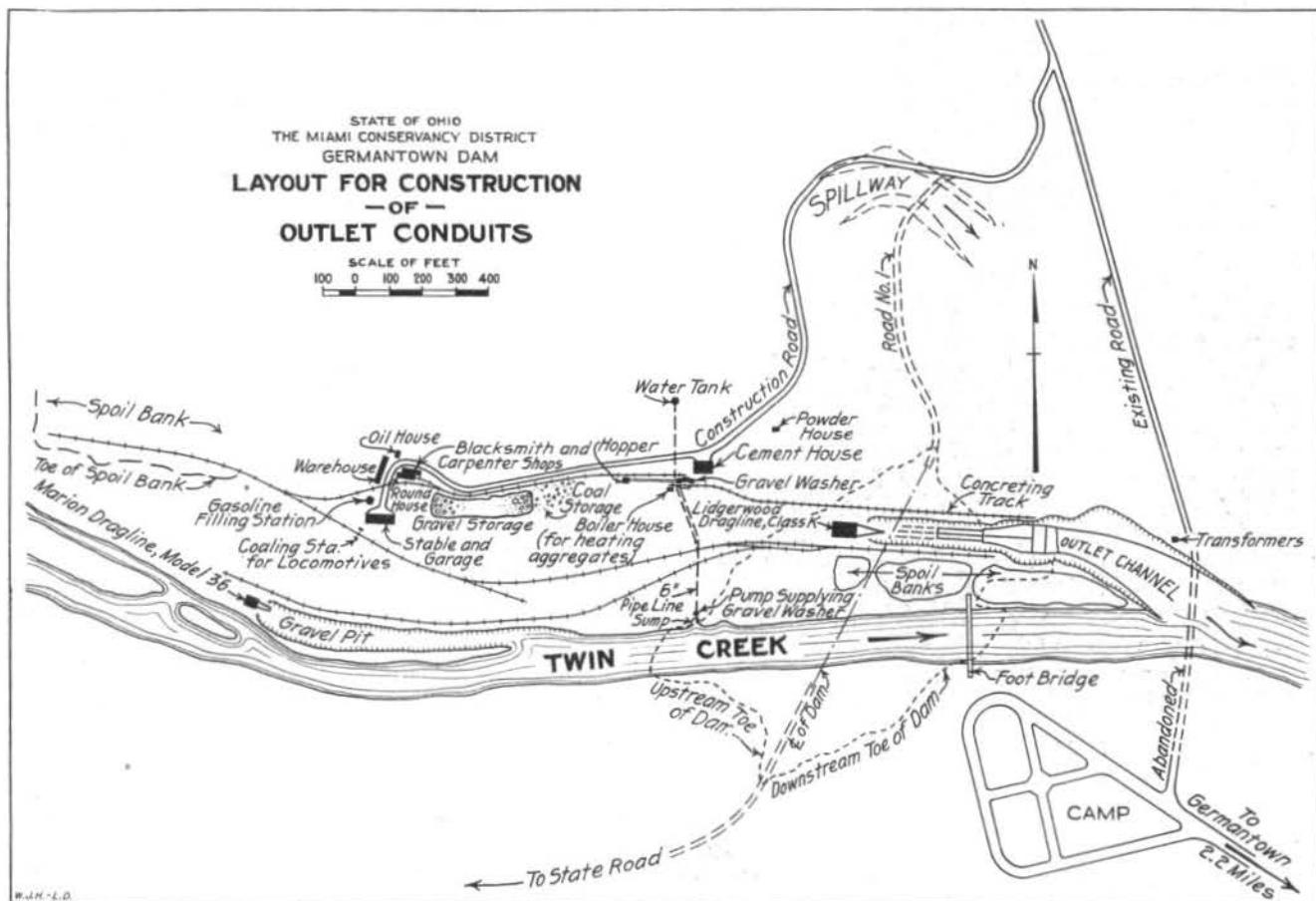


FIG. 161—LAYOUT FOR CONSTRUCTION OF GERMANTOWN CONCRETE CONDUITS

The conduits themselves are shown only partially completed. The full plan is shown (in sketch) opposite page 186.

ute. For the arches of the conduits the batch was given 20 to 25 revolutions, for the walls and floor 15 to 20 revolutions, to insure thorough mixing of the materials.

The fresh concrete was thoroughly compacted in the forms by the tramping of the men who spread it. Smooth surfaces on the resulting concrete were insured by spading next the faces of the forms. All joints between rock foundation or old concrete, and fresh concrete about to be placed, were thoroughly wire-brushed, washed, and slushed with cement grout. Freezing during the winter weather was prevented by placing steam coils in the gravel and sand bins, and by covering the forms with tarpaulin, using salamanders or steam coils also in the forms during the coldest weather.

The concrete was tested periodically during the continuance of the work by taking samples as the material went into the forms, and making the samples into cylinders 6" in diameter and 6" high, which were broken in a testing machine. The cylinders were cast in moulds made by sawing 6" iron pipe in two lengthwise. The moulds were removed after 24 hours and the cylinders packed in sand which was kept damp. The cylinders were tested at the end of 7 days, 28 days, and 3 months. The results of some of these tests are shown in the table below.

The work was carried on under the supervision of Arthur H. Pauls, Division Engineer, C. O. Shively, Assistant Engineer, and A. Armstrong, Superintendent of Construction.

STRENGTH IN COMPRESSION OF CONCRETE PLACED IN GERMANTOWN DAM CONDUITS, MIAMI CONSERVANCY DISTRICT. TESTS MADE BY BREAKING 6" x 6" CYLINDERS.

Description of Sample			Crushing Stress in Pounds per Square Inch		
Number	Date	Mix	At End of 7 Days	28 Days	3 Months
6/1	12/4/18	1:2.7:6	1336	1554	.....
6/2	12/4/18	1:2.2:5	1660	2180	.....
7	12/23/18	1:1.7:3.3	2991	3328	3512
8	1/8/19	1:1.9:4.3	2737	3393	3491
10	1/20/19	1:1.9:3.8	.....	2845	3201
11	1/29/19	1:1.7:3.3	.....	3102	3518

June Progress on the Work

GERMANTOWN

Since the concreting has been completed the large dragline has finished filling around the conduits. The earth excavated during the conduit construction was used for backfilling by forming a puddle around the conduits. In using this earth the area between Twin Creek and the conduits was at the same time cleared ready for the hydraulic fill.

Dykes at each toe of the dam have been thrown up preparatory to pumping.

Progress on the hydraulic pumping plant has been going steadily forward during the past month. The revolving grizzly has been installed. This is virtually a heavy rectangular sieve through which the material for the earth portion of the dam is sifted. It consists essentially of a series of transverse iron bars slid by an endless chain over six longitudinal bars, the bars in each case being spaced 6 inches apart. All stones larger than 6 inches square are carried by the moving bars to a platform beyond the grizzly, where they are broken or cast aside. All smaller material, mixed with water, drops through the grizzly and on into the sump, whence the dredge pump sends it to the dam.

A guy derrick has also been erected at the plant for removing the oversize stones and also for lifting out the electric motors when threatened by flood.

Clearing of Road No. 1 has been started and it is expected that this work will be pushed as fast as possible.

The gravel washing plant is being dismantled and transported to Dayton, where it will be set up near the mouth of Wolf Creek.

Arthur L. Pauls, Division Engineer.

June 17, 1919.

ENGLEWOOD

The concrete in the outlet conduits was completed June 7. The interior of the covered portion and the face of the retaining walls are being dressed and painted with cement wash. About the first of July the river will be diverted through the conduits and the present river chan-

nel finally prepared for filling and covering by the dam embankment.

Work on the cross dam is maintaining the necessary progress to permit the hydraulic fill to proceed.

One new 40-ton locomotive and eleven twelve-yard dump cars have been added to the equipment for constructing the hydraulic fill. Work upon this item has proceeded satisfactorily. Approximately 100,000 cubic yards of material were pumped into the dam during the month of May, making the total embankment to June 1 about 300,000 cubic yards.

The grading of highways 4 and 5, approximately 7,000 feet in total length, is substantially completed and a gravel surfacing is being placed.

H. S. R. McCurdy, Division Engineer.

June 15, 1919.

LOCKINGTON

On May 27 the concrete work in the walls and floor of the conduit and spillway system was completed. There remain the spillway weir and the concrete bridge to be placed after the earth fill is completed.

Loramie Creek was turned into the entrance channel on June 11, and on June 18 a cut was made in the Buxton Pike which crossed the outlet channel, allowing the water to flow through the entire length of its new channel. The material in this pike is being taken out of the outlet channel by the smaller Lidgerwood Dragline and placed in the old channel to form the approach to the bridge at its new location. The two-span steel highway bridge is being dismantled preparatory to placing it on the new concrete substructure. The work will be completed early in July.

Pumping of the hydraulic fill material was started June 12, the material being deposited at the downstream toe of the dam west of the outlet works. The source of the water being the Miami and Erie Canal, it was found advisable to clean out the channel of the feeder through Sidney. This work has been completed and the feeder is now in good condition. The upstream toe, up to elevation 904, is being built of the material excavated from the cut-off trench by

the larger Lidgerwood dragline, which is working double shifts.

Culverts are now being built on Road 9 and grading will be resumed in the near future. Plans are being developed to construct a road from the upper end of Road No. 9 to an east and west road one-half mile north of the Infirmary Pike, this new road to take the place of Road No. 10 as it was originally planned.

Barton M. Jones, Division Engineer.

June 19, 1919.

TAYLORSVILLE

The Lidgerwood Dragline is making good progress on the rock excavation from the outlet channel. The rock is in layers from two to five feet thick which is excellent for foundations, but it breaks into rather large blocks for loading. The dragline is now digging to a depth of 54 feet below the surface on which the mats rest. A little later this depth will increase to 63 feet. So far as we are able to learn this is near the record.

The cross dike on the west bank of the river is nearing completion and the Marion caterpillar which has been digging the earth for this work from the surface of the gravel pit, has been released and is being dismantled for shipment to Englewood.

The sluicing was delayed more or less because of the movement in the toes of the cross dike breaking the dredge line. The average yardage moved per hour during the month of May was 131.5 cubic yards, pit measurement, or 160 cubic yards, measured in embankment.

The gravel screening and washing plant has been finished and given a short trial. It appears to be ready for service.

The grading on the connection between the present B. & O. line and the relocation has been finished and about 600 feet of track has been laid.

The form work is about finished for the concrete arch highway bridge over the B. & O. relocation at the dam. The footings have been poured and the steel is now being placed.

O. N. Floyd, Division Engineer.

June 17, 1919.

HUFFMAN

The placing of concrete in the outlet works has been progressing at a very satisfactory rate during the past month, 5,900 cubic yards being placed during the month of May, and a total of 15,000 cubic yards has been put in to date. This is several hundred yards ahead of the progress schedule required to complete the concrete work this season. Both walls have reached their highest points, the south one on June 4, and the north one on June 16, and they both have been completed to various elevations for some distance ahead of this point. The concrete floor between these walls has been entirely completed to the top of the slope leading to the hydraulic jump pool. Several of the floor sections on this slope have also been cast.

The excavation for the concrete has been completed and the dragline is now excavating the outlet channel from the end of the concrete to Mad River. A part of the material from this excavation is being hauled out and dumped along the south bank of Mad River below the dam. The remainder is being cast to the north and will later be re-handled with the dragline and placed just below the downstream toe of the dam, where it joins the concrete structure. The excavation for the hog box and sump for the hydraulic fill is nearing completion. The clay material in the borrow pit that must be excavated to uncover the gravel for the concrete, is being transported and placed in

the cross dam just north of the diversion channel. This cross dam is being built so that the hydraulic fill may be started before the river is diverted back through the permanent outlet.

C. C. Chambers, Division Engineer.

June 19, 1919.

DAYTON

Channel excavation to date amounts to 400,000 cubic yards. A total of 280,000 cubic yards has been placed in levees and spoil banks. In accomplishing this work 615,000 cubic yards has been handled.

The large floating dragline has been moved under Main Street bridge. This operation presented numerous difficulties and made necessary the dismantling of a considerable part of the upper framework of the machine. The dragline is now excavating in the channel below Main Street, the material being transported by scow and unloaded into the north bank of Mad River.

The work of grading and seeding the slopes in Van Cleve Park and the yard of the Central Fire Station has been completed.

Extensions of the 15-inch tile pipe sewer at Webster

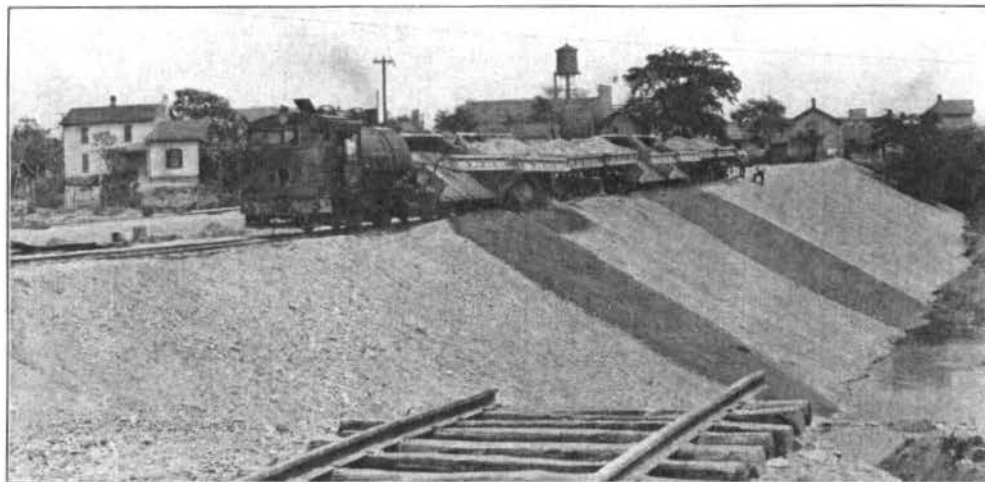


FIG. 162—FILLING LOW GROUND IN SOUTH HAMILTON

The train brings material from the river channel improvement, the excavation being done by a large dragline excavator. The area to be filled at this point is nine blocks long and several hundred feet wide and will take 1,400,000 cubic yards of earth.

Street and of the 6-foot concrete sewer at Herman Avenue have been completed. Work on the extension of the 5-foot x 8-foot concrete sewer at McKinley Park is now under way. The caterpillar dragline is engaged in that project.

Scow No. 5 was launched on June 11. This is the 30-foot x 68-foot scow on which the caterpillar dragline will be mounted.

Levee construction on Contract 41 has been completed. This comprises about 60,000 cubic yards of embankment above Island Park, which was constructed under contract by McWilliams Northern Dredging Co.

Approximately 45,000 concrete blocks for the flexible revetment have been made by Price Brothers Co. The daily output at the plant is now about 1,300 blocks.

C. A. Bock, Division Engineer.

June 19, 1919.

HAMILTON

The Class 24 Bucyrus Electric Dragline has been fitted with a 4½-yard bucket and the boom has been shortened. It is loading on dump cars and is working in the third cut below the Columbia bridge. Since June 6, when the machine entered this cut, the average daily output has been over 3000 cubic yards.

The smaller steam dragline has begun work on the tail-race between the Ford Tractor Plant and the B. & O. bridge over Old River.

Work on the Wood street sewer has been 60% completed. The excavation has been finished to Front street and the concrete to a point between Monument avenue

and Front street. The excavation so far has been mostly in sandy loam which will stand with very little sheeting.

The concrete base for the paving over the Buckeye street sewer has been completed and bids have been taken for the asphalt surface.

C. H. Eiffert, Division Engineer.

June 19, 1919.

RAILWAY RELOCATION

B. & O. Relocation. The grading for the relocation is 85 per cent completed, as only 100,000 cubic yards remain to be excavated. The roadbed is ready for the final surfacing between Miami River Bridge and Tadmor, and the work north from Tadmor is being excavated night and day. Tracklaying and ballasting will be started at once. It will be done by Roberts Bros. of Chicago, who have been awarded the contract.

Big Four and Erie Relocation. The Walsh Construction Co. have 100,000 cubic yards remaining in the Big Cut at Huffman Hill. This will be completed about August 1. The Springfield Pike, which almost parallels the railroad at Huffman Hill, is being constructed by Kahl Brothers. Some 12,000 cubic yards, which is being excavated from the Ohio Electric cut, is being used in the highway embankments. After the material in the big cut is removed, Walsh Construction Company will borrow about 90,000 cubic yards at a point about two miles west of Huffman Hill.

The team grader outfit of Condon & Kolterman will complete their work this month.

The shovel of George Condon at Fairfield is excavating in gravel material at the rate of 75,000 cubic yards per month. The work is progressing so well that tracklaying and ballasting will be started about August 1.

Ohio Electric Relocation. The work on this relocation is also progressing and the grading by McCann and by the District is well under way. At Mud Run Bridge the columns are completed and a large portion of the concrete for deck has been poured. At Smith Ditch the foundations are being constructed and equipment has been installed for the bridge over Mad River.

Albert Larsen, Division Engineer.

June 18, 1919.

RIVER AND WEATHER CONDITIONS

The rivers were comparatively low throughout the Miami Valley during the month of May. Although small rises of from one to three feet occurred in the various streams on the 9th and 10th, due to the rainfall of from one to three inches which fell during the period from the 6th to the 10th, dangerous stages were not reached in any of the streams at any time during the month. The total rainfall for the month at the District's stations varied from 2.94 inches to 5.46 inches. The precipitation at the Dayton U. S. Weather Bureau Station was 4.33 inches, or 0.45 greater than normal, thus reducing the accumulated deficiency since January 1 to 1.18 inches.

At the Dayton U. S. Weather Bureau Station the mean temperature for the month was 59.0° F. or 3.6° less than normal; there were 7 clear days, 9 partly cloudy days, 15 cloudy days, and 14 days on which the precipitation exceeded 0.01 of an inch; the average wind velocity was 10.0 miles per hour, the prevailing direction being from the northeast; and the maximum wind velocity for five minutes was 34 miles per hour from the southwest on the 3rd.

Ivan E. Houk, District Forecaster.

June 25, 1919.

The Work of the Conservancy

A Bird's-Eye View.

The July number marking the end of the first year of the Bulletin, it may not be inappropriate to give a bird's-eye view of the work of the District to date.

Preliminary to this it will be well to review the nature and extent of the flood prevention problem. The flood of 1913 was of unprecedented magnitude, equivalent to a mass of water half a mile wide and ten feet deep rushing at a velocity of 10 feet per second through the city of Dayton, a quantity about $3\frac{1}{2}$ times as great as would fill the old channel up to the tops of the levees. The problem was to take care of such an enormous mass of water.

The natural first suggestion was to deepen and widen the river channel through the cities. But to deepen through the cities means to deepen also above and below them. Otherwise you get simply pockets in the channel over which the river current slides. Deepening over the length of channel necessary is exceedingly expensive. So with widening. A river through a city of 160,000 inhabitants, like Dayton, built up to the levees with factories, residences, etc., cannot be widened much without enormous expense in the purchase of improved property. You can clip the edges, but to go far is to cut into the quick. Exhaustive study of this matter by the Conservancy Engineers, before any other solution

had been considered, showed that the path by way of mere river improvement, to double the capacity and then nearly double it again, was absolutely blocked by a mountain of expense.

It was this absolutely prohibitive cost of adequate channel improvement alone which led to the adoption of the present plan—that of river improvement combined with “retarding basins.” The scheme has been well tried in Europe, and in principle is quite simple. It is to catch and hold temporarily the greater part of a flood in great basins in the upper valleys, kept empty for the purpose and permitting only such water to reach the river channels below as they can be economically enlarged to carry. Fortunately sites for such basins are available in the Miami Valley.

The basins are made by building dams across the valleys from hill to hill. Concrete conduits built through the bases of the dams permit the ordinary stream flow to pass unimpeded. But in flood time the water comes down the valleys faster than the dam conduits permit it to pass through. The excess backs up behind the dams as long as the flood continues. As the flood subsides, the trapped water gradually flows away through the conduits.

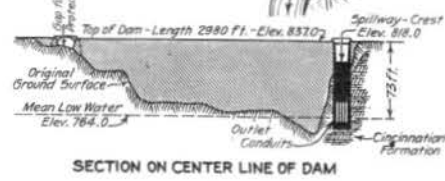
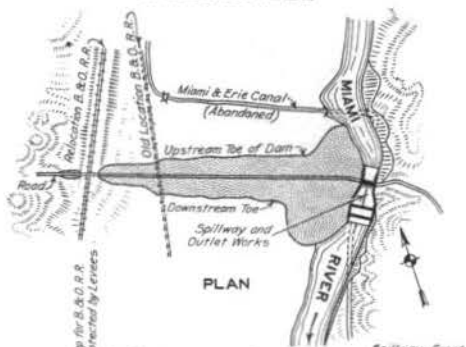
The action is exactly analogous to that of an ordinary wash bowl with the plug removed from the

Note to Figure on Opposite Page

The figure brings together the plans and center line sections of all five dams of the District, all drawn to the same scales, for ease of comparison. A typical cross section of a dam is also given. For the latter the horizontal and vertical scales are the same. For the center line sections the vertical scale is ten times the horizontal, the better to bring out the features. The stippled areas in the plan views represent the dams, corresponding to the line-

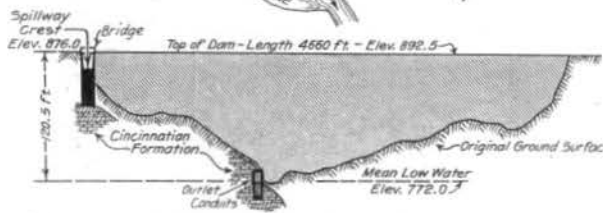
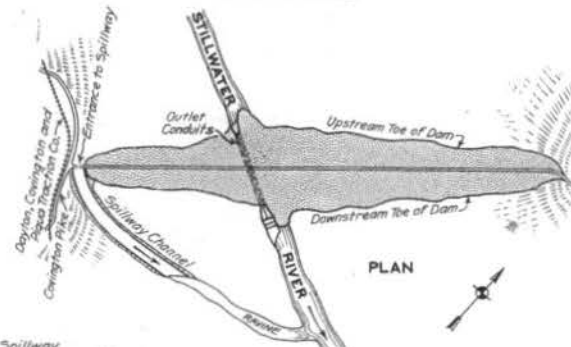
shaded areas in the center line sections. The black portions represent the concrete outlet conduits and “spillways.” The conduits take ordinary stream flow. The spillways are overflow channels to take the excess of extreme floods. Ordinarily they take no water at all. At Englewood and Germantown they are separate structures; at the other dams they are built in one structure with the conduits, economy dictating the procedure in each case.

TAYLORSVILLE



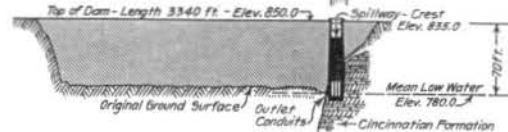
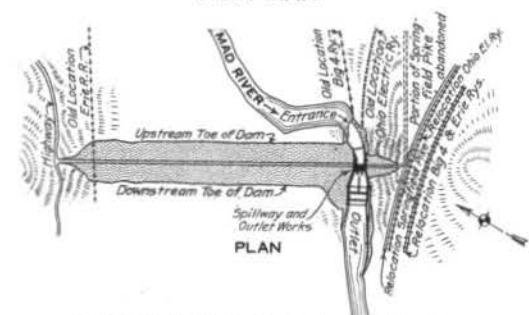
SECTION ON CENTER LINE OF DAM

ENGLEWOOD



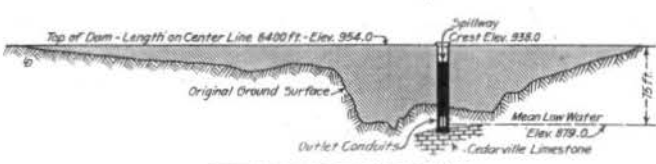
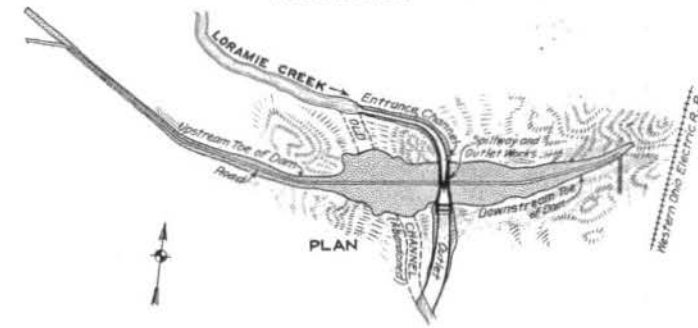
SECTION ON CENTER LINE OF DAM

HUFFMAN



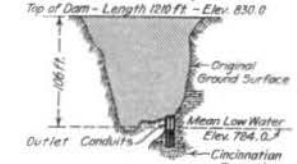
SECTION ON CENTER LINE OF DAM

LOCKINGTON

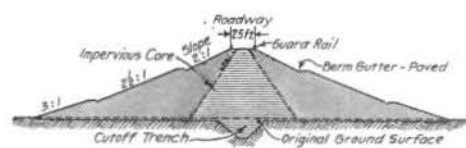


SECTION ON CENTER LINE OF DAM

GERMANTOWN



SECTION ON CENTER LINE OF DAM



TYPICAL CROSS SECTION OF DAM

State of Ohio The Miami Conservancy District PLANS AND SECTIONS OF DAMS

SCALE OF PLANS
400 0 400 800 Ft.

SCALE OF CENTER LINE SECTIONS
Horizontal
400 0 400 800 Ft.
Vertical
40 0 40 80 Ft.

SCALE OF TYPICAL CROSS SECTION
Horizontal
40 0 40 80 Ft.
Vertical
40 0 40 80 Ft.

bottom and the water faucet turned on. With a moderate flow the water will run out through the bottom as fast as it comes from the faucet. Open the faucet wide and the bowl will fill. Reduce the flow to its original rate and the water will slowly drain until the bowl is empty. The full stream is the flood; the bottom opening is the dam conduit; the bowl is the retarding basin, empty except during flood.

The solution of the problem by the method just indicated having been adopted, there remained a very great amount of study to determine how many retarding basins there ought to be, where they ought to be located and how their capacity and the size of their discharging conduits should be related to the enlarged river channel below, in order to secure the requisite safety at the least cost. The result in its main features, in so far as a map can show it, is indicated on the inside front cover page.

A brief study of the map will show that the focus of flood danger lies at Dayton, a city of 160,000 inhabitants, situated a little below the center of the map. Three rivers and a considerable creek meet within the limits of this city, all converging their flood flow to overwhelm it. Moreover, the slopes of the Miami Valley are rather steep and following a storm the water comes away fast. It will be quite clear that strategic locations for at least three dams must occur not far above Dayton on each of the three main streams. Three retarding basins, it will be accordingly noted, have been so located, the Englewood Basin on the Stillwater River, the Taylorsville Basin on the Miami, and the Huffman Basin on the Mad. These basins are indicated by shaded lines. The dams behind which they lie are indicated by boat-shaped black marks. The city of Sidney, at the north end of the map, is protected by the Lewistown Reservoir on the Miami River to the northeast, just off the map, and a retarding basin was therefore not necessary for its protection. The cities of Piqua and Troy, however, just below, did need protection, and a fourth retarding basin, the Lockington Basin, was accordingly located on Loramie Creek a little above them. For additional protection to the cities of Middletown and Hamilton, at the southeast corner of the map, a fifth retarding basin, the Germantown Basin, was located on Twin Creek, which feeds the Miami a little above those cities.

The construction of these dams involves problems somewhat different than any heretofore encountered in this country, due to the large capacities of their outlets, combined with the fact that they are the first dams of any size to be built here which are not for storage or water power purposes, but purely a bulwark of defense against flood.* The chief of these problems was to protect the valley immediately below, at the point where the conduits discharge, from the destructive effects of the tremendous volumes of water, amounting to hundreds of tons per second, rushing at high speed through the conduits under great pressures, as the water backs

up higher and higher behind the dams at times of excessive flood. The solution of this problem was given in an early number of the Bulletin (September, 1918.)

The general plan of construction of the dams is the same in all cases. The main structure, the dam proper, is built of earth, the material being obtained from the valley immediately adjacent. The conduits, which carry the stream beneath and through the dam, are built of concrete. In general the conduits are built first. At three of the dams, Germantown, Englewood and Lockington, they have been recently completed or practically so. At Huffman the conduits are about half done. At Taylorsville only the excavation for them is under way, the earth embankment at this place having been started first, contrary to the procedure at the other dams. The material for the conduits, excepting the cement, is also found in every case immediately adjacent to the damsite. This greatly reduces the expense of construction.

For purposes of comparison, the plans and longitudinal sections of all of the dams have been placed side by side in the figure opposite page 186, together with a typical cross section, the latter being practically the same for all of the dams. The Englewood and Germantown Dams are the highest, both being at the crest over 100 feet above the stream. Englewood is the longest, 4,660 feet. It also requires most earth for its construction, 3,500,000 cubic yards. The total earthwork for all the dams is 8,400,000 cubic yards.

The main embankment in all the dams is being built by what is known as the method of hydraulic fill. The important point about an earth dam, once it is made massive enough to resist the tendency of water behind it to slide it down the valley, is to make it impervious to seepage, because, like the hole in the dike which the little Holland boy plugged with his finger, a tiny stream, once started, may grow and lead to disaster. The imperviousness is obtained by making the middle portion of the dam a "core wall" of clay, extending through the structure from top to bottom, and from end to end. This wall is carried down also into the earth below. The material used to be brought in from a clay pit by teams and tamped in place at great expense. Against this clay wall, on both the upstream and downstream sides, coarser materials were placed to support it. The clay wall gave the imperviousness to the structure. The coarser materials gave the massiveness necessary to hold the dam in place against the tendency to slide under the water pressure down the valley.

Now the advantage of the hydraulic fill method of making an earth dam is that it takes material such as can be found in almost any river valley, and automatically, by the sorting power of flowing water, deposits an impervious core of the finer earth particles along the center line of the dam, having first deposited the coarser material on the upper and lower slopes. The core thus produced is not only

*The point needs to be emphasized. It must be clearly evident that just so far as water is stored behind such dams for power purposes, precisely so far are they robbed of their power as a defense. To provide sufficient storage capacity for both purposes, in the Miami Valley, is a quite impracticable proposition, both financially and physically. The retarding basins, therefore, are designed with no pro-

vision whatever for their future use as reservoirs for power. You cannot have your cake and eat it. The Miami Valley has its choice regarding these dams. It can use them for the purposes for which they were constructed, or it can divert them to money-making purposes, at corresponding risk to the lives and property they are built to guard.

better, but the whole construction is much cheaper than by the old method. It was for these reasons that hydraulic fill was adopted for the dams of the District.

In general the method as used is as follows: The earth is excavated in the valley bottom just above or below the dam, drawn to the "toe" or edge of the damsite in cars, and dumped into a "hog box." From this it is washed by strong jets of water into a "sump" or cistern, whence, mixed with from five to fifteen times its volume of water, it is pumped by centrifugal "dredge pumps" through pipes to the top of the partly constructed dam. These pumps are exceedingly powerful. They suck up the mixed materials, earth and water, from the finest impalpable particles up to stones 6 inches in diameter, and drive them through the pipe at high speed. The top of the dam, under construction, resembles roughly a very large rectangular trough of earth, extremely shallow in proportion to its length and width. The mixed earth and water from the pipes is discharged at both edges of the trough. The water drops the coarsest material near the mouth of the pipe. The less coarse it carries away with it down the slopes of the trough toward the center, depositing all but the finest material as it flows, until it reaches the "hydraulic fill pool," which occupies about the central quarter of the width of the trough. These finest portions, especially in the center of the pool where the water is very still, remain suspended in the water a long time and gradually settle to the bottom. It is these fine particles which make the central impervious core wall. The discharge pipes are shifted along the edges of the dam so as to deposit the coarse materials uniformly, thus maintaining the edges practically level, both with each other and along their length. The entire top of the dam is thus made to rise uniformly, maintaining always the long, narrow pool at the center and the wide sloping beaches at the sides, with the water flowing down the beaches to the pool. The process is continued nearly to the full height of the dam.

The hydraulic fill work is already in progress at the Taylorsville, Englewood, and Lockington Dams. It was first begun at Taylorsville in October of last year. It began at Englewood in February last, and at Lockington on June 14. At Germantown the machinery is set up and the actual work about ready to begin. At Huffman the machinery is not yet installed. The delay at Huffman is due to the preliminary work necessary to the removal of the Big Four Railway tracks which crossed the location of the outlet conduits. The total earth placed in the

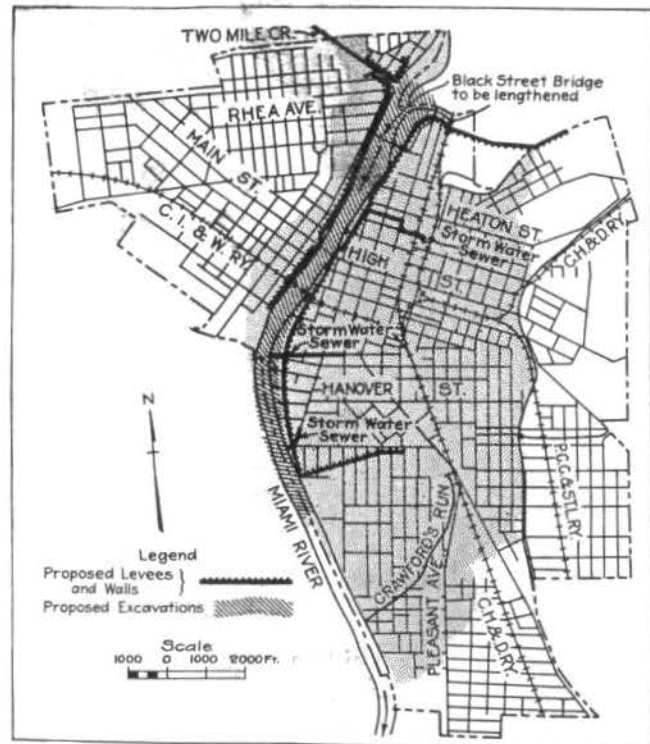


FIG. 164—RIVER IMPROVEMENT, HAMILTON

Black lines show improved levees and walls. Stippled area shows land flooded in 1913. Shaded river area shows portions to be improved. The new levee shown turning east at the south end of the levee improvement has been changed. It actually runs south along the river to Crawford's Run.

fill up to June 1 was at Englewood 300,000 cubic yards, at Taylorsville 109,000 cubic yards.

At all of the dams except Lockington the earth for the dam embankments must be obtained on the flat floor of the valley just above or below the structure. The excavation being much of it below ground water level, the work is best done by powerful dragline excavators. The "borrow pits," after the work is completed, will remain as lakes of considerable size adjacent to the dams. The lake at Englewood is well begun. At Lockington the borrow pit lies more advantageously on the valley slope. This enables the earth to be excavated by powerful streams of water and washed by more copious streams at lower pressure down the hill slope to the upper toe of the dam, whence the mixed material is pumped as elsewhere to the pool on top of the dam. At Taylorsville, for the material to be excavated for the conduits east of the river, the same

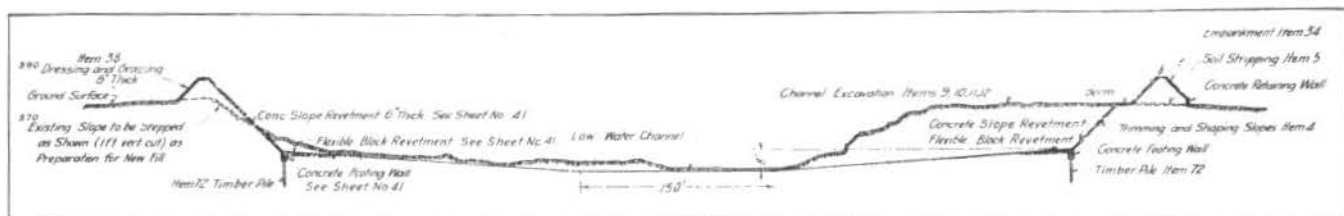


FIG. 165—TYPICAL CROSS SECTION OF MIAMI RIVER IMPROVEMENT

The original ground surface is shown by the irregular line. The earth will be removed by a dragline excavator down to the lower line. Part of the earth will make the levees shown at the sides; the rest will be used to fill several low areas back of the levees. The bottom is flat for the middle 150 feet, then slopes up each way to the foot of the bank. Total depth to top of levee in Hamilton is 35 feet. Total width, foot of bank to foot of bank, 520 feet.

method of excavation by powerful water jets is in use. Much of this material at Taylorsville is extremely tough clay, requiring to be "shot" with dynamite before excavation. This has considerably delayed the hydraulic fill work at this point.

The removal of the Big Four Railway tracks above mentioned is but a part of the extensive work of railway relocation made necessary by the flood prevention project. The Big Four, the Erie, and the Ohio Electric Railways all ran through the areas which are now a part of the Huffman retarding basin, and hence had to be removed to higher ground. Similarly, the Baltimore and Ohio Railway, which runs through the Taylorsville retarding basin, is relocated. On this railway 850,000 cubic yards of earth had to be excavated, of which 750,000 cubic yards have already been moved. The length of new B. & O. track made necessary is 14 miles. The roadbed for about 8 miles of this is already completed for tracklaying, which will soon begin. On the other roads a total excavation of 1,185,000 cubic yards is necessary, of which 935,000 yards have been removed. On the Big Four and the Erie, 15 miles of new line must be built, of which four miles is surfaced ready for tracklaying. On the Ohio Electric 10 miles of new track must be built. Between Dayton and Fairfield this track will be completed about the same time as that of the steam roads. The total estimated cost of railway relocation will reach nearly \$4,000,000.

As has been said, the retarding basins are expected to take care of only a portion of the extreme

flood flow, the remainder going through the dam conduits to the river below. The amount thus carried by the river at Dayton for a flood like that of 1913, will be about 70% greater than would fill the old river channel up to the tops of the levees. The extra capacity is being obtained by deepening and widening the channel and by increasing the height of the levees. Similar river improvement must be done at all the towns and cities along the Miami River below the Lockington Dam. The levee system, in fact, will be carried along the river past each town and city, and back to the hillsides above and below, so that each of these localities, for the few days the high water lasts, will become a little Holland, intrenched behind its dikes against any possible height of flood. This work is being done by very powerful dragline excavators. It involves the removal from the old river channel of about seven and a half million cubic yards of earth. Approximately one-half of this will be built into the improved levees. The rest will be used to build up low areas behind the levees. About 2,000,000 cubic yards must be moved at each of the larger cities, Hamilton and Dayton, the other three and a half million at the other cities. At Dayton 460,000 cubic yards have been removed to June 1. At Hamilton 500,000 cubic yards. At Dayton the work is fairly complete above the Main Street Bridge; at Hamilton, on one side of the river, from below the city up to Columbia Street Bridge. Of the work outside of these two cities a total of 95,000 cubic yards has been moved. The levees at Middletown have been practically completed below the traction crossing.

The Huffman Dam Trilobite

One of the largest trilobites ever found was discovered at the Huffman Conservancy dam, about 6 miles northeast of the center of Dayton, on the road to the Wright Airplane field. It was recognized at once by Arthur E. Morgan, the chief engineer of the Miami Conservancy District, as a most valuable find and steps were taken to preserve it. It was found, lying on its back, in the clayey rock at the base of the deep excavation where in the future will be located the outlet of the tunnel which is to pass beneath the dam. The exact locality is below the river level, but, when the trilobite was alive, all of Ohio and the adjoining states stood at a very much lower level, and was covered by the ocean. In fact, the trilobite was a sea animal, and belonged to the group known as crustaceans. To this group belong also the lobster, crab and shrimp, familiar sea animals. In these crustaceans, there are no bones. Only the skin is hard and tough, and all of the interior is soft and fleshy. Therefore, when the animal dies, only the skin remains for any length of time, and the interior fleshy part decays. In the large trilobite found at the Huffman dam, only the tough upper skin of the animal is exposed. On the lower side, in the living animal, there were more than twenty pairs of long legs. Since the under side of this large trilobite is not exposed, there is no means of determining whether the legs still are attached, but considering the fact that the trilobite was lying on its back before it was covered by sea mud, it is likely that the legs rotted away before the trilobite was covered up by mud, and thus preserved. The length

of this trilobite is fourteen and a half inches, and its width, ten inches. Its original thickness probably equalled at least two inches. The animal was jointed transversely, so that it could roll up sufficiently to bring the margin of the head into contact with the tail. In this position, the tough and hard skin prevented any enemy from reaching its much more vulnerable lower side. In the figure here produced, the head forms the upper third of the figure. On each side of the head, the cheek terminates posteriorly in a spine. The skin covering the head was divided by two sutures into a middle and two lateral sections, and along each of these sutures is seen one of the large eyes. The body is divided into eight narrow segments, and at the rear is a flat, triangular tail.

The Huffman dam trilobite is the largest complete known trilobite, fourteen and a half inches long, as stated before. Dr. John Locke found a fragment of a tail of a trilobite so large that he thought that its original length must have been twenty-one inches, and he published a figure of this length, although he had only a fragment of a tail of the actual specimen. Prof. John M. Clarke had an imperfect head of a trilobite, and from this head he estimated the original length of the trilobite at seventeen inches, publishing a figure of this length. The figure of the Huffman dam trilobite is that of an actual specimen, and is not based on a fragment supplemented by calculation.

This trilobite belongs to the well known trilobite genus *Isotelus*, but Mr. Foerste, of the Steele High

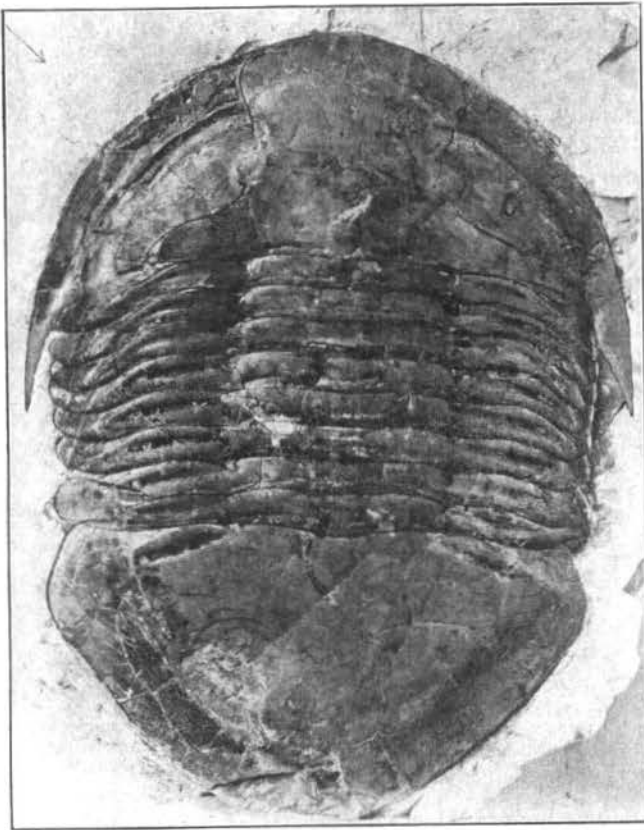


FIG. 166—THE HUFFMAN DAM TRILOBITE

School, regards it as a new species, characterized by the shortness of the head and tail, compared with their width, and proposes for it the name *Isotelus Brachycephalus*, which means "short head." This is merely a method used by scientists for quickly identifying the species of trilobite under discussion, and its nearest relationship to others.

During the celebration of the twenty-fifth anniversary of the opening of Steele High School, hundreds of people saw this specimen, and it will continue to be one of the great finds for many years to come.

Aug. F. Foerste.

A Request to District Employees

In connection with Mr. Foerste's article, the District requests that employees use care to preserve unusual fossils which they find. Even small fragments of these big trilobites, from the scientific standpoint, are valuable. Human skeletons found in the gravel should always be reported. They may be very old—even prehistoric. The Huffman trilobite is the greatest discovery of its kind ever made. It will probably be presented to the National Museum, at Washington, D. C.

A Year of Conservancy School Work

The first year's work of the Miami Conservancy District Schools ended on June 20. One hundred and fifty pupils have received instruction at the four schools during the year, 130 being the average number attending throughout the school term. Two boys and one girl have received state certificates of promotion to high school.

An ancient Greek philosopher was once asked what sort of an education was most worth while. He replied—that which the boys and girls, on be-

coming adults, could use. Our Camp Schools have this aim in view. Reading, arithmetic, the correct use of English, etc., have their later uses, and have not been neglected. With them have been linked the doing of things which will help to fit the boys and girls for the parts they will play in later life. These have included gardening, cooking, sewing, and the use of tools.

The value of these things to the pupils is indicated by the following, quoted from a fourth grade boy's composition: "My garden taught me that soil was good to plant food in, how to take care of the things that were growing, and how to keep accounts." Another composition has this conclusion: "The soil must be fertile to have a good crop. Growing things need plenty of food, water, and sunshine. Gardens teach you the value of money." The school gardens, in addition to the benefits derived from working out of doors, have thus provided lessons in arithmetic, drawing, manual training, nature study and citizenship.

There is universal agreement that any system of education is a failure unless it safeguards the health of children. It is not necessary that children know the names and number of the bones of the body, but it is essential that they understand and observe the rules of health. This has been the aim of the teaching in hygiene. Play in the open air has been encouraged. With the coöperation of parents and friends of the school, each school was enabled to buy volley ball, baseball, and playground equipment.

In spite of the difficulties and problems that go with the beginning of a new school, such as the waiting for materials, and the classification of children coming from many different schools, the teachers and patrons of our schools may be justly proud of what has been accomplished during the school year. To the teachers, Mrs. Eudell D. Everdell and Miss Elizabeth Jordan of Englewood, Miss Elizabeth Dungen and Miss Effie Geron of Taylorsville, Miss May Turner of Germantown, and Miss Mildred Goss of Huffman, the thanks of all are due. Through their efficient and loyal service they have given our schools a high standing in the educational field.

The Miami River Work

The recent moving of the 200-ton dragline excavator, mounted on its scow, beneath the Main Street bridge, marked the passing of another milestone in the Miami River improvement through Dayton. The boom has been again extended to its original length—135 feet, and the big machine is once more at work. At present writing it is just at the bridge and turning west to dig out the shoals, now high and dry, which obstruct the north half of the channel. It has already completed excavation of the south part of the channel for a considerable distance below the bridge (for the most part already deep enough), depositing the material at the foot of the stone wall along the south bank. A concrete wall at this point will be built, cutting back slightly into the bank, and the deposited material is to buttress the foundation of this wall and furnish a base for the flexible concrete revetment which will extend out from the foot of the wall.

The new north levee along Lehman Street will practically follow the old one as far west as McKinley Park, the change introduced here being the elevation of the top of the levee.

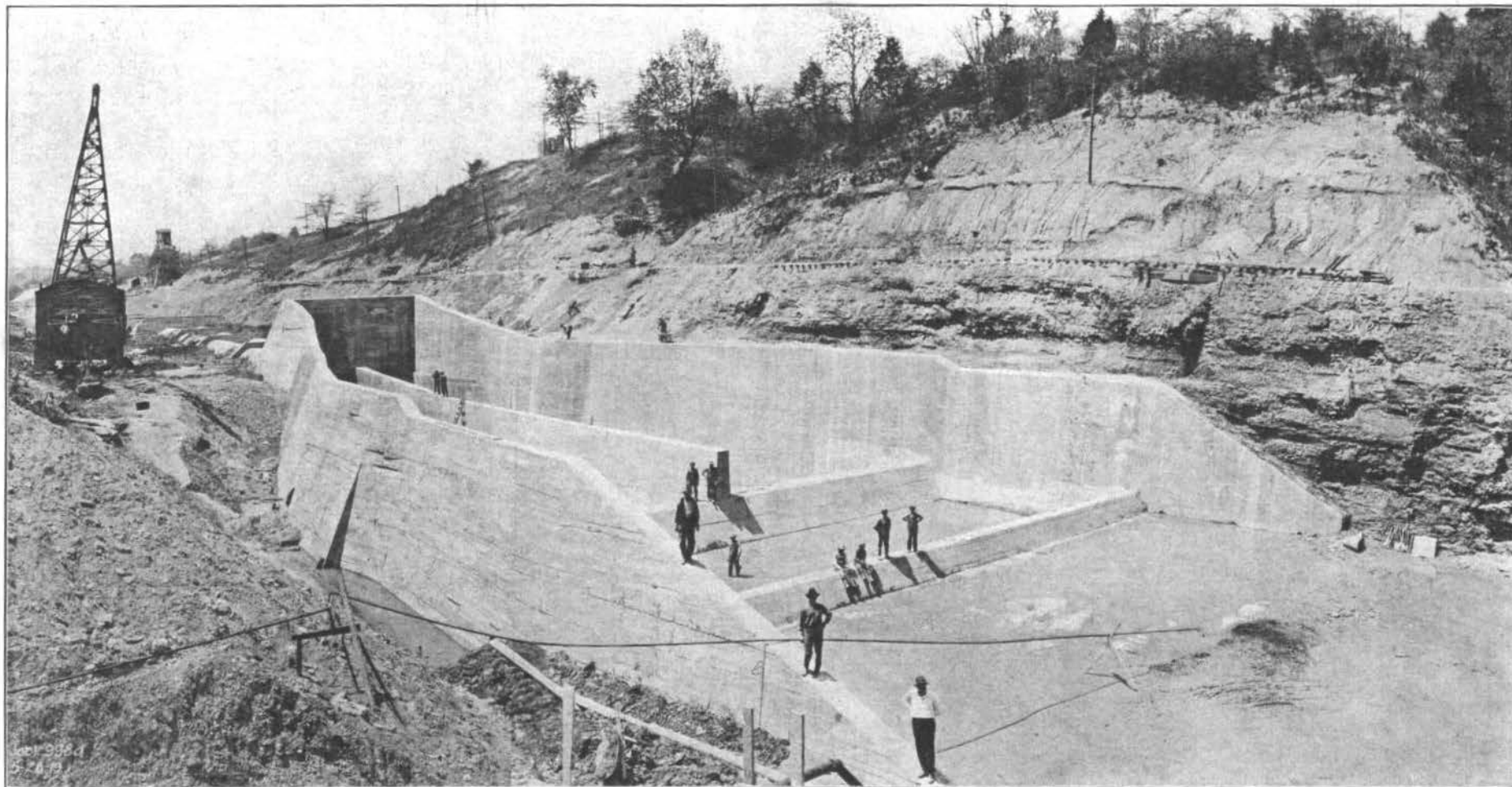


FIG. 167—OUTLET OF CONDUITS, GERMANTOWN DAM, MAY 26, 1919.

The tops of the conduits, with the "cut-off walls" projecting at intervals, (see under Fig. 158) can be seen between the dragline excavator and the "head wall" to the right of it. At ordinary stages Twin Creek will flow as harmlessly through the conduits as the water through any railroad culvert. But when floods occur, conditions change totally. With maximum assumed flood (at spillway level), the water will back up behind the dam 91 feet deep... It will come shooting through the conduits at the rate of 55 feet per second, at a pressure of 5,674 pounds—nearly three tons—per square foot. $312\frac{1}{2}$ tons per second will come through, with the speed of a galloping horse. The possibilities for destructive washout of the valley immediately below are evident. It is to curb the speed of the water and kill its destructive energy that the outlet works above shown have been designed and built. The chief feature is a large double tank or open chamber of concrete, (between the two outside main walls in the picture, and divided by the long horizontal wall) lying at the foot of the stairway shown in Fig. 160.

This "hydraulic jump pool" is full of water and holds thousands of tons. Into this huge mass of water the moving mass from the conduits, (rushing down the stairway, Fig. 160) will plunge, destroying its energy as against a liquid wall. It will then roll on (over the further cross wall in the foreground) in a great wave,—the so-called "standing wave"—into a second pool—the "stilling pool"—(between the two nearest cross walls); then on over the nearest cross wall, across a concrete apron and on into the valley below, its speed reduced to so low a figure that it can do no harm.

The solution of this problem—that of destroying the tremendous energy of the flood water through the conduits—was one of the most difficult which the Conservancy engineers had to solve.

The maximum width of the concrete outlet structure (outside to outside) is 108 feet. The foundations are carried down into solid rock, and the structure is interlocked with the solid rock on each side, to prevent movement due to the impact of the moving mass of water.