

MCD Report No. 20-2

THE MIAMI CONSERVANCY BULLETIN

AUGUST 1919

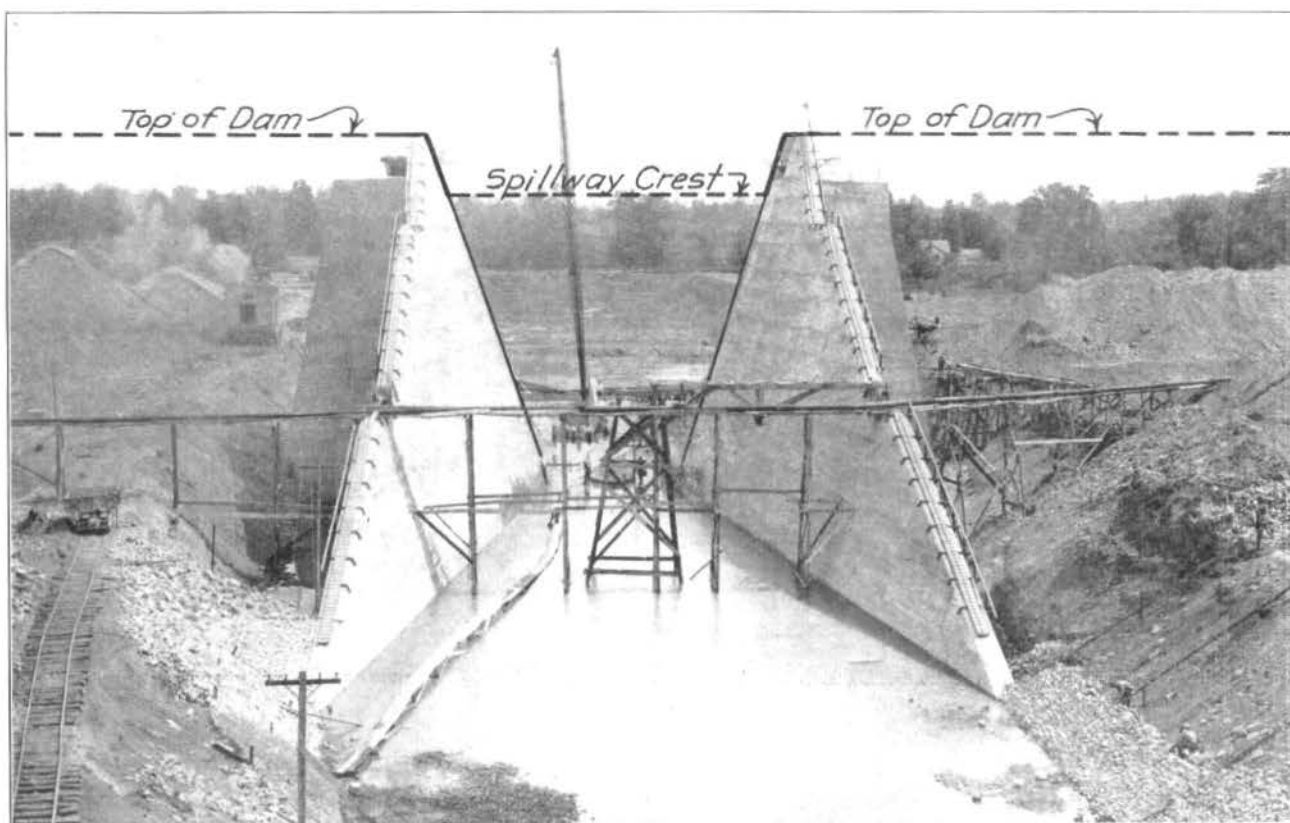


FIG. 1—CONCRETE OUTLET, LOCKINGTON DAM, FROM UPSTREAM END, JUNE 6, 1919

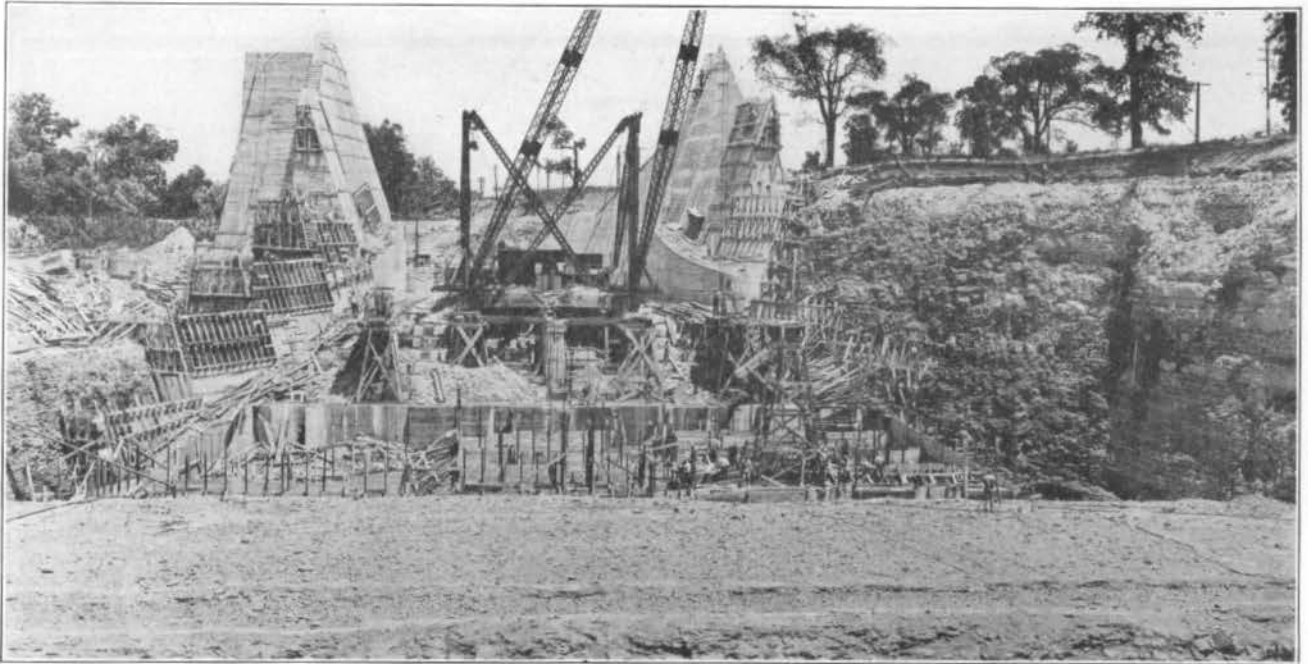


FIG. 2—CONCRETE OUTLET, HUFFMAN DAM, LOOKING UPSTREAM, JULY 10, 1919.

The type of structure is similar to that at Lockington, described elsewhere in this issue. The walls have reached the full height of the dam. The down stream ends are still under construction. The foreground is solid bed rock, ready for the floor of the second pool, the stilling pool. Just beyond this the excavation drops away to the floor of the hydraulic jump pool, (out of sight). Beyond this is seen the concrete stairway descending between the walls. The water will flow down this stairway into the hydraulic jump pool, from which it will pass over a wall to the stilling pool in the foreground. The left-hand portion of the left-hand wall is one of the cut-off walls, at right angles to the main wall.

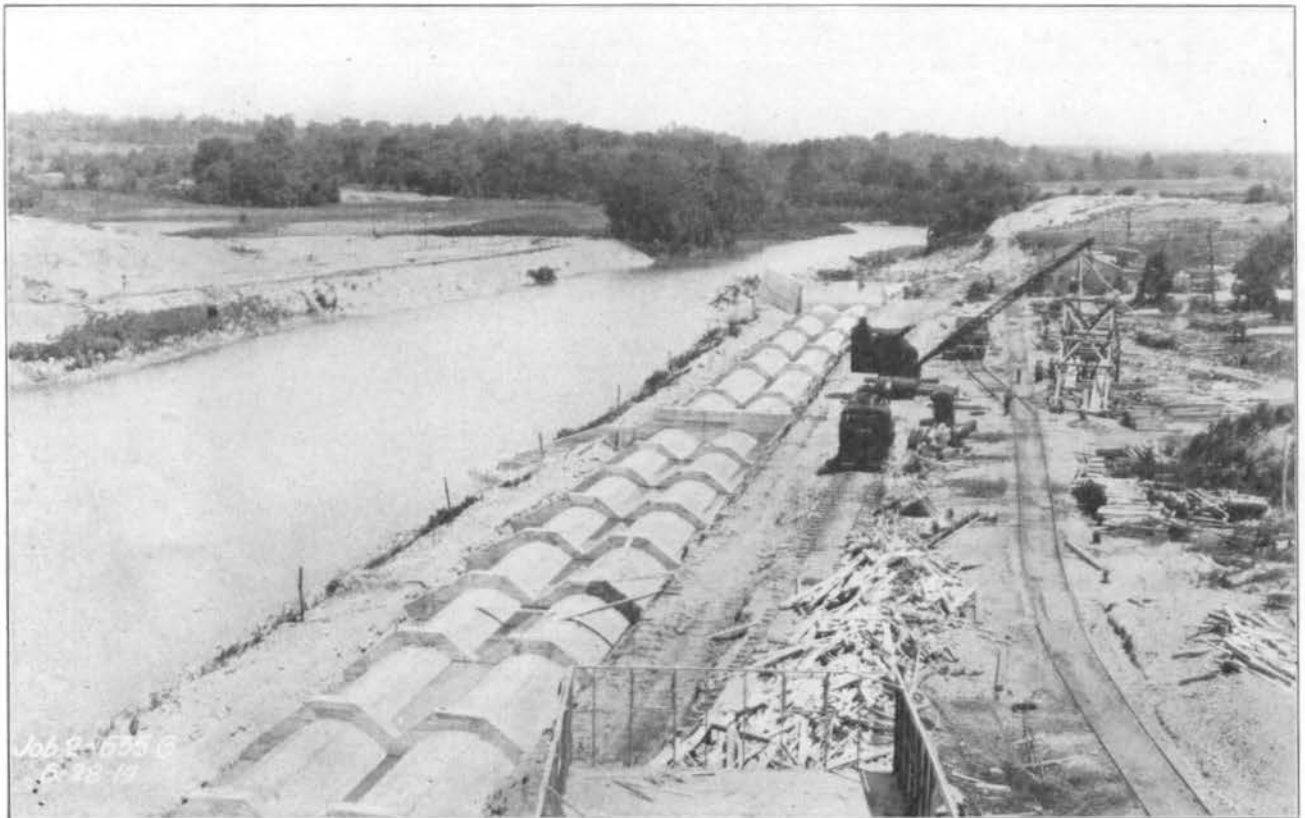


FIG. 3—CONCRETE OUTLET CONDUITS, ENGLEWOOD DAM, LOOKING DOWNSTREAM, JUNE 28, 1919

This is the type of conduit structure, referred to on page 5, which is entirely separate from the spillway structure. Figure 2, above, shows the type wherein conduits and spillway are combined, as also does figure 1 and figure 14. Note the great length of the conduits here (over seven hundred feet), as contrasted with those at Lockington, (the entrances to which are dotted in at the bottom of the wall, the Lockington conduits being not yet built). These conduits will be buried at the center line (at the low wall beside the locomotive) in over 90 feet of earth. The Lockington conduits, on the contrary, will be topped with concrete to the upper dotted line in figure 14.

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THE MIAMI CONSERVANCY BULLETIN

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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.

Another Legal Victory

In the Common Pleas Court of Montgomery County, the jury, on July 29, returned two verdicts in favor of the Miami Conservancy District, the cases tried being those of the District versus Rosa Koellsch, and versus Morris Kasmirsky, both property holders in the deeply flooded portion of the city of Dayton. These cases came up on appeals filed by these parties from the award of benefits as determined by the Board of Appraisers on the charge that the amounts were excessive. The findings of the jury were in each instance a complete support of the Board, the exact amount of benefits called for in the appraisal roll being confirmed in each case.

Previous to these two cases, five others, involving in all eleven pieces of property, had been tried, four in the Butler County and one in the Montgomery County court, the verdicts in all of them upholding the benefits determined by the Board of Appraisers. As a result of these decisions the majority of the property holders in Butler County who had perfected their appeals, recently withdrew their cases, thereby accepting the appraisers' awards.

The cases are of interest at this time, aside from their legal aspects, because they tend to confirm the general public opinion that prevailed at the time the Appraisal Roll was approved by the Conservancy Court in June, 1917. At that time property holders were given the right to appeal from the awards of benefits on their properties. Less than one-half of one per cent chose to do so. The other 99½ per cent, in spite of urgings on the part of a few discontented ones, did not appeal. This fact alone is significant, for there are in the District about 70,000 pieces of

property which will be benefited by being permanently protected against floods.

The amount of benefits as determined by the Appraisers represents that portion of the property value which is due to flood protection, and by which amount the property value would have depreciated had no flood protection been provided. The flood assessment to be paid by the owner, as now levied, is only 36 per cent of the amount of benefits. The equitable determination of these amounts of benefits was, of course, a big task, and consumed nearly two years. For each parcel of property it was necessary to determine the market value both with and without protection, and the depth of flooding on and surrounding it. The methods used by the Appraisers were worked out with the greatest care, and having once been settled upon were applied with the utmost uniformity and faithfulness.

It is, therefore, gratifying to find the figures of the Appraisers upheld by the courts. As a matter of fact in all of the cases so far tried it was very apparent that the parties who appealed did not have a correct understanding of the true intent and meaning of the appraisal figures. Many mistook the amount of benefits for the assessment. Others quibbled about matters of trifling consequence.

Thus in the case of Rosa Koellsch there was only a trifling difference between the appraisal value and that testified to by the owner. Had the jury found in her favor she would at the most have reduced her assessment by \$42.12, which taken over the 30 years in which payments are made, would represent a saving of about a dollar and a half per year.

Eminent Hydraulic Engineer Approves Conservancy Work

Among the engineers who were invited recently to inspect the progress of the work of the District was Daniel W. Mead, consulting hydraulic engineer, of Madison, Wisconsin, the occasion being the completion at three of the dams of the concrete outlet structures. The following statement, made by him following his visit, will be a satisfaction and an additional assurance to all the friends of the Conservancy District.

"My recent examination of the works of the Miami Conservancy District has given me renewed assurance that these works when completed will accomplish all that has been anticipated toward the flood protection of the Miami Valley. The progress made, in view of the war conditions which have obtained since the work began, seems entirely satisfactory. The foundation conditions developed at the dam sites are safer than was expected and have removed the most doubtful element in the flood protection problem. The work is being done so satisfactorily that I see no reasonable way in which it can be improved. The citizens of the Conservancy District are to be congratulated on the efficient and effective organization of the district, the progress and character of the work, the apparent systematic and economical way in which the work is being handled, and the safety to life and property which will follow the completion of the project."

The River Improvement at Hamilton

Attention is called to the article on page 11 in this issue, discussing briefly the problem of river improvement at Hamilton. Public attention, since the flood, has been focused much upon Dayton, due to that city's greater size and to its strategic position in the valley, both tending to make it the natural center of flood prevention activity. But in fact the relative effects of the flood were considerably more serious at Hamilton. The loss of life was several times greater. The problem of improving the river was also considerably more difficult. This was due principally to the constricted channel through the built-up section, some evidence of which may be seen in the fact that the flood swept away every bridge in the city. Following the flood, Hamilton attempted at first, as did the other cities of the valley, to cope with the problem single-handed, and called in the well-known engineer, John W. Hill of Cincinnati. With the perception that the Hamilton problem could be properly solved only as part of a larger project, embracing the valley as a whole, the people of Hamilton merged their interests with those of Dayton. The resulting plan, as related to the river channel, is presented in its main features on page 11.

The Concrete Block Plant

We wish to call the attention of our readers to the account, on page 13, of the plant of the Price Bros. Co. for making the concrete blocks for the Miami River improvement. Mr. Harry Price, to whom the design of the plant is largely due, spent much time and thought on the working out of the details. Being familiar with the type of machinery usual in such work, he was enabled to carry his design to an unusually satisfactory degree of efficiency. One ex-

cellent point about the devices which he introduced, notably in the wire bending machine for making the reinforcement, is their simplicity. The wire bender was in fact home-made of picked-up scrap. It ought to be said also that in the handling of his men Mr. Price has done unusually well, a point to which we hope in the future to call further attention.

Contract for Track-Laying Let

The contract for laying track on the Big Four, Erie and the Ohio Electric Railways will be let on July 31st. The work will include the placing of about 100,000 ties, 110,000 cubic yards of gravel ballast, and 4800 tons of steel rails. The rail will be 90-pound except on the Ohio Electric, where it will be 70-pound. The gravel will be obtained from the valley bottom just above the Huffman dam site. It will be excavated by one of the Conservancy dragline machines.

The American Association of Engineers

The Dayton Chapter of the American Association of Engineers was recently addressed at the Engineers' Club by Prof. F. H. Newell, formerly Director of the United States Reclamation Service, and now head of the Department of Civil Engineering at the University of Illinois. He is also President of the American Association of Engineers. His theme in general was the value of the engineer to society and aroused much comment. The Association has developed a good deal of strength in Dayton, meeting, it would seem, a real need. Its object, that of promoting the business interests of the profession, is different from that of any other of the engineering societies, and there has been considerable discussion regarding it. One way of helping the business of the engineer is to educate the public as to its need of engineering service. That was one of the points made by Mr. Newell, and it was emphasized by Mr. Chas. H. Paul when a little later, at the same meeting, he was called upon to speak. The need of such education can scarcely be doubted, and the smaller municipalities especially furnish a seed bed for perfectly legitimate propaganda. The smaller cities do so many things ill which they might do well if they would employ a properly trained engineer, instead of a half baked one or none at all, that the possibilities in this direction offer a rich field. It may be objected to as advertising, and hence unworthy of the profession, but the objection will not hold. It is public education to a public need, and inures as much to the benefit of the people at large as it does to the engineering profession. In fact more. Such education might well be made one of the chief activities of the American Association of Engineers.

Superintendent Johnson Goes to the D. P. & L.

Mr. Roy Johnson, who has been Superintendent of the electric transmission line work of the District, has resigned his position, the resignation taking effect July 7, to accept a larger job with the Dayton Power and Light Company. He will be Superintendent of Line Construction, having charge of all that work for the company. He superintended the building of all the transmission lines at the Conservancy dams, and his new and bigger job is in itself a guarantee that the work was well done. We note his going with regret and wish him prosperity in the work he is taking up.

The Two Types of Outlet Structure at the Dams

The Conduits and Spillway Are Combined at Two of the Dams. They are Separate Structures at the Other Three.

It will be evident at a glance, to any one who looks at the pictures of the newly finished concrete structure at Lockington, shown in this issue, and contrasts them with the Englewood conduits shown in figure 3, or with the outlets at Germantown illustrated last month, that two entirely different types of structure are indicated. Englewood and Germantown show concrete tunnels nearly buried in the earth and rock of the valley floor. Lockington shows high massive walls and no tunnels at all. Yet in each case the dam is at practically the same stage of construction—the stream turned into its new channel and the hydraulic fill of the earth embankment just beginning or well begun. A discussion of the reason for the difference referred to may be of interest.

In connection with a dam four essential features should be recognized. The first is the dam itself, blocking the stream and storing the water in the basin or reservoir in the valley above, this basin constituting the second feature. The third feature is the outlet channel that carries the stored water through or around the dam to the valley below. On the way it may pass through a mill or power house, in which the water develops useful energy by turning water wheels. When thus used for power purposes, it will take water from the reservoir at a level nearly up to the top of the dam, as in the ordinary mill head race. In the case of retarding basins, however, like those of the Conservancy District, designed not at all for power, but entirely for protection, the outlet channel passes through the base of the dam. It is simply part of the regular

river channel, and carries all ordinary flow without backing the water up the valley behind the dam at all.

The fourth feature is known as the "spillway." Its action is like that of a safety valve. It takes the water which the reservoir or basin cannot hold during flood seasons and discharges it below the dam. It is simply a broad, open channel, built of some material like stone or concrete which will resist the scouring action of the water. Since its object is only to take care of overflow, it connects with the basin or reservoir at a level near the top of the dam. In some cases the entire dam crest acts as a spillway, the excess water flowing over it and down the dam "apron" to the valley bottom below. In this case the apron must be built of materials which will resist wash. Such a dam is known as an "overflow" or "overfall" dam. An earth dam, however, like those of the Conservancy District, can never be of this type, since the rush of water down the apron would wash the material and might endanger the integrity of the structure. For an earth dam, therefore, a special spillway channel must be provided, which must take the water from the basin at a level sufficiently below that of the dam crest to prevent flood water ever overflowing the top.

One ideal type of spillway would be a structure entirely distinct from the dam, with inlet and outlet channels of its own, isolating the dam completely from danger of wash by spillway overflow. Nature sometimes, though rarely, provides conditions for such a spillway. The Germantown site exhibits such an instance. It is shown in figure 4. The

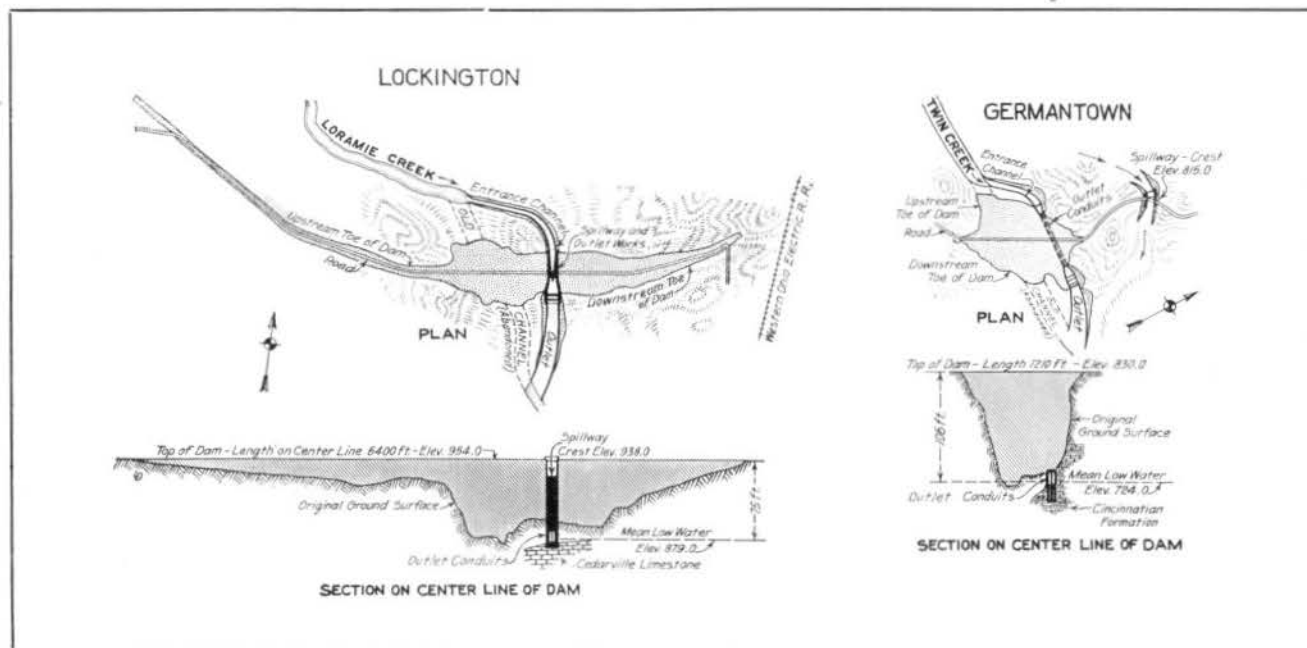


FIG. 4—PLANS ILLUSTRATING THE TWO TYPES OF OUTLET STRUCTURE

At Germantown the spillway (at the right) is entirely separate from the dam, with higher ground intervening. The channels leading the water to and from it are natural ravines tributary to the main valley of Twin Creek. Before water can overtop the dam it will flow up one of these ravines, over the spillway and down the other. At Lockington the spillway is directly over the conduits, the two being designed to be carried on the same foundation. See pages 5 and 6.



FIG. 5—LOCKINGTON OUTLET FROM TOP OF WEST WALL, JUNE 11, 1919.

The water, coming from the conduits, descends the stairway into the hydraulic jump pool, which is divided into two halves by the partition wall as seen. The water will then go on over the first wall into the stilling pool, (where the men are standing) then on over the second wall into the outlet channel. The dark diagonal band at the lower left-hand corner marks the downstream end of the conduits.

spillway (at the right) is about 800 feet from the nearest point of the dam, with the hill between. The channels leading to and from the spillway follow natural ravines tributary to the main valley, which receive the flood water far above the dam and discharge far below it. Should a flood come heavy enough to bring the spillway into action, the hill would become an island, with its summit still thirty-five to fifty-five feet above the water. The spillway fits a natural saddle in the valley slope and the water flows over it on the natural bed rock.

At Englewood also the spillway is a separate structure, resembling that at Germantown. But nature provides here no intervening hill. The spillway will be located just at the west end of the dam.

Cases frequently occur, however, which make it best to carry the spillway channel directly across the top of the dam itself, and the question then becomes one of determining how to do this so as to secure the requisite safety at the least cost.

A considerable part of this cost is that of securing solid foundations. Now as already indicated, at all the dams of the District, there will be conduits to carry the ordinary river flow, and these conduits must also have solid foundations. It is evident that if the same foundation could be made to carry both structures, a considerable saving in expense might be made.

In its simplest form, this would amount to building a narrow section of the dam of concrete, or other similar material, pierced by the conduits at the bottom, and carrying the spillway channel at the top. And in fact, at Taylorsville, Huffman and Lockington this is the design adopted.

If the dam is very high, however, it is evident that the cost of building such a section entirely of concrete might be greater than that of building two separate structures, one for the conduits and the other for the spillway. The spillway in this case would naturally be at or near one end of the dam, where foundations could be found without going very deep. This is the case both at Englewood

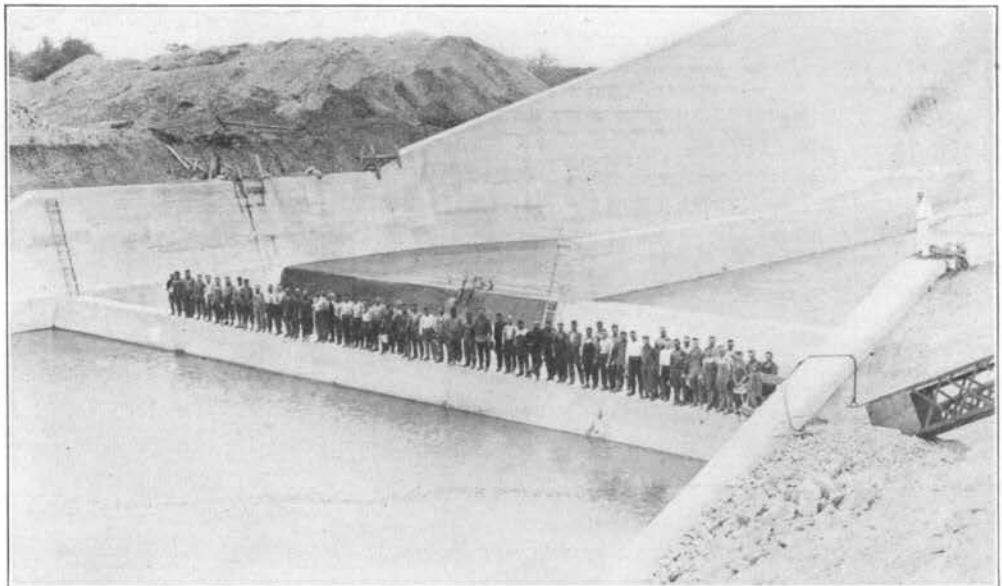


FIG. 6—THE MEN WHO DID IT

This photograph of the men who built the Lockington outlet was taken on June 11, 1919, the day that the waters of Loramie Creek were first turned into the new channel. The first of the water to come through is seen pouring over the left-hand half of the weir, (just back of the men) into the hydraulic jump pool. It is just ready to flow over the right-hand half of the weir.

and at Germantown, as has already been indicated.

Consideration of what has been said will make it clear that as a rule, other things being equal, considerations of cost will usually prescribe the combined structure for low dams and separated structures for high dams, and that at some intermediate height, varying with the particular case in view, the cost will be practically the same using either design.

The Lockington structure, illustrated in this issue, is of the combined type. It was at first planned to build the conduits and spillway here in separate

structures, there being a natural spillway location across the low dike at the west end of the dam, where a natural ravine would lead the discharge back to the creek in the valley below. Borings made at this point, however, indicated that proper foundations could only be reached at a depth so great as to make the expense out of the question. A combined structure, conduits and spillway in one, was the economical solution.

A fuller discussion, going further into the engineering details of this subject at the several dams, will be given in future issues of the Bulletin.

The Outlet Structure at Lockington

Combined Conduit and Spillway Structure of Concrete, 525 Feet Long, 128 Feet Wide and 84 Feet High.

The Lockington dam is uppermost in the valley of all the dams of the District. It is being built across Loramie Creek valley, about a mile and a half above the junction of the creek with the Miami River. It will be an earth dam, about 7000 feet long, 440 feet thick at the base, and 75 feet in height above mean low water, and containing 974,000 cubic yards of earth. The retarding basin above it, at maximum flood, will cover 3600 acres to an average depth of $17\frac{1}{2}$ feet, equivalent to 63,000 acres 1 foot deep.

The great length of the dam is not due to an unfavorable site, but to the fact that to secure the necessary reservoir capacity, the dam had to be carried so high as to extend its ends in long, low dikes a considerable distance up the valley slopes. These dikes, less than twenty feet in height, constitute nearly half the length of the dam.

The dam is being built of earth by the hydraulic fill method. The outlet structure, recently completed, and illustrated in this number of the Bulletin, is built to carry the waters of Loramie Creek. It is already in operation, the creek having been turned through it on June 11. In its present form it consists essentially of two massive concrete walls, built at right angles to the dam and conforming to the cross section of the finished structure. Eventually a concrete cross dam will connect the two walls and block the space between, along the center line of the main dam. This will be pierced at the base by two openings side by side, rectangular in shape, 9' wide and 9' 2" high, to carry the ordinary creek flow. This cross dam will not be carried to the full height of the structure, but will stop 16 feet short of it. This leaves a rectangular opening at the top of the dam between the two concrete walls, sixteen feet deep and about 77 feet wide, to act as a spillway. The building of the cross dam is postponed until the main earth structure is completed, in order to leave the amplest possible opening to carry flood waters during construction, which might otherwise back up sufficiently to overflow the partly finished earth work and injure it.

Since it would require a flood 40% greater than that of 1913 to cause water to run through the spillway at all, it is scarcely expected that this part of the design will ever come into use.

The working layout for the Lockington outlet structure was described in the Bulletin for Novem-

ber, 1918. The conditions were in several respects usually favorable. Bed rock existed only a few feet below the elevation of the bed of Loramie Creek,

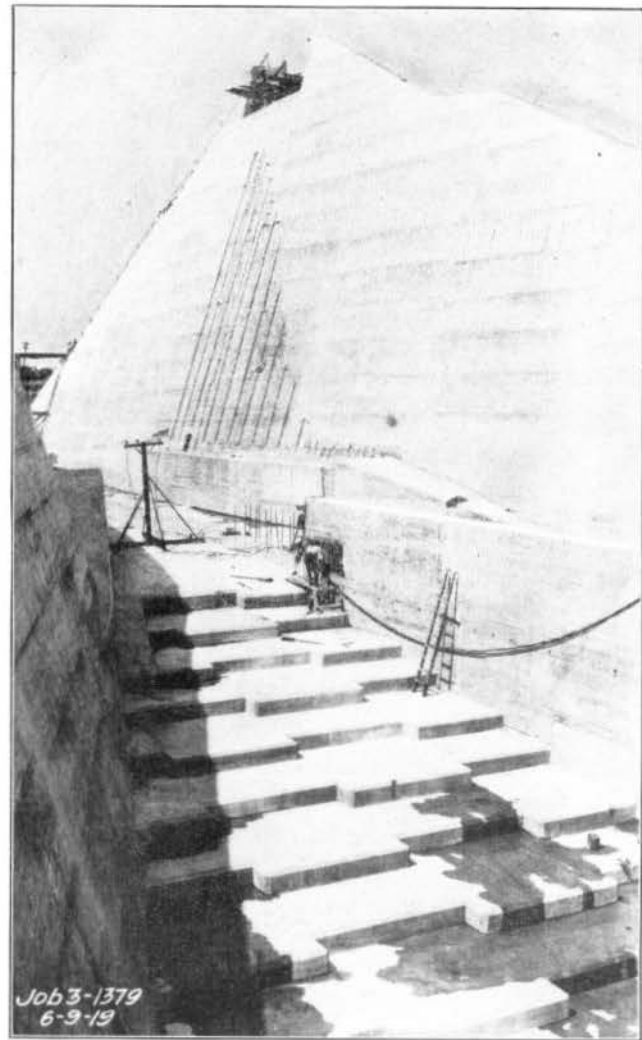


FIG. 7—LOCKINGTON OUTLET, LOOKING UP-STREAM

Taken from weir wall below, June 9, 1919. Loramie Creek was turned into the new outlet June 11. The vertical lines in the further wall are the keyways into which the concrete crossdam will lock.

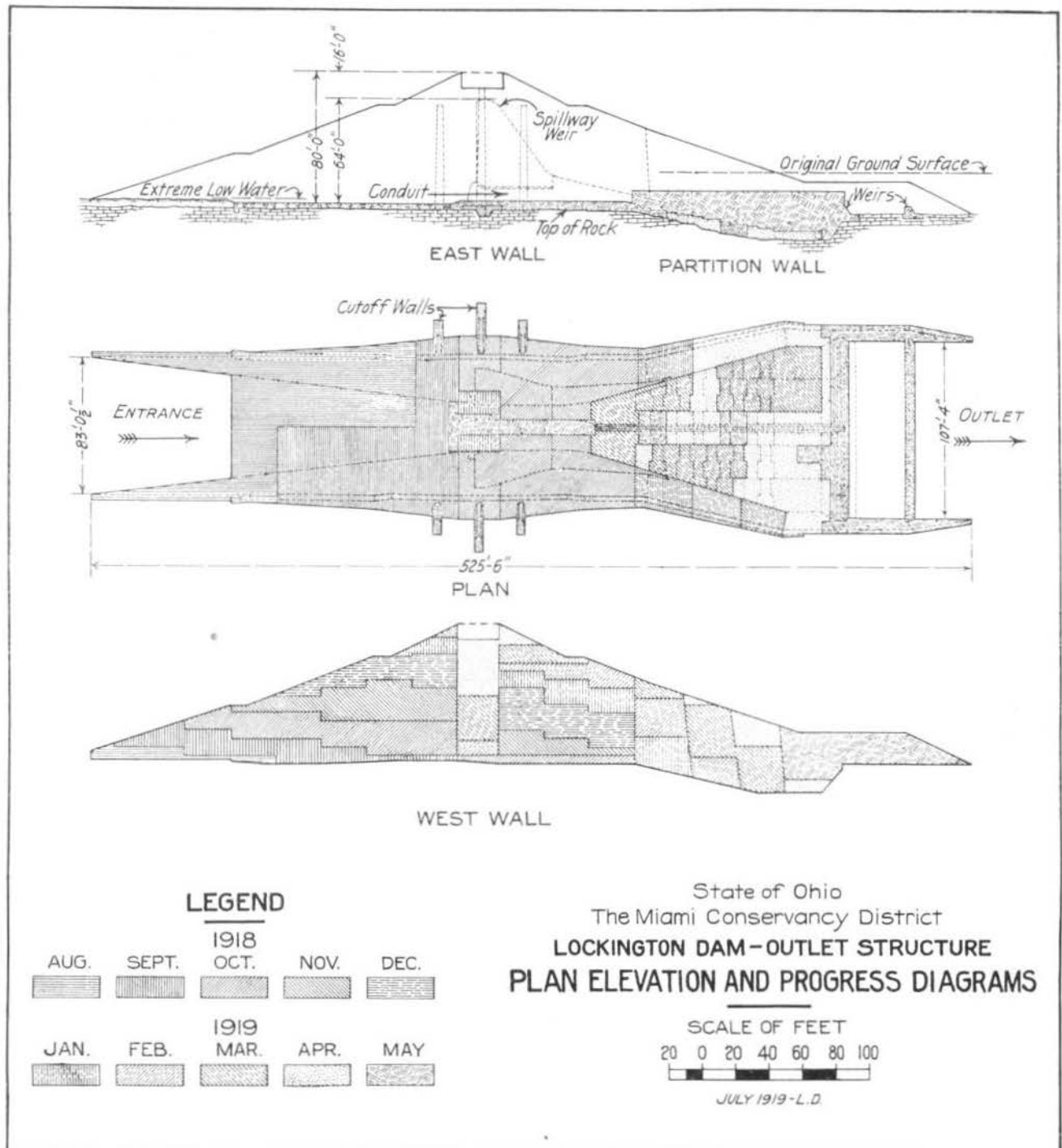


FIG. 8—PLAN, ELEVATION AND PROGRESS DIAGRAMS OF LOCKINGTON OUTLET STRUCTURE.

The west wall, the plan, and the partition wall in the upper figure, are hatched to indicate the month, during which each section of the concrete was built. Each month has its own peculiar style of hatching to distinguish it from the others. These are given in the figure under "Legend." The work of pouring the concrete began at the north (left hand) end in August, 1918, and the steady progress of the work can be clearly traced, month by month. The figures above were copied from those in the Office of Division Engineer Jones, and indicate how by such "progress diagrams" the men in the office follow the work in the field. The general method only is indicated above, not the details. In the office different colors are used for each month instead of different hatchings. The progress diagram of the east wall is omitted to show more clearly the outline (dotted line) of the spillway weir and crossdam.

almost level, and so firm that most of it needed only the cleaning off of the superimposed earth. Nowhere did more than a foot and a half of loose rock occur. A considerable part of the excavation necessary to reach the foundation was gravel, well adapted for concrete. This was piled into a stock pile east of the excavation.

The layout in practice worked well. The gravel washing and concrete mixing plant, similar to that at Germantown described in the April Bulletin, was at one end of the excavation, the gravel being transported to it in 4-yard dump cars drawn by a steam dinkey. The mixed concrete was carried from the mixer to the work in 1¼-yard bottom-dump buck-

ets on small platform cars drawn by a gasoline dinky. The excavation not being deep enough to permit chuting the concrete by gravity into the forms from a track on the berm as at Germantown, the material was distributed to the forms in the buckets by two guy derricks. These had masts 120 feet high, with booms 105 feet long, operated by electric hoists. These lengths permitted buckets to be lifted and dumped up to the very tops of the walls, 84 feet above foundation footings. The derricks also handled the concrete forms. Water seeping into the excavation was removed by electrically driven centrifugal pumps, some of it being piped to the gravel washer for use in the screening and concrete mixing. Supplies were obtained over a spur track connecting with the Western Ohio Electric Railway, about 2000 feet east of the work.

The total length of the concrete outlet structure is 525 feet, its maximum width, outside to outside, 128 feet, and its full height from bottom of foundation 84 feet. This does not include the depth of the floor of the hydraulic jump pool below the bottom of the main wall. The structure contains at present 28,223 cubic yards. To finish it will require 3085 cubic yards additional, exclusive of the road work and concrete bridge over the spillway. This added yardage will be placed after the earth fill of the dam has reached about spillway level over its entire length.

The Concrete

Soon after concreting was begun tests were made of the materials, and the workability of the mixture, which led to the use, in general, of aggregate in the quantities shown in the following table, the volume of each size being given as used in one batch of concrete.

Sand under $\frac{1}{4}$ "	13½	Cu. Ft.
Gravel over $\frac{1}{4}$ " and under $\frac{3}{4}$ "	11	" "
Gravel over $\frac{3}{4}$ "	22	" "

The measuring chutes were set to these capacities, securing thus an accurate and quick proportioning of the mixture. At times the chutes, and hence the proportions, were slightly changed to meet variations in the run of the gravel.

The cement was added in three different proportions, five, six, or seven full sacks to the batch of concrete, a full sack being considered to be one cubic foot. This gave the following proportions:

5 bag mix	1:2.7:6.6
6 bag mix	1:2.25:5.5
7 bag mix	1:1.93:4.7

The average size of a batch for the entire job was $1\frac{1}{4}$ cubic yards.

The five bag mix (1:2.7:6.6) was used in the interior and rear of the heavy walls, and in the bottom of some of the thickest walls. The six bag mix (1:2.25:5.5) was used for the entire wall whenever its thickness was less than about ten feet, and for the inner five or six feet of all walls thicker than this. For the submerged weirs, the partition wall, and the top two feet of the floors, the seven bag mix (1:1.93:4.7) was used. The concrete surrounding the outlet conduits was made of an especially rich mixture, 1:1.5:2.5. This was worked into place by persistent quaking of the mass, accomplished by the use of spades and boards moved vigorously back and forth. It was mixed to a consistency which would just give water to the surface after this continued working.

A typical analysis of the sand and gravel, as usually combined for use, is as follows, the cement not being included:

Size of Sieve	% Passing	Size of Sieve	% Passing
3 "	88	No. 4	30
2½ "	83	No. 8	21
2 "	76	No. 14	11
1½ "	62	No. 28	4.3
1 "	50	No. 48	1.4
¾ "	44	No. 100	0.8
½ "	38	No. 200	0.5
¼ "	32		

It will be noted that there is a deficiency in the small grains, of sizes passing sieves No. 14 to No. 48 inclusive; and an excess of the larger sand, passing Nos. 4 and No. 8 sieves. The excess was got rid of by means of a special screen added to the gravel screening plant, and which was described in the February Bulletin. The same article describes other special arrangements found advisable in the Lockington gravel washing plant. The general arrangements of the Conservancy gravel washing plants, including that at Lockington, is given in the April Bulletin.

The work at Lockington has been carried out under the supervision of Barton M. Jones, Division Engineer, C. H. Shea, Assistant Division Engineer, and G. E. Warburton, Superintendent.

July Progress on the Work

GERMANTOWN

The large Lidgerwood dragline has finished excavating the inlet channel and on June 25 the water was turned through the conduits.

On June 30, the hydraulic pumping plant was put in operation. One pump is being used at a time, the material being discharged at one toe of the dam and then at the other, the slopes being thus carried up alternately. The material is being placed at present in the area between Twin Creek and the north side of the valley. Twin Creek serves as the source of water supply, a sump having been cut from the creek to the hydraulic plant. It is necessary to pump all of the water, no gravity method for water supply being available.

Excavation for the spillway has been in progress during

the past month. This work is being done by separate contract.

A small earth dam will be placed across the ravine near the entrance to the spillway in order to provide a convenient place for wasting the earth excavated from the spillway.

Arthur L. Pauls, Division Engineer.

July 17, 1919.

ENGLEWOOD

On June 30 the lower cofferdam at the outlet conduits was breached to permit the river water to enter the conduits. The streamflow, however, will not be diverted until some time this month, when cofferdams at the upstream and downstream toes of the dam will be built and the river

bed unwatered for examination and preparation for embankment.

Work on the cross dam is progressing favorably. On July 14 a twelve-ton steam roller was put into operation, compacting the embankment of the center portion in six-inch layers. The upstream and downstream portions of the cross dam are now being pumped into place along with the hydraulic fill.

A total of 128,000 cubic yards of material was placed in the dam during the month of June. Of this, 113,000 cubic yards was hydraulic fill, pumped into place, and 15,000 cubic yards deposited in the cross dam by means of the large electric dragline. The total embankment to June 30 was approximately 440,000 cubic yards, or 12½ per cent of the entire dam.

The graveling of Highways 4 and 5 is progressing favorably.

H. S. R. McCurdy.

July 15, 1919.

LOCKINGTON

One dredge pump is now running day and night shifts, pumping the material a distance of 1,500 feet through a 12-inch pipe to the lower toe of the dam in the old creek channel. At present most of the material is being taken from the overflow ditch, which will lead from the sump to the entrance channel. Rocks too large to pass through the pump are being hauled from the sump and placed in the upstream toe of the dam.

The cut-off trench has been excavated by the larger Lidgerwood dragline, beginning at the concrete outlet structure and reaching to a point about 1000 feet west of it. For most of the distance the trench reaches bed rock. The excavated material, being suitable, is used to build the upstream toe of the dam. To date about 25,000 cubic yards have been placed in this dike.

The Class B Lidgerwood dragline has built the west approach to the bridge over the outlet channel and is now shaping up the lower end of the channel banks.

Part of Road No. 9 is being graded preparatory to graveling. The culverts on Road No. 10 and most of those on Road No. 9 have been built.

Barton M. Jones, Division Engineer.

July 18, 1919.

TAYLORSVILLE

The work of the Lidgerwood dragline in the outlet channel has been practically the same as reported last month, as the upstream progress of the working face at present is only about 40 feet per month.

The cross dike on the west bank of the river is finished except for a little settlement that will be made up with teams. A track has been laid from trestle No. 2 along the cross dike to the first berm on the lower toe of the dam, and a blanket of rock from the outlet excavation is being dumped on the lower toe.

A borrow pit is being opened up for the sluicing east of the inlet channel as extra earth is needed in the dam and the working face in the inlet channel is too short for efficient handling.

The gravel washing plant has been used to wash and screen the gravel for the concrete arch bridge over the B. & O. R. R. and for the most part worked very satisfactorily.

The concrete bridge has been poured all except the hand-rails.

The progress on the new cottages has been very slow because of delayed shipments of lumber.

O. N. Floyd, Division Engineer.

July 16, 1919.

HUFFMAN

The south half of the excavation for the outlet channel, from the lower end of the concrete to Mad River, has been completed. The material from this excavation has been loaded upon cars and hauled out to the Big Four and Erie Railroad fill. The dragline has started back, excavating the north half of this outlet channel, the material being placed in a fill just below the downstream toe of the dam.

The concrete in the main part of the two walls of the outlet works has been placed, and with the exception of a few sections the floor has been completed from the upper end down to the hydraulic jump pool. A little over 6,000 cubic yards of concrete were placed during the month of

June, and a total of 20,700 cubic yards have been put in to date.

Work on the erection of the hydraulic pumping plant has been in progress during the past month.

C. C. Chambers, Division Engineer.

July 16, 1919.

DAYTON

Channel excavation to date amounts to 428,000 cubic yards. A total of 354,000 cubic yards has been placed in levees and spoil banks, including 60,000 cubic yards of Contract No. 41. In accomplishing this work a total of 728,000 cubic yards has been handled.

Concrete is being placed in the extension of the storm sewer at McKinley Park. This construction has been difficult because of the large quantity of mud and trash which had to be excavated from the old hydraulic outlet before the foundation material could be placed.

The caterpillar dragline is engaged in the work of lowering the 20-inch water main which crosses the bed of the Miami River from Lawrence Street to Belmont Park. In order to place the main below finished channel grade it has been found necessary to lower the pipe for a length of over 300 feet.

The Germantown gravel washing plant has been brought to Dayton and is being erected near the mouth of Wolf Creek.

The dry dock at Sunset Avenue has been put in operation, one of the 40 ft. x 120 ft. scows being now in the dock for repairs.

Price Bros. have completed about 75,000 concrete blocks for use in the flexible revetment.

C. A. Bock, Division Engineer.

July 19, 1919.

HAMILTON

The total amount of material excavated by the two draglines to July 1 was 665,000 cubic yards. The electric dragline has been taken through the Columbia bridge and will take out the center cut between the Columbia bridge and the railroad bridge. From June 7 to June 29, inclusive, 18 working days, the machine excavated and loaded on cars 62,000 cubic yards, or an average per day of 3,444 cubic yards.

The steam dragline, Bucyrus Class 14, is continuing work on the tail-race at the Ford plant.

Work on the Wood street sewer is nearing completion. The Front street sewer will be started as soon as the work on Wood street is finished.

The placing of the asphalt pavement on Wood street and Buckeye street has been awarded to the Andrews Asphalt Paving Co.

Good progress has been made on the crossing under the B. & O. R. R. The excavation under the tracks has been brought to grade and the railway company's work on the trestle has been practically completed. This crossing is to enable dump car trains, loaded with materials excavated from the river north of Main street, to reach the low ground near the Ford plant where the material must be dumped.

C. H. Eiffert, Division Engineer.

July 19, 1919.

RAILWAY RELOCATION

B. & O. Relocation. The grading on the B. & O. Relocation is 95 percent completed. Condon & Smith started work in the last cut the middle of July and will finish all grading about the first week in August. All surfacing is finished from the south end of the relocation to Taylorsville, and the subgrade is ready for track laying. Roberts Bros. have had a small crew, under Superintendent Sutherland, setting up their track laying machine at Siding No. 1, about two miles north of Dayton, and are ready to start laying track. All of the new rails and 40 percent of the ties have been unloaded. Vang Construction Co. have loaded their outfit and shipped it out. Kahl Bros. Construction Co. are now finishing the levee just north of Taylorsville. The railroad company has started to elevate the tracks from Needmore Road to Leo Street, a distance of approximately two miles. The raise is required by the Conservancy plans because of the elevation of the Miami River bridge to conform with the improved levees. The raise is six feet at this point, and diminishes uniformly to meet the old grade at Leo Street. From the bridge north

it rises on a 0.2 per cent grade to meet the relocation a little north of Needmore Road. The cost of elevating the main line, and that of one sidetrack north of Miami River bridge, is to be borne by the District. All other track work, and the elevating of the bridge structure, will be borne by the railroad company.

Big Four and Erie Relocation. The excavation of the big cut at Huffman Hill has progressed so that of the 680,000 cubic yards total, only 50,000 cubic yards remain. The cut is now being taken down to subgrade. The finishing of the embankment and the other cuts is progressing as this excavation is being made. The Ohio Electric and Big Four cuts cross the Springfield Pike, and because the excavation is now being made through the present highway, it is necessary to divert all highway traffic. The pike will be relocated so as to parallel the railroads. A portion of it has been constructed and the remainder will be completed as soon as the traffic on the new railroad line is in operation. At Harshman the channel change is almost completed. The Walsh Construction Co. is doing this work.

East of Fairfield, George Condon is excavating the last cut, the material in which is gravel. He is moving this at a rate of 50,000 cubic yards per month.

Preparations for tracklaying and ballasting these two railroads are being commenced.

Ohio Electric Relocation. The grading between Mud Run and Carlisle Junction is rapidly taking shape. The two stiff leg derrick "draglines" are doing excellent work. The masonry for Mad River bridge is well under way. A steel sheet piling cofferdam was used on this work and

the footing of the west pier has already been placed. The Mud Run trestle and Smith Ditch concrete trestle are about 50 percent completed.

McCann, who has the contract between Fairfield and Mud Run, has installed a revolving steam shovel just west of Osborne and is handling the excavated material from the shovel with teams.

Albert Larsen, Division Engineer.

July 19, 1919.

RIVER AND WEATHER CONDITIONS

The rainfall in the Miami Valley during June was well distributed through the month and was less than normal in amount. Consequently no surface runoff occurred in any of the drainage areas. The river stages fell slowly but continuously throughout the month at all stations.

The total rainfall at the District's stations varied from 1.26 inches to 3.56 inches. The precipitation at the Dayton U. S. Weather Bureau Station was 2.59 inches, or 1.37 inches less than normal, bringing the accumulated deficiency since January up to 2.55 inches.

At the Dayton U. S. Weather Bureau Station the mean temperature for the month was 75.6° F., or 3.5° above normal; there were 10 clear days, 14 partly cloudy days, 6 cloudy days, and 11 days on which the precipitation exceeded 0.01 of an inch; the average wind velocity was 7.5 miles per hour, the prevailing direction being from the southwest; and the maximum wind velocity for five minutes was 50 miles per hour from the northwest on the 16th.

Ivan E. Houk, District Forecaster.

July 22, 1919.

The Problem of the River Channel Through Hamilton

Difficulties Due to Heavy Flood Flow and a Constricted Channel Through a Built Up District.

The problem of flood control at Hamilton was more difficult than at any other city of the valley. Relatively, the destruction there in 1913 was greater

than at any other point. The flood was greater than at Dayton in the ratio of 7 to 5. It amounted to 350,000 cubic feet per second, moving at high ve-

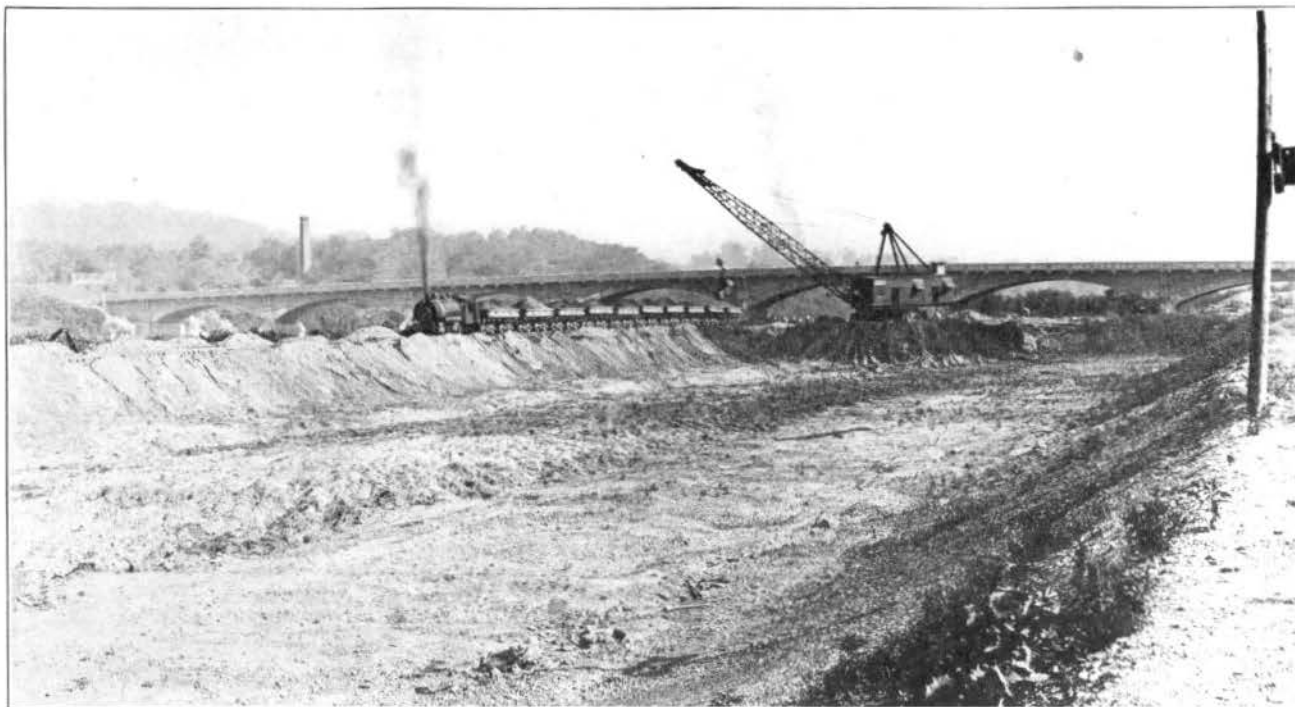


FIG. 9—EXCAVATING IMPROVED MIAMI RIVER CHANEL BELOW COLUMBIA BRIDGE, HAMILTON

The excavator is a Class 24 Bucyrus dragline, with 100 foot boom and 2½-yard bucket. The cars are 12-yard cars drawn by a 48-ton locomotive. The material is dumped to fill an extensive low area in Peck's Addition to Hamilton. The slope at the right is the bank slope, with a berm and a levee (not seen) to right of it. The material where the train is standing will be removed later. The river flows in its low water channel beyond. Taken July 3, 1919.

locity. The valley bottom, broad above, narrows at the city to a trifle over a mile, the entire width occupied by dwellings and business blocks, which helped to pile up the water. Where it first struck the city it covered most of this area to a depth of ten feet or more. In the river channel it was fifty feet deep. The drop through the city was steep—twenty-two feet in a distance of about a mile and a half, and the current was correspondingly swift and violent. In places the slope of the water was five or six feet in the length of a city block. The water rushed down the incline like a stream down a rapid among boulders, except that the stream here was a mile-wide flood, and the boulders were residences and city blocks. About two hundred of the smaller houses were swept away. The known loss of life was over two hundred.

Such facts make vivid the truth which the calculations of the Conservancy engineers established, that a flood of such dimensions could not be provided for economically by simply enlarging the river channel through the city. The river at Hamilton for a considerable distance flows through a restricted space between the plants of large and important industries. To secure protection by channel improvement alone so many of these would have to be wrecked to provide the necessary width as to make the cost insurmountable. To carry the river around the city through a by-pass amounts to a physical impossibility, since the city occupies the entire valley bottom. Considering Hamilton and Dayton together, with the half dozen smaller cities to be protected, left no question that the practical solution was by a joint project of protection such as was finally adopted, by which a large part of the flood waters would be held back in retarding basins behind dams in the upper parts of the drainage area, leaving only so much flow to be carried by the enlarged river channel as, in connection with the cost of the retarding basins, would be found most economical. At Hamilton, the amount of water thus left to be carried by the improved channel, was calculated to be 200,000 cubic feet per second.

Even so, the problem at Hamilton remained a very serious one. This was due primarily to the constricted width at the sites of important manufacturing plants, above referred to, between which the river flows. From the building of the Champion Coated Paper Co. to the nearest building of the Niles Tool Works was only 420 feet. Between the banks here the distance was only 390 feet. At Dayton the narrowest corresponding width was 550 feet. Consequently certain buildings here must be wrecked to provide the necessary width.

A crucial point was at the High-Main Street bridge. This had been designed by the City without being made to conform fully to the needs of the Conservancy plans. It was a newly built structure of concrete arches on concrete piers and abutments. It set limits to the improved waterway in height, width, and depth. The distance between the abutments was only 501 feet, limiting the new channel to that width. To increase this meant to wreck the west abutment. The depth of the improved channel was limited by the possibility of undermining the bridge piers during floods. The extent of the problem may be indicated by the fact that the maximum capacity of the old channel at this point was

less than 100,000 cubic feet per second. The new channel must carry 200,000.

The increased capacity for carrying flood flow must evidently be obtained either by deepening the channel, or by widening it, or by building levees, or by all three. The height of new levees, as just explained, was limited by the height of the bridge arches and was made as great as possible. The new width was made 500 feet at the bridge and for some distance above it. The new depth was made from 30 to 31 $\frac{3}{4}$ feet at maximum flood flow, with the water still three feet below the tops of the levees. On the east bank above the bridge, where the need for protection was greatest, this height of the levees above extreme flood stages was increased to four feet.

The widening involved the purchase of a strip of land 150 feet in breadth, extending nearly a mile along the east bank of the river. Part of this was occupied by the buildings or parts of buildings which had to be wrecked. Among these were parts of the Niles Tool Works, the Sterling Paper Co., and the Black-Clawson Co. The wreckage also included the power plant of the Hamilton & Rossville Hydraulic Co. The cost of the strip was upwards of three quarters of a million dollars.

The width of the channel thus obtained is not uniform. The improvement begins at the mouth of Two Mile Creek near the north limit of the city. The width of the channel here, from foot of bank to foot of bank, is 600 feet. This narrows gradually to 540 feet at Black Street bridge, about a quarter of a mile below, and to 520 feet opposite the plant of the Champion Coated Paper Co., a little farther down. This 520-foot width is maintained for 3,000 feet further, to the High-Main Street bridge. It then widens to 620 feet at the B. & O. Railroad bridge, about 1,200 feet further down. The 620-foot width is then maintained to the lower end of the improvement. The total length of the improved channel is 13,000 feet.

The widening of the channel below the High-Main Street bridge means the excavation of 200,000 additional cubic yards of earth, but the crest of the flood at maximum, as calculated, will be reduced two feet thereby and the additional safety thus secured is considered to be well worth the cost.

With the diminished quantity of water and the enlarged channel as described, the velocity of the river during flood will be greatly reduced, but will still be quite high. It will be highest, of course, where the channel is narrowest, along the 520-foot width, and especially at the Main Street bridge, where part of even this width will be occupied by the bridge piers. The effect of these piers is to back up the water slightly, so that at maximum flood the water will be a foot higher above the bridge than below it. It is in the drop of the water at this bridge that the highest velocity will be obtained.

The effect of such an increase in velocity was discussed in the article, printed in the May Bulletin, on erosion and deposit of sediment. The principles there discussed were in fact well illustrated by the river at Hamilton during the 1913 flood. Squeezed into the narrow neck between the Champion Coated Paper Co. and the Niles Tool Works, the water simply concentrated an increased erosive power on the narrow section and scooped out the river bottom into a hollow six or seven feet in depth. By a simi-

lar action at the High-Main Street bridge the bottom was deepened eight or ten feet. Finally, in passing around the only bend of magnitude in the city, just below the B. & O. Railroad bridge, the water swung to the outside of the curve, and scooped the bottom out in a third pool along the west bank. In each case the deepening was several hundred feet in length.

In the improved channel these tendencies cannot entirely be eliminated, but of course, with the flow reduced from 350,000 to 200,000 cubic feet per second, and with diminished velocity, they will be greatly reduced in magnitude. Nevertheless, at the High-Main Street bridge, where the construction and velocity are greatest, the case requires special attention.

It will be noted that at each principal constriction in width of channel, during the 1913 flood, the water deepened its bed. It effected a compensation for its restricted width by increasing its depth. Faced with the problem at High-Main Street bridge, the Conservancy engineers did the same thing. They deepened the channel under the bridge two feet below the grade, as established above and below, thus providing the necessary increase in capacity. To stop deeper wash, however, such as might undermine the bridge piers, the plans provide for driving a wall of interlocked steel piling ten feet deep into the river bottom just below the bridge, with the top of the wall just at the surface of the deepened channel.

With the improvements indicated, the velocity of the water at maximum through Hamilton will still be high, sufficient to produce strong effects. It will be able to roll along the river bottom loose stones six or eight inches in diameter, or even larger, as experiments and observations have shown. Damage from such action must be guarded against. This could be effectively done, of course, by paving the bed of the river with concrete, but the cost of this would be approximately \$900,000.00. This expense was not considered necessary, chiefly for the reason that if erosion of the river bed should occur during a flood, the effect would be simply to deepen the channel and hence to increase its flood carrying capacity. The trouble thus tends to be self-curing. The deeper the bottom is eroded, the more capacious the channel will become, till a point will be reached where erosion will cease, since the more capacious the channel, the slower the water will flow. As the channel at Hamilton is nearly straight, this deep-

ening may take place without the formation of serious gravel bars. If bars do form they must be removed as part of the cost of maintaining the improvement.

But although erosion of the bottom may thus be a gain rather than an injury, this is not true in case of the banks. These must be very carefully protected. The levees and banks will be lined throughout the narrow section with monolithic concrete paving six inches thick. At the foot of this pavement a line of piling will be driven, strong posts three feet apart, driven eight feet in the earth, their heads embedded in a continuous concrete wall sunk in the river bed. The concrete paving is then continued out from this wall along the river bed thirty-five feet toward the center of the stream, where it ends in a second concrete wall. This wall is anchored at every three hundred feet of its length to a strong fence of interlocked steel sheet piling running toward the bank, sunk ten feet in the river bed, anchored to both walls, and turning a short distance down stream along the inner walls. Thus each bank and edge of the stream bed is armored with concrete for a total width exceeding ninety feet, reinforced by strong timber posts, and by two concrete walls, with steel crosswalls under the stream bed at every three hundred feet, the entire width of the concrete being reinforced and tied together and to both walls by a mesh of steel wire.

It seems scarcely possible that river banks thus armored can be scoured out. Even should scour begin, it would be effectually stopped. The inner edge of the concrete armor might in fact be undermined to a depth of several feet, yet the integrity of the protection would remain unimpaired. For the concrete paving along the bottom, where dangerous wash would occur, consists of a flexible mattress of concrete blocks woven together by steel cables. This mattress would settle into any depression which scouring might create, and take the shape of the new bottom. Thus the paving, even if undermined, would be still unbroken, anchored by two steel cables through every block to the still solid structure next the bank. The entire bed of the river might be deepened by scour several feet, yet the banks remain undisturbed.

Consideration of the foregoing will make it clear why the Conservancy engineers, in solving this problem, did not think it necessary to go to the expense of paving the entire channel. The protection described is believed to be sufficient to guard against the severest flood.

Making Concrete Blocks for Miami River Revetment

Some Ingenious Devices and an Efficient Layout.

In order to prevent wash by the current, a considerable length of the new river banks will be covered with a lining of concrete. This lining will extend also to cover a thirty-five-foot strip of river bed adjacent to the banks. At the lower edge of this lining, or "revetment," especially around the channel curves, on the concave side of the curve, there is danger that the concrete will be undercut by the current, with resulting damage, and possible danger of cutting through the levee. If the lining could be made in the form of a flexible mattress, so

that when wash began, the mattress could settle down to protect the threatened point, the "stitch in time" would be taken against further trouble.

Such a flexible revetment might be made of concrete bricks or blocks, laid flat on the shore like bricks in a wall, if the blocks were linked together by steel hooks. Cheaper and better, two holes may be cast in each block and the blocks strung together by galvanized steel cables passed through the holes. If the blocks break joints, we shall thus get the equivalent of a woven structure, in which the blocks

are the woof and the cables the warp. Such a structure was adopted for the Miami River flexible revetment.

About 400,000 of the blocks will be required, of a size, 1 ft. x 2 ft. x 5" in thickness, the narrow faces all beveled $\frac{1}{4}$ " from their center line each way and the holes located 6" from the short edges of the block (See block on top of car, Fig. 10). The holes are $\frac{3}{4}$ " in diameter and take a $\frac{1}{2}$ " steel cable. The problem was the economical casting of such blocks.

The plan of the forms for the blocks, as developed by Mr. Harry Price, of Price Bros., Contractors, who are doing the work, is shown clearly in Fig. 10. For economy in handling, the blocks are molded on small flatcars, 16 blocks to the car, remaining on the cars from the time they are cast till they are unloaded, a finished product, in the storage yard. The 16-celled form is built up on the floor of the car, which forms one face of the block. The cells are formed by longitudinal and cross pieces as shown, forming the partitions, 2 tenons on each end of each longitudinal piece slipping rather loosely into corresponding mortises in the cross pieces, which are longer. A partition piece of each kind is shown leaning against the end of the car. The center cross piece is bolted to the car platform; all the other pieces are loose.

The forms are built up by slipping the tenons of five of the short partition pieces into the corresponding mortises in the fixed cross piece, then laying the next cross partition piece in place, slipping the mortises over the tenons of the short pieces already in place. This completes one middle section of four cells. The other middle section and the 2 end sections are similarly built up. The whole form is then tightened by cross blocks and wedges inserted between the two end cross pieces and the projecting

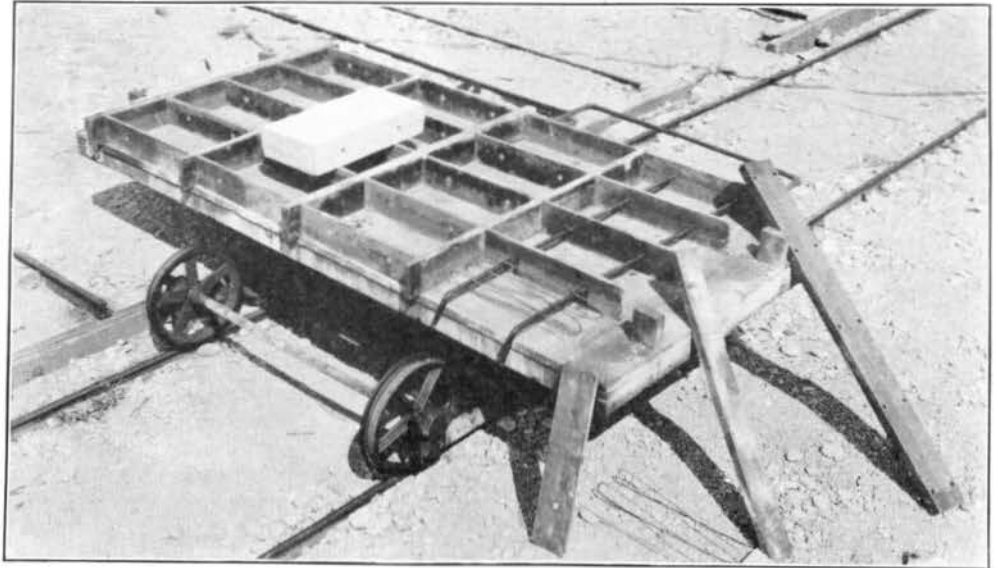


FIG. 10—CAR WITH 16-CELLED CONCRETE FORM

See page 14 for explanation

studs seen at the ends of the car platform. The top of the form is left open to receive the concrete, the freshly poured block being struck off with a broad trowel but not finished. The partition pieces are lined with sheet steel, number 16 gage and rust-proof. The holes through the blocks are formed by iron rods, slipped through holes in the form partitions as shown in the figure. Rods and partition faces are oiled with straw paraffin oil to prevent the concrete from adhering. The rods are removed while the blocks are still a little green. The blocks cure for 24 hours on the car, after which the forms are taken apart by knocking out the wedges and removing the partition pieces and the finished blocks, one by one.

The movement of the cars in relation to the general arrangement of the plant is shown in Fig. 11. Empty cars with forms made up receive the fresh concrete from the mixer and are pushed on to a rolling platform which moves along the transfer track at the left to a point opposite one of the tracks in the curing yard, to which it is then transferred, all the pushing being done by hand. (Short sections of rail on top of the rolling platform are placed

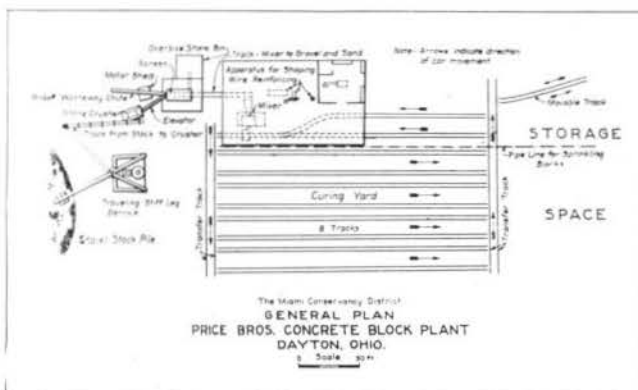


FIG. 11—GENERAL PLAN, CONCRETE BLOCK PLANT

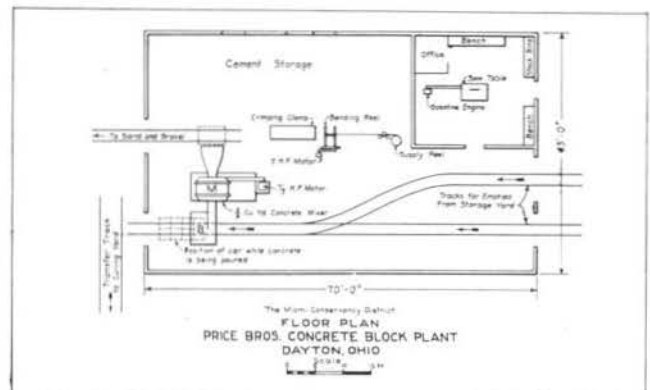


FIG. 12—INTERIOR PLAN, CONCRETE BLOCK PLANT

to align with the tracks in the curing yard and on the same level.)

The curing yard contains 8 tracks, each capable of holding 13 cars. At the end of a day's run this yard is filled with from 81 to 83 cars, all loaded with green blocks. The next day these cars, by way of the second transfer platform, (two of these being in use) are run over the transfer track at the right to the movable track, (so marked in Fig. 11) in the storage yard, over which they pass to the point where they are unloaded to await transportation to the river levee. The blocks remain in the curing yard about 24 hours. The regular day's run is 81 cars, or 1296 blocks, enough extra carloads being cast during the week to bring the average up to 1300 blocks per day. After the blocks are unloaded, the forms are taken apart, cleaned, oiled, set up



FIG. 13—PRICE BROS. CONCRETE BLOCK PLANT

Clamshell in foreground loads gravel from stock pile (not seen) into car shown dumping into rock crusher at left. Elevator belt to left of car takes crushed gravel to screen above, whence it passes to bins below and then by cars to mixer. Curing yard at right. Storage yard in distance. Mixer, etc., in house at left.

again, and returned to the plant for a fresh load of blocks.

The finished blocks are kept wet for several days by a sprinkling device made by running down the length of the storage yard a light weight pipe with slots sawed in its upper quarter at proper intervals.

Cement for the concrete is brought by truck and unloaded by hand. The gravel is obtained from the bed of the Miami River. It was deposited in a stock pile on the bank by a dragline excavator, the plant being close to the river. The gravel is taken from the stock pile by a traveling stiff-leg derrick with one-half yard clam shell bucket (see Fig. 13), and dropped into a car running on a track on a trestle. The car dumps into the hopper of a stone crusher, from which an elevator takes the crushed material to a gravel screen which separates it into two sizes—coarse aggregate, 2" to $\frac{1}{4}$ ", and sand, all below $\frac{1}{4}$ ". The screened material passes by gravity to bins and thence to hopper cars which carry it along a track to the receiving hopper of the concrete mixer.

From the mixer (M, Fig. 12) the fresh batch pours into a mortar box B, one batch making about a car and a half of blocks. The car with the form is rolled under the mortar box. The fresh concrete runs from the box into the forms through four gates, properly spaced to fill 4 cells of the form at a time. Four such pourings fill a car.

The fresh blocks, after being run to the curing yard, are thoroughly spaded by a special spade made by straightening the shank of the blade of a garden hoe. They are then rough-finished by striking with a broad trowel as already stated.

The reinforcement for the blocks is of No. 7 steel wire, shaped as shown in the picture, Fig. 10. The reinforcement is laid into the form as shown and slightly lifted from the bottom as the block is being poured, in order to bring it into proper position, the fresh concrete being stiff enough to hold it in place.

The reinforcement is made from the wire by a simple and ingenious arrangement sketched in plan as part of Fig. 12. The wire coming from the supply reel passes over three grooved wheels as shown to take the bend out. It passes thence to the bending reel made out of parallel gas pipes attached to a pulley rotated by an electric motor. This reel forms it into a somewhat flattened coil. The crimping clamp is then rolled forward on its rails (not shown) and its jaws bring the coil to final flatness. The coil is then removed from the reel and cut into sections of the requisite number of turns to give it the final shape seen in Fig. 10.

The rock crusher is a number one jaw crusher, built by the Western Wheeled Scraper Co. The mixer is a Koehring batch mixer of 21 cubic ft. capacity, run by a General Electric $7\frac{1}{2}$ H. P. motor. A 2 H. P. motor runs the wire bender, a 3 H. P. motor the gravel screen, and a $7\frac{1}{2}$ H. P. motor the rock crusher. All the electric motors are of the induction type and take current from the Dayton Power & Light Co.'s alternating current line, the plant being within the city limits of Dayton.

The labor required is as follows: wire bending machine, one man; trucks bringing cement, 2 men; derrickman; crusher and screen, 2 men; sand and gravel car to mixer, 4 men; mixer, 2 men; filling forms, 2 men; transfer car, 1 man; spading and finishing blocks, 2 men; cleaning, oiling, and setting up forms, 4 men; unloading blocks, 3 men. Add to these a superintendent, an inspector, a general utility man, and a night watchman. This totals 28 men. Much of the work has been done with 24 to 26 men.

The plant is operating very successfully and economically, and is turning out an excellent product. The contract price for the first hundred thousand blocks is 20 cents per block; for additional quantities, 16 cents per block. Counting the expense of gravel and use of rock crusher, both of which are

supplied by the District, this makes the average cost between 17 and 18 cents per block. The turn-out up to July 26 was 87,500 blocks, just half the number required for the Dayton river improvement. Hamilton will require 225,000. The plant will be dismantled and moved to Hamilton to make them.

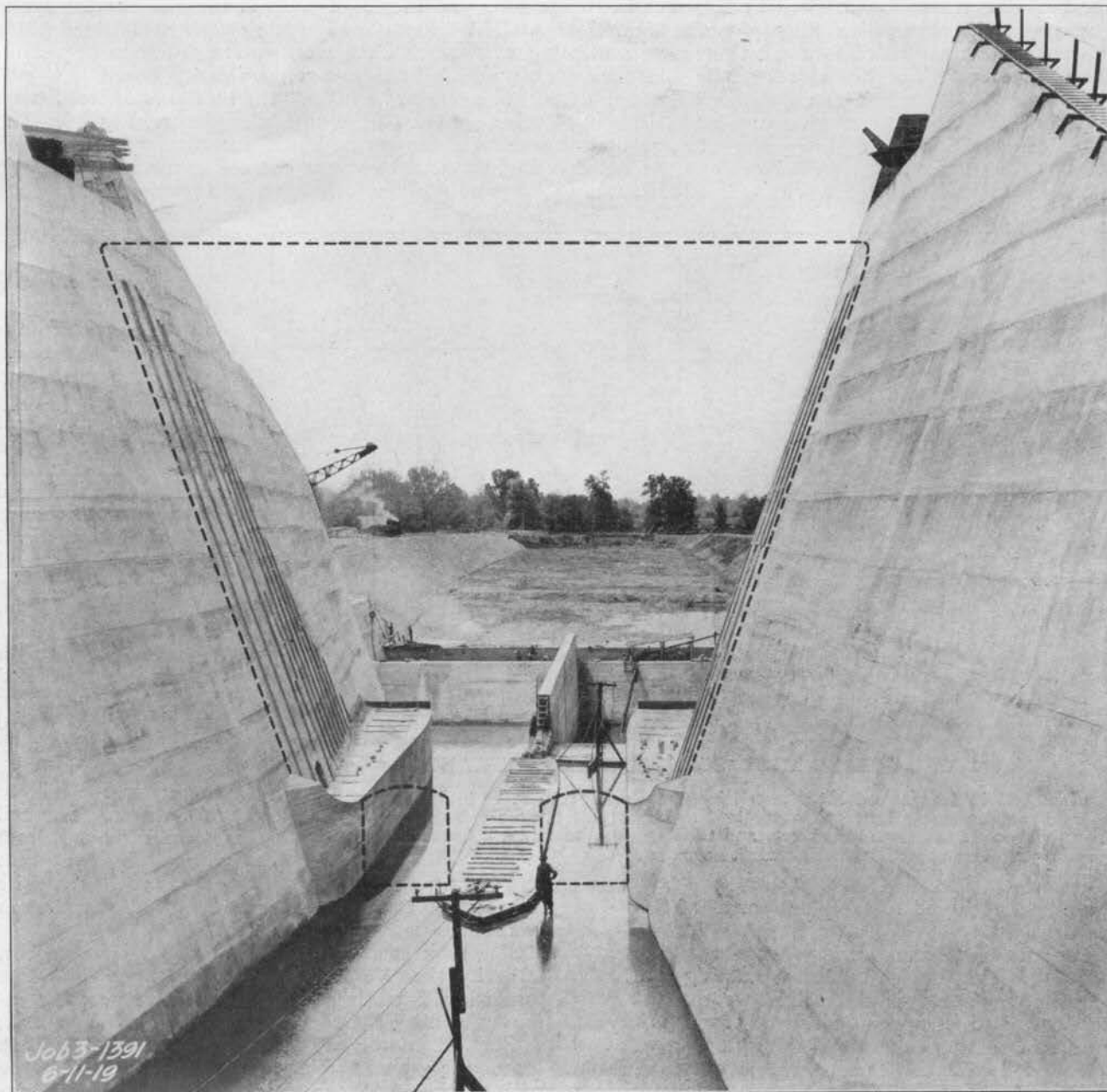


FIG. 14—LOCKINGTON OUTLET STRUCTURE, FROM TRESTLE IN FOREGROUND, FRONT COVER PICTURE, JUNE 11, 1919.

The view is down stream. The space between the walls, when the dam is finished, will be blocked by a concrete crossdam between the dotted lines shown at the side and extending up to the dotted line at the top. The space above the dotted line is left open for the spillway channel, which will take the overflow in case of extreme flood. This channel will be 16 feet deep and about 77 feet wide on the average. The walls at the top, forming its sides, now appear notched. These notches will be filled up with concrete. They indicate the position of the ends of a concrete bridge which will cross the spillway, carrying a highway which will be built across the dam. The vertical grooves in the walls, just beyond the dotted lines at the sides, are designed to interlock with the ends of the crossdam referred to above. The dotted rectangles toward the bottom mark the entrances to the two conduits which will pierce the base of the crossdam. These conduits will be separated by a heavy concrete wall, the base of which appears in the boat-shaped structure between the rectangles. The conduits are 9 feet wide and 9 feet 2 inches high. It will be noted that they will be quite short, extending only from the rectangles as seen to the farther end of the boat-shaped structure, a distance of about 46 feet. This length should be contrasted with that of the Englewood conduits shown in figure 3 (about 700 ft.)

THE MIAMI CONSERVANCY BULLETIN SUPPLEMENT

"The News Letter"

To Promote the Conservancy Spirit on the Work

August 1919

GERMANTOWN

In Honor of Miss Turner

On Thursday afternoon a very pleasant surprise party was given by the ladies of the camp at the home of Mrs. A. L. Pauls, in honor of Miss May Turner. She was presented with a manicuring set, and although greatly taken by surprise, heartily thanked the ladies for their kindness. Games and guessing contests furnished the afternoon's entertainment, after which a delicious luncheon was served.

Miss May Turner left for her home in Crookston, Minn., to spend her vacation. She was accompanied by her sister, Miss Edythe Turner.

Another enjoyable dance was held in the school house Thursday evening.

Oh, Boy!—A Lively Shively Boy!

Oh, boy! Germantown Camp has a new Assistant Engineer. Congratulations, Mr. Shively. Will Dad's shoes fit his son?

Mr. and Mrs. Heckman and family have moved from Germantown Camp to Taylorsville.

On Friday evening, July 11, a dance and party was held at the school house. Light refreshments were served and all present had a pleasant time.

HAMILTON

Contractor Builds Camp

Mr. Frank McGillicuddy, who has an excavation contract at Hamilton, has arrived on the job and is busy receiving equipment and building his camp.

We are glad to note that G. W. Schrader, Inspector, is recovering from the injury to his arm, received July 4th. Mr. and Mrs. Schrader are now enjoying a week's vacation at Lewistown Reservoir.

From Khaki to Coated Paper

Sergeant Kenneth Faist, son of Office Engineer J. E. Faist, returned from France recently and has accepted a position with the Champion Coated Paper Co.

Schwartz Goes to Hamilton

We take pleasure in noting that C. H. Schwartz will come to Hamilton at an early date as inspector on the concrete walls at the Ford plant. Mr. Schwartz has been with the Conservancy District since the early days of the project, save the time he was in the military service.

Huffman Jinx Still At It

We had as our guests on July 13 the baseball team from Huffman, and while they returned to their camp on the short end of a 4 to 1 score, it may be stated that they played a clean, snappy game, and did not give up till the end.

Manager Stanley Roush of the baseball team has assumed a more optimistic attitude since his team has taken the last three games and climbed to the respectable standing in the percentage column of .600.

Mr. Thomas Patterson, bookkeeper for Frank McGillicuddy & Co., contractors, has arrived on the job.

LOCKINGTON

Miss Jean Benning of Chicago is visiting her sister, Mrs. Axel Person.

Frank Watson, our master mechanic, has moved his family from Detroit and taken a cottage in the camp.

Mrs. Charles Brooks and children of Dayton recently spent a week with Mrs. Brooks' sister, Mrs. C. H. Shea.

Mrs. C. M. Gudgeon has returned from a visit with relatives in Dayton.

Mr. and Mrs. L. J. McWilliams are entertaining Mr. McWilliams' mother, of Newark, Ohio.

Mrs. W. J. Smith has as guest her mother, Mrs. Elizabeth Gross, and her sister, Miss Rose Gross, of Dayton. Miss Gladys Watkins, who has been visiting Mr. and Mrs. Smith, has returned to her home in Philadelphia.

Mr. and Mrs. Sam M. Ball have taken a cottage in the camp. Mrs. Ball recently arrived from Colorado.

TAYLORSVILLE

B. B. Team Tops the Column

The ball team played Hamilton at Taylorsville June 22; score 4 to 0 in favor of Taylorsville. Taylorsville played Englewood at Englewood July 4, game going to Taylorsville with a score of 5 to 7. July 6th, Huffman played at Taylorsville; score 4 to 1 in favor of Taylorsville.

July 13, being an off Sunday for the team, we played the Warehouse, losing the game with a score of 7 to 4. We hope to get a return game soon, but we will request that they either have Everhardt read up on the rules or gag him. On Saturday evening, July 12, the ball team gave a pie social and dance, when \$30.00 was cleared for the treasury. Music was furnished by an orchestra from Dayton.

Outdoor Theater

Open air picture shows are being given almost every week, and are meeting with marked success, both in attendance and financially. Money is collected by passing the hat and so far receipts have been more than the expenses.

Taylorsville Annexes Vandalia

Taylorsville is now a regular station for all incoming and outgoing mail. At present the mail is put off the trains here, taken by the carrier to Vandalia and distributed to rural route carriers from there, but as we expect to have a postoffice here, it is very likely that the mail will be distributed from this point, especially in view of the fact that there has been some talk of annexing Vandalia to Taylorsville and calling it North Taylorsville.

Community Association Elects New Officers

The Community Association held their regular semi-annual election of officers on June 27, and the following were elected for a term of six months: B. H. Petty, Chairman and Commissioner of Community Service; W. D. Rogers, Commissioner of Social Service; F. A. Meyer, Commissioner of Finance; N. L. Hinton, Commissioner of Education, and R. W. Trowbridge, Commissioner of Community Safety. Commissioners are organizing their various committees and work is under way to organize a Volunteer Fire Department.

Religious

On Sunday evening, June 22, Rev. Clippinger, of the Westminster Presbyterian Church of Dayton, preached in Community Hall.

The evening of July 13 Rev. Lefever of Bonebrake Theological Seminary preached a very interesting sermon to a camp audience.

Sunday School is held regularly every Sunday morning with an average attendance for the last month of about thirty.

Social

Mr. C. E. Moon, our timekeeper, with Mrs. Moon and her sister, Mrs. Hobart Axson, are away visiting their old home in Michigan. They will be away about two weeks.

Many residents of the camp attended the picnic at Englewood on July 4. All enjoyed the outing.

THE MIAMI CONSERVANCY BULLETIN

Mr. C. P. Heckman and family moved into camp recently from Germantown. Mr. Heckman was employed at Germantown Dam before coming here.

Burns-Sanderson Wedding

Mrs. Edith Burns and Mr. Guy Sanderman were married at the home of Mrs. W. D. Rogers, June 28, 1919. Mrs. Burns is a sister of Mrs. Rogers, and Mr. Sanderman returned from the army just recently. They will reside in Dayton.

ENGLEWOOD Hot Celebration

The Fourth of July celebration at Englewood was attended by a large crowd from the other parts of the District, in spite of the extreme heat prevailing on that day. The program began in the afternoon with the ball game between Taylorsville and Englewood, the former winning in a hard-fought game by the score of 7 to 5. Following this came the water sports in the outlet works of the conduit, the chief feature being a race with two ducks as the prizes. A ball game between Huffman and Hamilton, with the latter winning 4 to 2, and athletic events for cash prizes, concluded the afternoon program. At six o'clock an outdoor picnic luncheon was served by the girls of the Camp School to nearly two hundred persons. This was followed by dancing in the evening. A brass band provided music throughout the afternoon and evening.

Hustling the Winners

Three league games have been played by the Englewood team during the past month. In the first game Englewood beat Hamilton at Englewood by the score of 17 to 4. On July 4th, we lost to Taylorsville, 7 to 5. On July 13th, the team journeyed to Germantown and took that team into camp by a score of 12 to 1, Charley Krapp, the Englewood pitcher, holding them to one safe hit and deserving a shut-out.

Community Association Elects New Commissioners

The semi-annual meeting of the Riverside Community Association was held at the Community Hall the evening of Monday, July 7th. A most satisfactory and harmonious meeting was had; three new commissioners were elected for the term of one year, and reports by the officers for the past half-year were heard. The Secretary's report showed that the Association's activities had been many and varied and productive of valuable results. The report of Mr. Thomassen, retiring Treasurer, showed the Association to be in a very satisfactory condition financially. The three new commissioners elected were Messrs. Saltmarsh, Henry, and Mitchell.

Pushing Atlantic City

Englewood has it on the other camps in the possession of a miniature bathing beach. Some of the ladies have become expert swimmers and expect to have a swimming tournament in the near future.

Surprise to Mrs. Everdell

The Domestic Science class of the 4th and 5th grades planned a very pleasant surprise on their teacher, Mrs. Everdell, in honor of her birthday. A delectable luncheon was served. It was a complete surprise, planned and carried out entirely by the children.

To Start Housekeeping With Bells On

We understand the wedding bells will soon be ringing in camp in the vicinity of the office. The gentleman in question, Mr. Wald, purchased the fine household furnishings of the Thomassens and is getting ready to start out in real style.

New Boy Brings Large Smile

Mr. Orville Cox is wearing a large smile over the arrival of a ten-pound boy on Monday, July 2nd. Mother and son are doing well. The youngster is the second boy born in camp.

Mr. and Mrs. Frank Bowen are enjoying a new Buick touring car which they recently purchased.

Mr. and Mrs. Lee Mitchell spent a Sunday in Piqua, where Mrs. Mitchell's mother is quite ill. Mr. and Mrs. F. G. Rohrback of Garfield, Utah, visited Mr. and Mrs. Mitchell over the Fourth.

Mr. and Mrs. Peter Haskell are spending their vacation in New York.

Mrs. William Heller, who has been visiting in Pennsylvania for the past four weeks, returned home the first Wednesday in July.

Miss Florence Miley of Middletown visited Mrs. Mitchell several days during the month. Miss Miley favored us with some beautiful solos at the party to the Thomassens.

Mr. and Mrs. John Huntley of Dayton were Sunday visitors of Mr. and Mrs. Jack Owens.

Miss Capitola Mitchell spent a week with her aunt, Mrs. J. W. Miley, of Middletown.

The Thomassens Start for Norway

Mr. and Mrs. G. N. Thomassen left on Sunday, July 13th, for an extended trip to Norway. Mr. Thomassen goes on a three months' leave of absence from his work as Field Clerk. We are sorry to lose these popular and estimable people and wish them a safe and pleasant journey.

On Thursday evening, July 10th, a very pleasant surprise was tendered Mr. and Mrs. Thomassen to bid them farewell and Godspeed on their journey. Everyone in camp was invited and a most enjoyable time was had by all. A fine program of recitations, solos, and violin and piano music was rendered, after which a delightful luncheon was served by the ladies. With social intercourse and dancing the evening passed merrily away. After singing "God Be With You Till We Meet Again," and hearty good wishes for a safe and pleasant journey to Mr. and Mrs. Thomassen, the guests departed for their homes.

The Johansens to Norway Also

Mr. and Mrs. A. K. Johansen left on June 26 for New York, en route to Norway. Mr. Johansen has been time-keeper, while Mrs. Johansen was the Camp Nurse. Their departure is regretted by their many friends in camp.

HUFFMAN

The Misses Goss and Rahm Respond to "Eastern Attractions"

Gloom over broken family ties again settled over Huffman Camp, on June 27th, when Miss Goss and Miss Rahm departed for their former home, Leominster, Mass. "Don't we miss the girls," was the commonest expression the next day, and has been ever since. They always gave a willing and very helpful hand to the whirl of camp activity. We all have a lingering hope that eastern "attractions" may prove disappointing and that they will return next fall.

Niagara Falls Not in It With Dayton

Miss Goss' parents and Miss Rahm's mother visited at the "Peace Cottage" June 21st to 27th. After seeing the sights in the vicinity of Dayton, they all took in the less interesting attraction at Niagara Falls on their trip to Massachusetts.

Death of Mr. Madigan, Sr.

On July 7th, Mr. Madigan was called to the bedside of his father at Frankfort, Ind. He returned to Huffman on the 14th, only to receive a telegram a few hours later, telling him of his father's death. The sympathy of the entire camp is extended to Mr. Madigan.

Hint Educational Jamboree Unfit for Publication

Mrs. Saylor, Commissioner of Education, and her committee, Miss Goss, Mr. Clawson, Mr. Mark and Mr. Chambers, closed their term of office, June 21st, with a "Grand Jamboree." In company with their wives and husbands they had a theatre party at the Lyric. Events after the show are not for publication.

The Social Vortex

In compliment to Miss Goss, Miss Rahm and their guests, a party was given at the hall Wednesday evening, June 25th. Games, informal dancing and refreshments were the attractions.

On Wednesday afternoon, July 16th, Mrs. H. W. Minton entertained the Sunshine Club at her home on Huffman avenue. Delicious refreshments were the climax to a pleasant afternoon.

We welcome Mr. and Mrs. Ben Rogers and Mr. and Mrs. Dye as new families in camp.

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

Valedictory of Our Junior Englewood Editors

Children's Festival.—The children of our school gave a very successful program on the last day of school, called "Primrose Festival." The place at the school was quite appropriate for the play. The characters taking part were: Granny Green.....Mary Williams
Ann Weaver.....Ivy Saltmarsh
Peter Malkin.....Valentine Stock
Molly Baxter.....Christine Waddell
The Traveler.....Chester Patrick
Hiram Doolittle.....Clarence Bouladier
(Written by Isabelle Williams)

Fourth of July Luncheon.—The girls of the Domestic Science class served a delightful luncheon on July 4th at 6 p. m., with the aid of Mrs. Everdell, to the guests from the other camps. It consisted of sandwiches, potato salad, pie, lemonade and ice tea. The girls serving were Capitola Mitchell, Mary Williams, Ivy Saltmarsh, Christine Waddell and Leona Bouladier. (Written by Capitola Mitchell, 5th Grade.)

Mr. and Mrs. C. A. Bock and Miss Cora Martin of Dayton, and Mrs. Martin of Westside, Iowa, were dinner guests at the home of Mr. and Mrs. Chambers, Friday evening, June 27th.

Dr. and Mrs. Saylor and daughter Geneva are spending their vacation on their farm near Clayton, Ohio. The doctor felt he needed a change and thought a little farm work might help in getting it.

Mrs. Mark has had the pleasure of a ten-day visit from her mother, Mrs. Meade, of Columbus. Mr. and Mrs. Grice of Portsmouth, Ohio, have also been guests in camp at the home of their daughter, Mrs. L. C. Zull.

Whaddayamean—"Enjoyed Bachelorhood?"

Several of the married men in camp have recently enjoyed temporary bachelorhood for various lengths of time. The following are some of the wives who have been visiting away from camp to allow their husbands this vacation.—Mrs. Gena, Mrs. Shuler, Mrs. Mark, Mrs. Shertzinger, Mrs. Hodge, Mrs. Madigan, Mrs. Minton and Mrs. Chambers.

Clawson Running Amuck Amongst Fences

The big news is left for the last—Clawson's new car. It's a dandy, and in spite of several missing sections of fence in the vicinity of Huffman it still looks pretty good. Traffic cops, take a hunch, and buy faster cars if you want to catch him.

DAYTON

THE WOMAN'S CLUB

Conducted by Miss Mayme McGraw

Floral Tribute to Brower

We extend our sympathy to Mr. Karl Brower of the Purchasing Division in the matter of the shameful manhandling he received lately on the tennis court at the hands of Mr. Robinson. It is an especially sad case when a player of several seasons' standing is beaten by a greenhorn.

Miss Herbig of Mr. Locher's office left on Monday, July 7, for a vacation of several weeks. She will take the steamer trip through the Great Lakes to Duluth, Minn. Her place during her vacation will be taken by Miss Alexander.

Miss Glossinger Marries

Miss Rose Glossinger of the Taxation Division was married on July 12 to Mr. George Tribbets at the First Reformed parsonage at Dayton by the Rev. W. A. Hale. The young couple are making their home at the Bellevue Apartments. Congratulations are extended by all of Mrs. Tribbet's Conservancy friends.

Denies Rumor

The department editor "denies the allegation and defies the alligator."

Heard in the Administration office:

Miss ———: It says here that the "flu" often leaves people much healthier than before taking the disease, even causing them to become fat.

Mr. ———: Is that so? Our house has a flue, but I haven't noticed it getting any larger.

Mr. Morgan and Mr. Locher both made their first flight in an aeroplane during the past month. Yes, they say it is quite a sensation.

Mrs. Tanner of the Stenographic Division spent the week-end, July — to —, at home with two sisters who are visiting her, the one from New York and the other from Minneapolis.

Mrs. George Tribbets (nee Rose Glossinger) was the guest of honor at a picnic given by the Taxation Division before her departure from the Conservancy.

Julian Eltinge, Long Island farmer, hired a neighbor lad on whom he tells the following in proof that he is the champion Thrift-Boy of America.

Eltinge went to the rescue of a man who had upset in a row boat and was drowning. The lad watched the drowning man from the bank and just as he went down the second time shouted out:

"Say, mister! If you don't come up, can I have your boat?"

Almost anything is possible if you concentrate upon it long enough and if you keep your balance.—Thomas A. Edison.

New-Comers

A daughter, Alice Elizabeth, weight seven pounds, was born to Mr. and Mrs. D. E. Field on Wednesday, July 2. Mr. Field has been with the District a little over one year, being engaged on designing in the drafting room at headquarters. The Fields came from Omaha, Neb.

Born, July 16, at the Miami Valley Hospital, ———, Ries, boy, weight 7 lbs., 6 ounces. Name not yet settled.

Later—Mrs. R. wants to name him after his father. Of course that settles it. His name is Edwin John Ries.

J. F. Burkin finished the survey of the Germantown Basin on July 28 and moved the next day to West Milton, where he begins a similar job for the Englewood Basin. The work establishes the District property lines and includes also a topographical survey of all of the farms.

BASEBALL

Englewood. George Rogers, our first baseman, is a cop from the University of Cincinnati. He says that there are only two things he likes better than engineering. They are baseball and dancing.

Oakland Welbaum, our manager, was formerly manager for the Fidelities, one of the fastest teams in this part of the country.

The Krapp family, of Trotwood, are well represented on the team by Fred, first base, whose delight is in stealing everything except the catcher's glove; also by Harry, outfielder, and Charlie, outfielder and pitcher. It is a safe bet that with the two last cavorting in the garden, a drive to the outfield is in a well.

H. S. R. McCurdy has organized a scrub team to oppose the regulars in practice during the week. He plays first base and we'll say from the way he holds down the bag, that he has held it before and was some player in his day.

There have been the usual number of funny plays and Merkels pulled at Englewood during the season. The prize goes to a visitor who stole second with the bases full.

Taylorville. The Dayton Shop Whistles nosed out Taylorville in a fast game on July 13. Score, 7 to 4. Quite some portion of the Dayton game was played by the rooters, especially Everhardt, who took up a grand total of 59 minutes jamming the wind; players, spectators and the ump suffering about equally from the hot Sirocco. We recommend E. to any team in the League needing that kind of assistance.

THE MIAMI CONSERVANCY BULLETIN

We also hand it to the Englewood ump, who celebrated the 4th by creating a new rule, giving a base runner two bases on a walk.

Englewood rooters claim that their chances for the 4th of July game were talked to death by the Taylorsville first baseman.

Taylorsville has organized a team of Has-Beens to train the regulars. They play every Tuesday and Friday evening. To date the regulars have won three and the Has-Beens one. If the H. B.'s keep improving, they will take on a league team. How about it, Huffman?

According to the standing, Taylorsville has the best dam team in the District.

Huffman. The trouble with our last (Taylorsville) game? The Ginks got us—that's all!

L. Paul, our sphere spinner, blew out 18 men—18—count 'em! And still they got us!

Paul held them to three hits. And still they got us.

To rub it in we got 14 hits—14—!—And at that they got us.

The above being the record, what's the answer?—Ginks, as aforesaid. Ginks and nothing else.

Sherloch, third base; Dye, catcher; Harding, right field, and Barnes, second base, each got two hits.

L. Paul besides canning 18 men, got three hits. The Fate that will beat a man with a score like that would steal food from a child.

Dye, catcher, cut off every runner to second. His throwing arm is also named—Die.

Between Dye and Paul, our team includes all the time-keepers at Huffman.

Taylorsville was so afraid of Gena, our outfielder, that they never gave him a chance during the game. If they had—O boy! His hands are like bushel baskets, so to speak.

The bugs all say that our shortstop is the greatest Boon to the team.

Germantown. Why we lost the last two games?—Lehman, our shortstop, quit us to get married. When he gets over it and comes back—you up at the top there—look out!

Cross and Reinhart, two of our outfielders, went to Dayton with the gravel plant. That left some hole to fill, but we'll fill it—with the big dragline if necessary.

Hancock, our pitcher, twirled for some time with the Southern League. He converted his wife to baseball—she wasn't married then—and she is now the liveliest fan in Germantown; knows the game to the last kink.

C. O. Faber, our manager, is in hard luck. He burned his left hand severely while handling the electric starter at the hydraulic plant, but will be back on the coaching line soon.

We are close to the bottom, but that's not worrying us. We are just down there laying a firm foundation for the top notch stuff that's to come. Watch our skyrocket.

Following is a complete schedule of games played since the Baseball League was organized, including the scores. Below it is the table of team standings.

MIAMI CONSERVANCY DISTRICT BASEBALL LEAGUE

June 22			
Taylorsville	4	Germantown	11
Hamilton	0	Huffman	4
June 29			
Englewood	17		
Hamilton	4		
July 4			
Taylorsville	7	Hamilton	4
Englewood	5	Huffman	3
July 6			
Hamilton	8	Taylorsville	4
Germantown	4	Huffman	1
July 13			
Englewood	12	Hamilton	4
Germantown	1	Huffman	1
July 27			
Taylorsville	12	Englewood	8
Germantown	4	Huffman	2

STANDING OF TEAMS

July 28, 1919

Team	Games Played	Won	Lost	Pct.
Taylorsville	4	4	0	1.000
Englewood	4	3	1	.750
Hamilton	5	3	2	.600
Germantown	4	1	3	.250
Huffman	5	0	5	.000

TENNIS

The most famous game so far was the one staged by Robinson and Brower, referred to elsewhere. Obsequies have been joyously held over Brower's remains ever since. Robinson also put one set over on the senior editor a little later. For a new one, R. is a hummer.

In the Green Tag Tournament, Everhardt stands at the top, with Chandler and Clement second.

Row 3 is occupied by C. Maltby, E. Maltby and Jackson.

Row 4 is occupied by Messrs. Blackwell, Larsen, Teeple and Sylvester.

Seated in row 5 are Messrs. Rigel, Foust, Robinson, Froseth and Merrey.

Row 6 is adorned by Messrs. Smith, Brown, Mygott, Caye and Bennett.

The ladies, having played, so far as we can learn, no tennis whatever, receive honorable mention only.

Fishworms

The time arrived, as most times do,
For which I'd long been wishing;
And I climbed into my old duds
By gum, and I went fishing.
I took my high-priced bamboo rod—
(It cost me fourteen clinkers),
A book of fancy bugs and slugs
And sixteen pounds of sinkers.
A lunch of cracknels, pop and pie,
And embalmed chicken gizzard,
And forty-seven kinds of hooks
From "double O," to "izzard."

At peep o' dawn I shook the sheets
And hoofed it for the river;
And many times along the road,
I wished I owned a flivver.
Carbuncles sprouted on my feet,
And nodes and other swellings
As down the dusty pike I plowed
Past blistered barns and dwellings.
Although I sprinted at the start,
I petered to a hobble;
And when I reached the river bank
I scarce could wobble-wobble.

I hooked a rubber Junebug on,
And cast it in the channel;
The line drew taut—and I pulled in
A red shirt made of flannel!
And then I tried a helgamite,
Imported from Nantucket;
And sprung my wishbone towing in
Old Captain Kidd's coal bucket.
The katydid from Timbuctoo,
Brought in a Quick-Meal heater;
A wheel chair from the "thirteen" flood
Snapped up the sky blue skeeter.

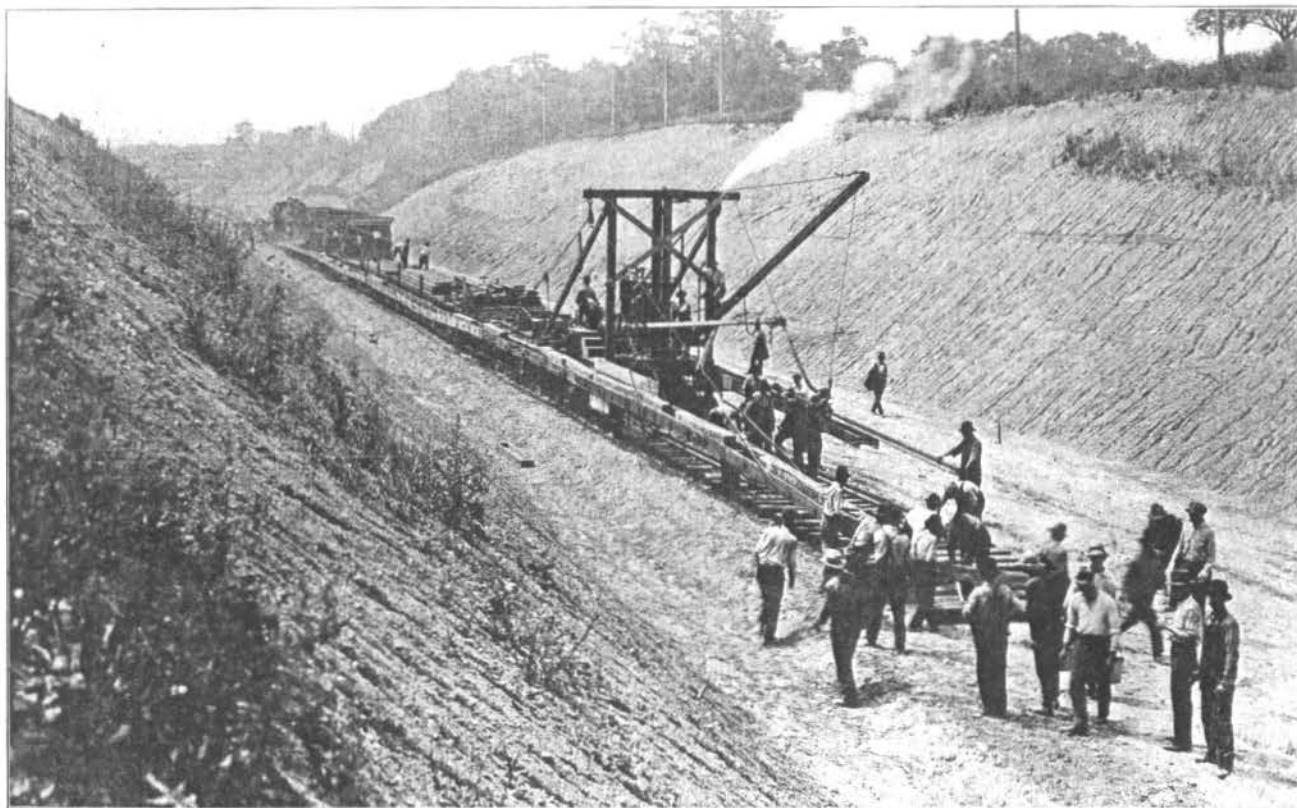
All day I worked my patent flies,
And lined the bank with tin cans,
And railroad ties and chicken wire,
Rat traps and weeds and pie pans.
And when old Sol was sinking down
Behind the weeping willow,
And I was yearning for my oats,
My coffee, pipe and pillow,
The bushes parted at my side—
I saw with blood atingle
A farmer with a string of fish
As long as this punk jingle!

"What did you use for bait, kind sir?"
I mumbled all aquiver.
"Fishworms," he said, and turned around
And went on down the river.

—Elldce.

THE MIAMI CONSERVANCY BULLETIN

SEPTEMBER 1919



TRACKLAYING ON THE B. & O. RAILWAY RELOCATION, AUGUST 12, 1919.

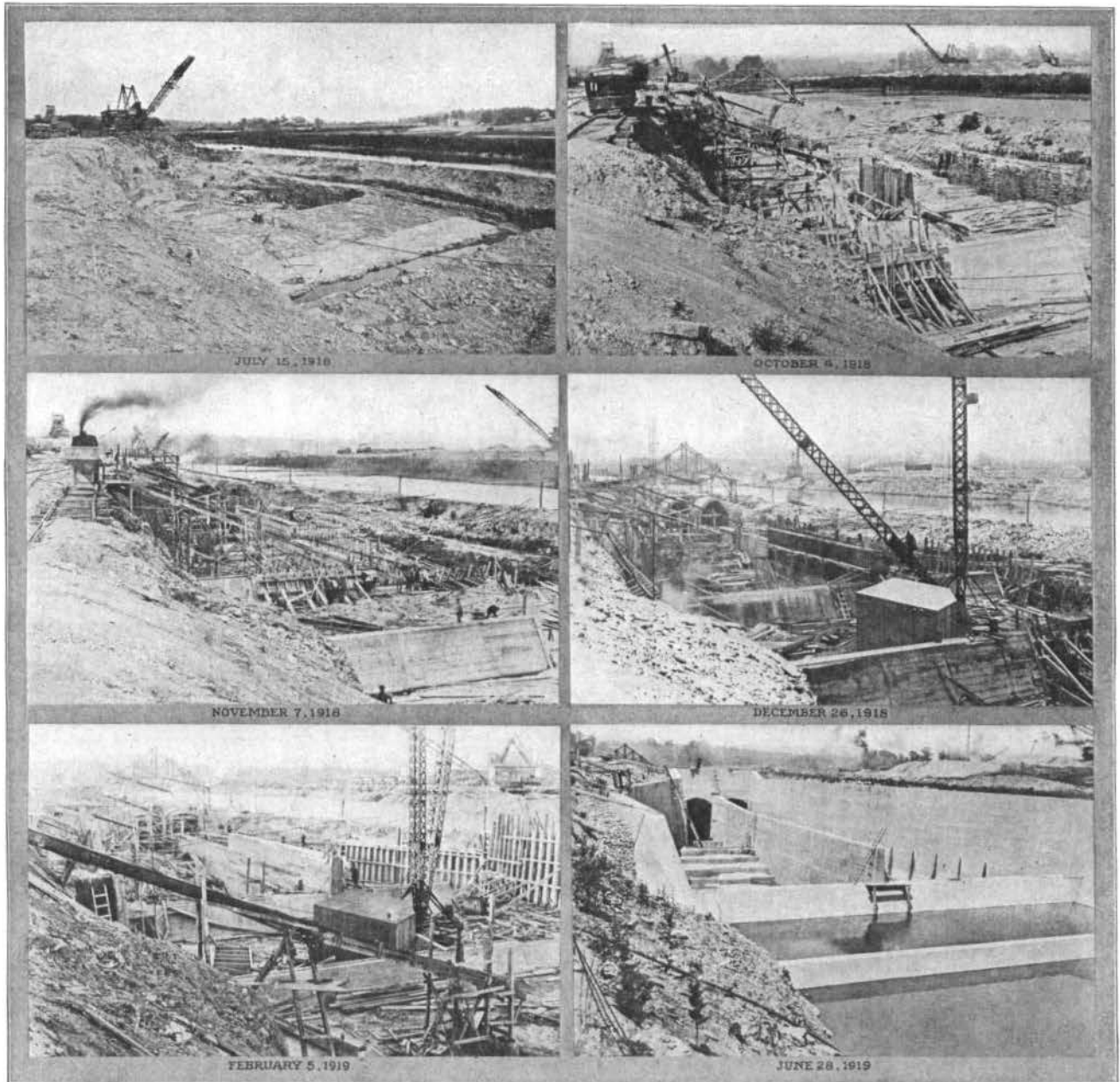


FIG. 16—PROGRESS PICTURES OF THE OUTLET STRUCTURE AT ENGLEWOOD.

Tracklaying Outfit—See Preceding Page.

All track materials—rails, ties, angle plates, spikes, track bolts, etc.—are carried on a train of "gondolas," or flat cars, pushed by a locomotive in the rear. The front car carries a hoist engine which also drives the mechanism transmitting power to the chutes which carry the ties and rails to the front of the train. Steam for the hoist engine comes through pipes from the locomotive. The chutes are built in sections and hung on the sides of the cars. Ties and rails are tumbled into the chutes, ties on one side and rails on the other, and ride forward on rollers driven by the derrick engine. At the front end they are taken by the men and placed on the railway grade. The chute for the ties (at the left) extends further ahead than the other, so that the ties can be laid first. The rails are lifted by the derrick by means of tongs which clutch them, balancing by the middle, so that they can be easily swung into line. Temporarily the rails are spaced by iron bridges which slip over their bases, and are linked end to end by the angle bars with a single bolt. Men following the train attach the other bolts and spike the rails to the ties. The process requires about 125 men and is capable of laying a mile and a half a day under favorable conditions.

Progress Pictures of Outlet.

Date is given below each picture. July 15, 1918, the excavation for floor and foundations is nearly complete. October 4, 1918, (at upper right) the stairway and the floor of the pools are completed, with part of the lower weir (at the right), and the forms are up for part of the walls. November 7 the forms are just in place for the first sections of the conduit arches. December 26 (at middle right), these first arch sections are completed. Over and beyond them is seen one of the scissors trusses which straddled the excavation, riding on trucks on a track on each side. This truss carried the concreting chutes. The derrick seen handled the concrete for the further wall, the excavation here being too wide to permit the material to be chuted (it coming in cars from the mixer on a track at the left). On February 5, 1919, (at lower left) the two downstream sections of the conduit arches are seen with the forms in place ready for the concrete. These downstream arches are flattened at the crown. This is to give the issuing water during flood a downward component of flow, thus helping to direct it into the hydraulic jump pool. June 28 shows the completed structure a short time before the river was turned into it.

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Chas. H. Paul, Asst. Chief Engineer
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THE MIAMI CONSERVANCY BULLETIN

PUBLISHED BY THE MIAMI CONSERVANCY DISTRICT

DAYTON, OHIO

Volume 2

September 1919

Number 2

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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.

Walter M. Smith Goes to the Illinois Canal Link

Walter M. Smith, Designing Engineer for the District, has resigned his position to accept a similar one with the Board of Public Works of Illinois. The work in immediate prospect is the construction of the connecting link between the Chicago Drainage Canal and the Illinois River, which has been in contemplation for several years. It includes also, however, the design of a unified canal system, linking up with the railways for the entire State. The Chief Engineer of the project is Mr. Mortimer G. Barnes, with whom Mr. Smith has been in close association for the past thirteen years. Mr. Barnes was Mr. Smith's immediate superior on the work on the Gatun Locks at the Panama Canal, for the design of which Mr. Smith was largely responsible. The two men were also later associated in partnership as consulting engineers. The return to this old and close connection is a pleasant and noteworthy feature of the change. Besides the work on the Gatun Locks, Mr. Smith was largely responsible for the design of the Kensico Dam at Valhalla, N. Y., the largest masonry dam in the world, where he introduced changes which effected a large saving. For the Conservancy District his principal work has been on the structural design of the concrete outlet works at the dams. This work is now far advanced, so that the District, while greatly regretting Mr. Smith's departure, will not suffer from it as otherwise it might. The immediate new work, involving an estimated expenditure of some \$20,000,000, is of a nature for which Mr. Smith's training particularly fits him, and his associates of the District wish him and expect for him the greatest success in it.

New Devices at Englewood

At two of the dams—Englewood and German-town—the material for the earthen portion of the dam, which is excavated by dragline excavators working on the valley floor near the damsite, is transported in cars and dumped into a "hog box" at the toe of the dam. From this it is washed by powerful water jets into a concrete "sump" or cistern, whence, mixed with from ten to twenty times its volume of water, it is pumped to the hydraulic fill pool on the top of the dam. On the way from the "hog box" to the sump it passes through gratings or "grizzlies" which screen out all the boulders exceeding six inches in diameter, these being too large to pass through the pumps. Until recently the screened out boulders have been removed by men, who also removed roots, etc., and broke up any clay masses too large to pass through the meshes of the "grizzly."

At Englewood not long since two rotary "grizzlies" (one for each dredge pump), have been put in, replacing the old ones, and rendering most of the labor of the attendants unnecessary. These screens are of a type much resembling the ordinary rotating screen used for gravel. The main feature is a rotating hollow cylinder of boiler plate open at both ends and punched with six-inch holes. The material is washed into one end by the hydraulic monitors of the "hog box." The cylinder being set on a slant, the boulders roll down hill and out at the lower end into a bucket, which is periodically hoisted away and dumped in a car by a derrick. All earth and rock smaller than six-inch size drops with the water through the holes in the cylinder into the sump.

The drum rotates on rollers driven through belting and gears by an electric motor.

In use the new "grizzlies" have proved very successful, and they will soon be introduced at Germantown, and also at Huffman, where a similar general method of hydraulic fill is to be employed.

At Taylorsville and Lockington the excavation in the borrow pit is by hydraulic "monitor" instead of by dragline excavator, and the large stones remain in the pit. Hence at these dams the new "grizzlies" are unnecessary.

Another recent improvement, due to Mr. Knerr, the chief electrician at Englewood, is an electrical indicator which registers instantly in the pump house any drop below standard pressure at the dredge pipe outlet.

The effect of the two improvements, together with the installation of new pumps and pump runners, has been to increase the input of hydraulic fill material at Englewood about 50 per cent—from 4000 cubic yards to 6000 cubic yards. The new "grizzlies" steady the feed of earthy material to the pumps. The new indicators give speed and delicacy to the pump control, thus saving stoppages due to choked suction and dredge pipes.

A detailed account of these devices will be given later.

Progress on the Tracklaying

The tracklaying outfit illustrated on our outside front page is now at work about three-quarters of a mile north of the National Road, leaving only two miles more on the B. & O. Railway to be completed. This does not include the ballasting. The pit for the latter is open, however, the track connection from the new railway to the pit, on the valley bottom just below Taylorsville dam, has been made, and this work will soon begin. The tracklaying outfit, on completion of that work on the B. & O., will begin operations on the Big Four and Erie in the Mad River Valley. The work on the big railway cut at Huffman Dam, to make way for these roads, is rapidly nearing its end, and material for the tracklaying is being received.

Effect of Dry Wave on Conservancy Camps

The following quotation from a letter to Mr. Morgan from Mr. McCurdy, the division engineer at the Englewood Dam, is interesting as a bit of evidence regarding results of the dry edict which went into effect on June 28.

"It is interesting to note that, while heretofore we sold coupon books averaging to the value of \$75.00 weekly, for the past four weeks we have not sold a single book.

"Also, at the bunkhouses the ordinary Saturday night and Sunday trouble is reduced almost to nil.

"It is not an accident that this change coincides closely with the absence of liquor from sale and storage."

The evidence at all five of the Conservancy Construction Camps is of the same general tenor and indicates an excellent influence of the new laws in improving the Saturday night and Sunday conditions as to quiet and order in the bunkhouses. At Germantown there was also a marked effect in bettering the labor turnover.

The evidence of the coupon books, while significant as indicating that the men under dry influence, no longer "go broke" so as to need them, is peculiar to Englewood. At the other dams the coupons still continue in use. These books, issued on wages due, and good for merchandise at the camp stores, are regarded as a convenient cash account of household expenditures, and are regularly used by those who have no need for credit at all.

Conservation of Dayton Trees

Dayton takes just pride in the trees which give beauty and dignity to her parks and avenues. She has had the benefit of the advice and direction of some of the masters in American landscape architecture in regard to them, and its natural that she should look with concern at any feature of the Conservancy work which might appear to threaten them with harm.

With this feeling the authorities of the District are in full accord and the plans for the work along the river have been made with the matter very definitely in view. This appears in the method now being used in raising the levees along the left bank, above Herman Avenue bridge. This work would have been easiest done by the big dragline when the river channel was being excavated, but the swing of the heavy bucket would have practically destroyed the row of trees now growing on the face of the levee. The earth is therefore being brought in dump cars running on a track laid on the top of the embankment, and dumped in a manner to work no harm. These same procedure will be followed on the right bank all the way from McKinley Park to Island Park.

There are places, however, where the trees cannot be saved. The paramount motto of a flood protection project must, of course, be "safety first." This demands the taking out of present irregularities in the river banks and the widening of the channel so as to permit the freest possible flow of flood water. This means that in places the present levees be cut back and re-aligned, and when this occurs, trees sometimes must be removed.

An instance recently occurred along the McKinley Park levee near the new sewer outlet. The face of the old levee here had to be shaved back by the big dragline in a slice of considerable thickness, and the trees necessarily were cut away with the earth they were rooted in. The same thing will happen in the near future on the east bank between Third and Fifth Streets.

These things are regrettable, but they are unavoidable. Where trees and residences stand in the road of public safety they must, of course, be set aside. Every consideration is given them. They are saved wherever possible. Where they are destroyed or removed it is only after careful consideration.

Concrete Forms for Conduits

One of the leading articles in the next Bulletin will be by Walter M. Smith, on the design of the forms for the conduits at Englewood and Germantown. Several ingenious features were introduced into these to facilitate collapsing and repeated use.

The Outlet Conduits at Englewood

Two Parallel Concrete Tunnels 709 Feet Long, to Carry the Stillwater River Through the Base of a Dam 4716 Feet Long and 122 Feet High.

By H. S. R. McCurdy.

The Englewood Dam is located on the Stillwater River about 9 miles northwest of Dayton. It is the largest of the Conservancy Dams, being 4716 feet long, 122 feet high above the existing river bed, and will contain 3,500,000 cubic yards of earth, or about 45% of the total embankment in all of the dams. In a flood similar to that of 1913 the Englewood Reservoir would hold in storage 209,000 acre-feet of water, or sufficient to cover 209,000 acres one foot deep.

This vast storage of water embodies the flood control element of the system, representing as it does the action of the retarding basin in holding back from the cities and valley below the dam the onrush of the flood waters.

Egress from the retarding basin is through the outlet conduits in the dam. It is by means of this structure that the delicate refinement of flood control is accomplished. In harmony with the other four Conservancy dams the size of the conduits is so figured that in a flood 40 per cent greater than that of 1913 they will pass just such a flow of water as can be safely accommodated in the improved channels downstream. The measure of protection afforded can be judged by the fact that in a flood such as occurred in 1913 the flow of the Stillwater River at Englewood damsite would be cut down

from 85,000 to 11,000 cubic feet per second, a reduction of 87 per cent.

A most desirable condition for the building of a masonry conduit through an earth dam is a solid rock foundation. It was known from the boring investigations that such existed at all of the proposed damsites for the Conservancy District. But at Englewood, as also at some of the other damsites, expectations were exceeded in this respect, a condition of the rock substrata being developed by the excavation operations which was even better than was anticipated and eminently fitted for the purpose it was to serve. The nature of this rock is clearly revealed in the illustration on page 155 of the May Bulletin.

The Englewood outlet structure has a total length of 1060 feet, of which 709 feet is double-barreled covered conduit. The thickness of concrete in the sides of the conduits is from 18 inches to three feet and the crown of the arch is between 15 inches and 27 inches thick, depending upon the depth of earth cover the particular portion is called upon to sustain. Each conduit is 13 feet inside width and the temporary depth is 22½ feet. This depth, however, is for construction purposes only and will later be reduced to 10½ feet by filling in the bottom with compacted gravel and building

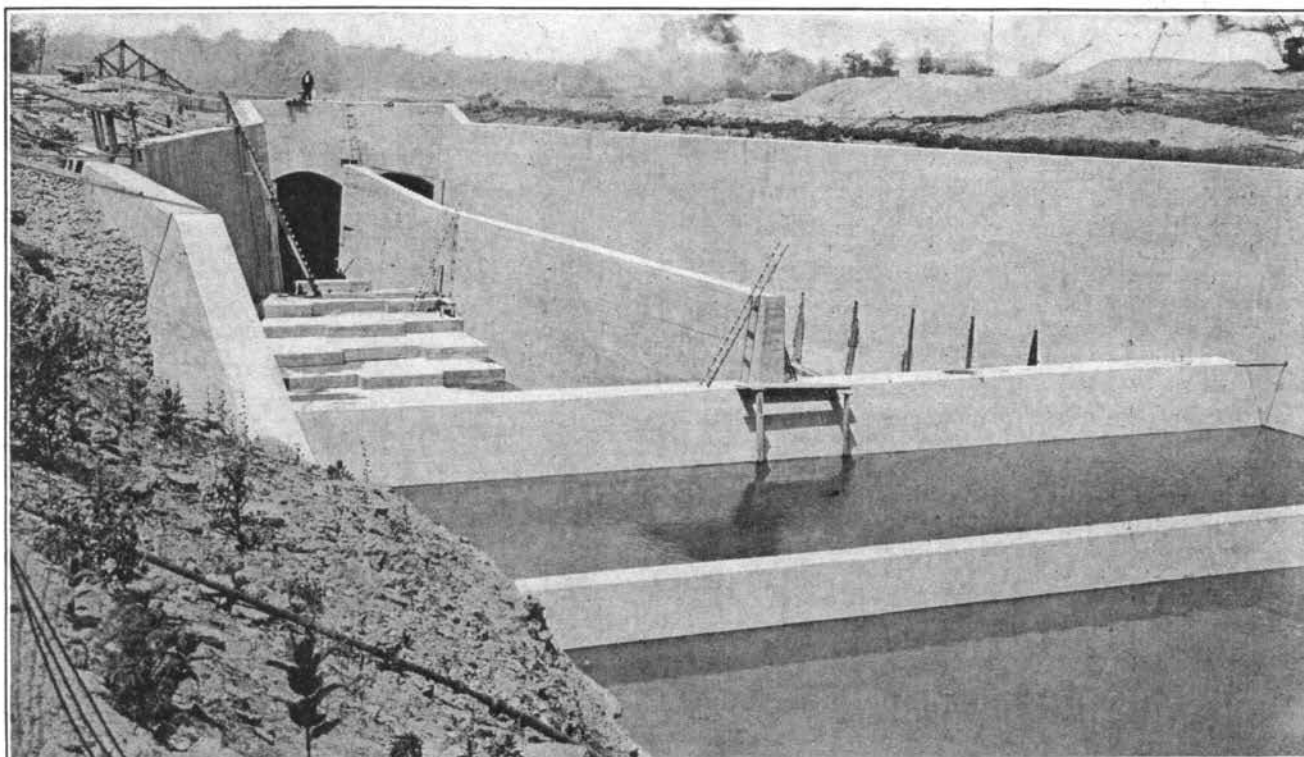


FIG. 17—OUTLET STRUCTURE AT ENGLEWOOD, JUNE 28, 1919.

This shows the completed structure before the river was turned through it. The stairway leads the issuing stream down into a wide, deep pool and against the further of the two cross walls. It must surmount this wall to reach the second pool (the further pool of the two seen). Crossing this pool is must surmount the nearer cross wall, thus reaching a short concrete floor which carries it to the downstream river channel below.

thereupon the permanent concrete floor. The final size will be as shown in Fig. 18. The reason for the increased depth during the construction period is that it is not desirable to realize the full retarding effect of the permanent conduits until such time as the dam shall have reached such a height as to be free from danger of overtopping.

The surfaces of the conduits, wherever they are to be exposed to the flowing water, were given a smooth finish, not on account of appearance, nor even to give a maximum discharge, but to offer no foothold, however minute, for the rushing water to start erosion. This is in accordance with the demand for permanence which has guided the construction throughout. When it is considered that during maximum flood the water in the conduits will attain a velocity of 60 feet per second (over forty miles per hour), it will be seen that such precautions are vital.

To reduce this velocity to one which could safely be allowed to pass into the natural river channel, the outlet end of the conduits discharges into a flaring basin, the bottom of which is formed of concrete steps, down which the water will cascade, and across the end of which, to further baffle the tendency of the water to rush on, are two concrete weirs, or walls. Passing through this stilling basin, the ambition for destruction of the flowing water is so thoroughly curbed that it passes into the river channel at a speed of not more than 6 feet per second, a reduction of 90 per cent. To admit the flow into the conduits with as little disturbance as possible, the upstream end is funnel shaped, with the inlet into the covered conduits rounded to an easy curve.

Excavation on the outlet works was begun May 10, 1918, and continued to November 13, 1918, during which time 8,000 cubic yards of earth and 58,000 cubic yards of rock were excavated. This work was handled by means of a large steam dragline excavator equipped with an 85-foot boom and a 5-yard bucket. The machine moved ahead along the line of the conduit, digging behind itself as it went and depositing the material in 12-yard side dump cars on a standard gage track beside the excavation. A portion of the excavated material was transported and dumped into a waste pile located along the river downstream from the dam. The remainder, principally rock, was placed at the downstream toe of the dam near the outlet from the conduits, to serve as a shield to prevent the backwash from the outflow through the conduits during flood eating away the earth at the downstream toe of dam.

The operation of the dragline necessarily left the surfaces of the rock cut in ragged condition, with numerous projecting loose fragments. As it is necessary that the concrete of the conduits form contact only with absolutely solid rock, final cleaning and trimming were done by hand-quarrying methods.

The dragline method of excavation worked down the cut to grade before moving the machine ahead and thereby enabled concreting to start before completing the cut to its full length. Concreting at Englewood began August 10, 1918, and was finished June 7, 1919. A total of 19,000 cubic yards was placed. An uncommon feature of this work is that during the winter months, when ordinarily concreting operations are either suspended entirely or proceed under most trying conditions, an average out-

put was consistently maintained fully equal to that of the warmer months. This fortunate circumstance was due, of course, to the unusually mild winter weather and the absence of snow storms.

The cement used was of a well-known standard brand and was tested before using by a laboratory of established reputation. No cement failing to pass the recognized standard requirements was released for shipment to the work. Sand and gravel were furnished by the large draglines sending material to the dam and by a smaller dragline operating solely for this purpose. The material was run into the screening plant (described in the April Bulletin) in the regular 12-yard cars and separated into three sizes, two of gravel and one of sand. These were stored in overhead bins and flowed by gravity to the concrete mixer. Side-hopper steel cars of one cubic yard capacity on narrow gage tracks received the mixed concrete from the concrete mixer and were hauled by a gasoline locomotive on a track laid alongside of the conduits to the place of depositing. Here the car discharged into chutes through which the concrete flowed by gravity into place. Spading gangs, skilled in the art of working concrete, manipulated the soft mixture in such a manner as to expel surplus air and water and insure the utmost consolidation.

Particular attention was paid to the aggregates, i. e., the sand and gravel, entering into the concrete. Each day a representative sample of sand was taken from that entering the mixer. By shaking this sand violently in water, the clay and silt mixed with it were washed out and their amount determined. The sand was also sifted through sieves with standard openings, to ascertain the proportions of the various sized grains. Granting that a particular sand is clean, and that its grains are composed of durable mineral matter, a determination of its mortar making qualities is quickly made by comparing its sieve analysis with those of other sands from the Miami Valley which had previously been mixed into con-

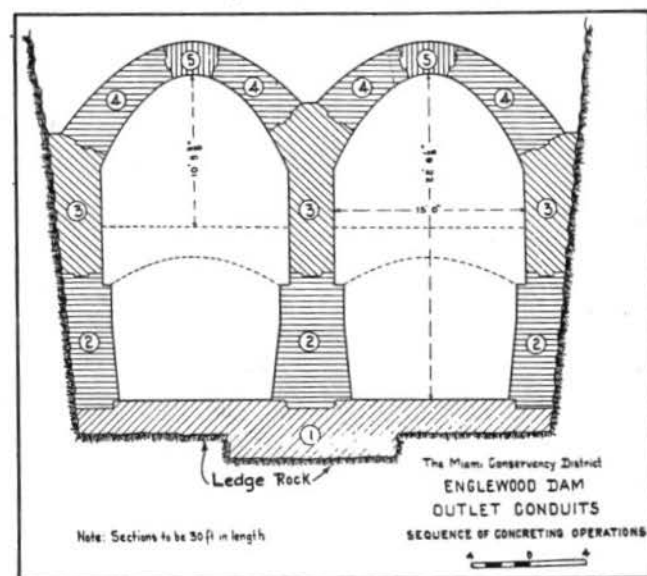


FIG. 18—SECTION OF ENGLEWOOD CONDUITS.

Shows the setting of the conduits in the ledge rock, and also the five successive steps in the pouring of the concrete, longitudinal joints being introduced at each stage.

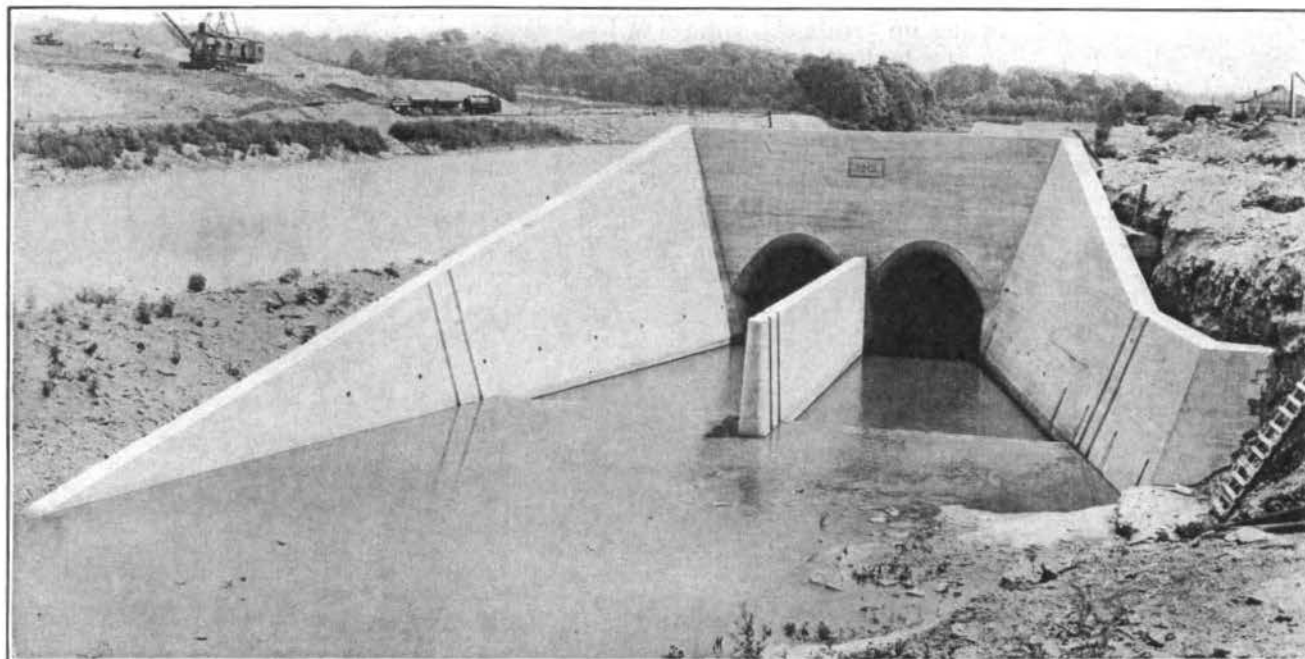


FIG. 19—STILLWATER RIVER ENTERING ENGLEWOOD CONDUITS, JULY 28, 1919.

The river was turned into the conduits two days before this picture was taken. The old bed appears at the left. It was blocked by a low cross dam at each end of the conduit structure, and has since been pumped out and the bed thoroughly cleaned of all objectionable materials by a dragline excavator, the digging in most places reaching ledge rock. The notches in the walls are to receive timbers in case either conduit needs repair, the timbers constituting a dam.

crete and tested. The gravel entering into the concrete was also carefully examined from day to day to see that it was free from dirt.

Another refinement entering into the construction of the conduits was the adjustment of the amount of cement entering into the concrete used in the various parts of the structure, the amount being greater where greater strength or wearing quality was needed. For instance, in the face of the walls of the entrance and outlet of the conduits at the level where the water will stand during the greater part of the year additional cement was used in the mixture. The reason for this is that during the winter the alternate freezing and thawing at the surface of the water has a tendency to cause disintegration, and consequently at this particular point greater weather-resisting qualities are desirable in the concrete than elsewhere in the walls. Similarly, in a thick retaining wall, the face of which is exposed to swiftly-flowing water, more cement was used in the mixture along the face than in the backing of the wall. Also in the portion of the center wall at the inlet, which will be exposed to buffeting from floating logs or other objects, a much stronger mix was used than would be dictated by considerations of strength alone.

The foregoing adjustment of mixtures was, of course, in addition to the proportions as nominally determined upon for the various parts of the structure, depending upon the stresses the particular concrete is called upon to sustain. Inasmuch as the cement is by far the most costly ingredient entering into the mixture it is obvious that its content should be as low as practicable without sacrificing any of the qualities essential in the finished product. Following this reasoning, a number of standard mixtures were selected. In all cases the amounts of sand and gravel were constant, the variation in the

mix being governed by the number of sacks of cement added. Thus, a 5-bag mix gave proportions by volume of 1 part cement to 2.8 parts sand, to 5.6 parts gravel, and an 8-bag mix gave proportions of 1 part cement to 1.75 parts sand, to 3.5 parts gravel. Other numbers of sacks gave mixtures in proportion.

At frequent intervals cylinders of concrete, 6 inches in diameter and 6 inches long, were cast from the material as it was being placed. These were stored in damp sand or sawdust to insure proper seasoning and tested for comparison. The results of these tests appear in the following table, the last column giving the breaking strength under compression.

Sacks	Proportions	Number of Specimens	Lbs. Per Sq. In. At 3 Months
5	1:2.8:5.6	15	2880
6	1:2.33:4.66	30	2573
7	1:2:4	6	more than 3300*
8	1:1.75:3.50	9	" " 3300*

When it is considered that the concrete will not be called upon to sustain stresses in excess of 500 lbs. per sq. in. it will be seen at a glance that no apprehension need be felt as regards the safety of the structure.

The average quantity of cement per cubic yard in the entire 19,000 cubic yards was 1.57 barrels.

In order to provide for internal stresses in the concrete due to shrinkage in setting, and partly to facilitate casting, the conduits were built in 30-foot lengths and brought up to their full height in several separate operations. This will be made clear by reference to Fig. 18. Movable forms were devised by the designing division which could be used repeatedly throughout the concreting operations.

*Exceeded capacity of testing machine.

By striking wedges and setting up turnbuckles the form was pulled free from the hardened concrete and rolled to its new position on casters attached to the bottom timbers.

As a final preparation for service the exposed surfaces of concrete were given a light coat of a thin mixture of cement, water and small quantities of hydrated lime and fine sand. This mixture penetrating any pin holes in the face of the concrete adds

to its durability.

The conduits were put into actual service on July 26, when the old channel of the Stillwater River across the damsite was blocked by a temporary cross dam and the flow diverted through the conduits. The work was done under the supervision of H. S. R. McCurdy, Division Engineer, H. W. Horne, Assistant Division Engineer, and Richard Byers, Superintendent of Construction.

August Progress on the Work

GERMANTOWN

Fair progress was made during the first month of pumping. Some difficulty was experienced with the equipment. The locomotives were under repair for a portion of the month, which of necessity reduced the amount of material that could be delivered to the pumping plant. Some trouble was also experienced with the cast iron runners catching too many rocks. This difficulty was overcome by the substitution of manganese steel runners of new design. The rocks that will not pass through the grizzly are being stored for use in the gutters on the dam.

Three towers for obtaining the earth pressure in the dam are in progress of erection. These towers are located in the old channel of Twin Creek.

A clay blanket is being spread on the old creek bed preparatory to placing the hydraulic fill in this portion of the dam. In one portion of the old channel, teams with wheeled scrapers are being used; at another place a hoist engine has been rigged to a Fresno for the purpose of spreading the clay; at still another the Marion dragline is being put to this use.

Arthur H. Pauls, Division Engineer.

August 15, 1919.

ENGLEWOOD

During the latter part of July the cofferdams across the bed of the Stillwater River at the upstream and downstream toes of the dam were completed and the flow of the river diverted from its old course through the outlet conduits. A steam dragline has since been working over the abandoned river bed, clearing off loose material and preparing a foundation for the embankment of the dam.

Work on the cross dam is progressing steadily, the embankment now having reached a height of forty feet, or two-thirds of its projected height. Owing to the narrowing in of the top, however, the yardage remaining to be done is comparatively small.

Slightly over 100,000 cubic yards of embankment were placed in the dam during July, bringing the total to the end of July to about 525,000 cubic yards, and showing a completion to date of 15 per cent. Revolving screens, to discard all oversize rock from the material being fed to the dredge pumps, have been installed in place of the square gratings formerly used. Not only has the progress been greatly accelerated by this change, but the unit cost of embankment is being correspondingly reduced. On August 14 over 6,500 cubic yards of material were pumped into the dam during the 20 hours covered by the day and night shifts, establishing a record.

The graveling of Highway No. 4 is nearing completion.

H. S. R. McCurdy, Division Engineer.

August 15, 1919.

LOCKINGTON

The upper toe of the dam, west of the outlet structure, has been completed to elevation 904, about 19 feet above the main valley floor. This forms a dyke across the river bottom of sufficient height to protect from extreme flood that part of the earth fill lying west of the new channel. The material was excavated by the Class K Dragline from the cut-off trench and placed while in the wet condition. The lower toe of the dam is being built by hydraulic fill, the dredge pumps working day and night shifts. To date most of the fill has been placed by one pump. The second pump will go into regular service within a short time.

The western 3100 feet of the dam is comparatively low, being upon high ground. This is being built by the large dragline with material excavated from a pit extending along the north side of the fill. Water for compacting the

earth is being pumped from Loramie Creek into the borrow pit.

Road No. 10 was let by contract and graded during the month. Work on Road No. 9 is progressing favorably. Approximately 3000 feet of it have been graded and graveled, the culverts are all built and a concrete slab bridge is being built at Lockington for carrying the road over the Sidney feeder of the Miami and Erie Canal. Some clearing and grubbing is being done on Road No. 8.

The steel bridge on Buxton Pike over the outlet channel was opened for traffic on July 25.

During the month the Class B Dragline has been occupied in placing selected backfill behind the east wall of the outlet structure, in loading trucks with gravel for Road No. 9 and in stripping soil from the low marsh ground lying east of the outlet works.

The gravel washing and screening plant, out of service until next year, when it will again be needed for building the spillway weir, has been leased until the end of this year. The product is to be used for building concrete roads.

B. M. Jones, Division Engineer.

August 18, 1919.

TAYLORSVILLE

The rock excavation for the outlet works, being done by the big Lidgerwood dragline, is still progressing a little faster than the estimated rate, as has been the case for the past three months. There has been only a few yards' difference in the monthly records of this machine during this period.

The progress on the sluicing has been only fair as a new borrow pit is being opened up and all of the water lines have been relocated on account of the relocation of the railroad off the east end of trestle No. 2. This shut the pumps down for ten days.

The Marion steam shovel is constructing the new loading track around the north end of the excavation for the concrete.

Trestle supports for the concrete track and derricks have been started at the south end of the outlet excavation. The base of the derricks and the concrete track will be carried at elevation 760, which is 34 feet above the lowest point on the foundation and 77 feet below the top of the walls. We plan to start concreting about the middle of September.

The concrete bridge over the B. & O. R. R. has been finished.

A pit has been stripped south of the damsite from which gravel ballast will be dug for the new B. & O. railway tracks.

O. N. Floyd, Division Engineer.

August 16, 1919.

HUFFMAN

The large electric dragline has completed the excavation of the outlet channel, with the exception of a cofferdam across the lower end to hold out the back water from Mad River until the concrete work has been completed. The dragline will now be used to clean out all objectionable material from the old bed of Mad River. This is done in preparation for the embankment. The dragline will then be taken to the main borrow pit to excavate material for the earthen part of the dam.

Concreting in the outlet works has been progressing very satisfactorily during the past month. The steps and floor have been completed to the lower end of the hydraulic jump pool, the first weir is about fifty per cent completed, and the side walls are built to their full height as

far as the downstream toe of the dam. The sections of the wall below this point are up to various elevations.

A small cross dam has been built north of the diversion channel so that the placing of the hydraulic fill can be started before Mad River is diverted through the outlet works.

All of the foundation work for the hydraulic pumping plant has been built and the installation of the plant itself is under way.

C. C. Chambers, Division Engineer.

August 19, 1919.

DAYTON

Channel excavation to date amounts to 483,000 cubic yards. A total of 373,500 cubic yards has been placed in levees and spoil banks, including 60,000 cubic yards of levee embankment on Contract No. 41. In accomplishing this work a total of 809,000 cubic yards has been handled.

The D-15 large dragline, which was placing material in the spoil bank along the north side of Mad River below Webster Street, completed that work. It then crossed the Miami River to the spoil area on the west bank below Herman Avenue, where it has completed excavating the canal to be used for transporting material on scows into the spoil bank.

In the meantime the other large dragline has been working near Dayton View Bridge. It excavated approximately 3000 cubic yards of sand and gravel, which were transported to Price Bros.' concrete block plant, and 8000 cubic yards which it placed directly in the spoil bank on the north side of the river.

The 20-inch water main which crosses under the bed of the river above Dayton View Bridge has been lowered to the new grade for a length of 300 lineal feet.

The concrete extension of the storm sewer at McKinley Park has been completed. Excavation has been started for the construction of a concrete retaining wall on the north bank of the river just west of Main Street.

The enlargement of the levee on the east bank of the river between Island Park Dam and Herman Avenue has been started. The material for it is excavated from the main channel by the caterpillar dragline, loaded into dump cars of 4 cubic yards capacity, and hauled along the top of the old levee by two 6-ton gasoline locomotives.

Good progress is being made with the erection of the gravel washing plant at the mouth of Wolf Creek.

Scow No. 2 is being repaired in the Sunset Avenue dry dock.

At Price Brothers' plant 109,000 blocks for the flexible concrete revetment have been completed. This is about 62 per cent of the total quantity required for the work at Dayton.

C. A. Bock, Division Engineer.

August 18, 1919.

HAMILTON

The total excavation for the two draglines, to August 1, was 714,000 cubic yards. The electric dragline has begun just south of the railroad bridge, on a cut 150 feet wide along the center of the channel, and is working south toward the Columbia Bridge. During the past two weeks seven standard gauge car trucks have been removed from the river. Several cars and a large amount of bridge steel have also been encountered. The cars fell with the bridge in the 1913 flood, having been pushed out on it in an attempt to hold it in place.

The steam dragline is working on the levee south of the tail-race at the Ford plant.

The asphalt paving over the Buckeye Street sewer has been completed and all work on the Wood Street sewer except the paving, which will be done as soon as the backfill has settled sufficiently. Excavation on the Front Street sewer has been completed for a distance of 150 feet.

Frank McGillicuddy & Co. have started work on the channel excavation north of Black Street on the east side of the river. The material is being hauled to the north spoil bank, through the B. & O. underpass, and filled in around the Ford tractor plant. The equipment on this work consists of a Marion model 70 steam shovel, 4 18-ton dinkeys and 42 4-yard dump cars.

C. H. Eiffert, Division Engineer.

August 18, 1919.

RAILWAY RELOCATION

Baltimore and Ohio. The grading for the relocation will be completed before the end of the month, Condon & Smith's shovel being the last one on this work. After finishing or surfacing is done this entire work will be ready for tracklaying.

Roberts Bros. have started the tracklaying and are making satisfactory progress. The track has been laid as far as Taylorsville and at present rate of progress they will



FIG. 20—TROUBLE HUNTERS ON THE TRAIL, JUNE 14, 1919.

This is the Flying Squad of the Conservancy Electrical Department. They go all over the District. You may find them at the north end one day, at Lockington, and at Hamilton the next, seventy miles farther south. They take care of all pole line troubles excepting those of the transmission mains, which are handled by The Dayton Power and Light Company. Troubles like burned out armatures of electric motors, they do not take care of. These are brought in and repaired in the Conservancy shop.

not be long doing this work. The ballasting will then follow. They have a force of 90 men at work.

The elevating of the B. & O. main line and passing track south of Needmore Road, in which the District is interested, is thirty per cent advanced. The other B. & O. track work, which is being elevated at the same time, is twenty-five per cent completed.

Big Four and Erie. The big cut at Huffman will be excavated to its full depth and width by the end of the month. The cut being in rock is excavated one foot below the usual depth, the extra foot to be filled in with earth below the ballast, to give the necessary elasticity to the track.

The Ohio Electric cut adjoining the big cut is also very near completion. George Condon will finish the last cut on his work about September 1. He will then widen the embankments for about two miles west of Enon, these being now narrow. This will be done after the track is laid over these embankments. This will complete the grading east of the Montgomery-Greene County line. The Walsh Construction Company will then build about 90,000 cubic yards of embankment between Dayton and Harshmanville, which will complete all the grading on this work. The contract for the tracklaying and ballasting was awarded to the Walsh construction Co. The tracklaying was sublet by the Walsh Company to Roberts Bros. The steel rails and angle bars are already unloaded.

Ohio Electric Railway. The two stiff leg derrick "draglines" have moved across Mad River and will soon complete the grading of the roadbed between Mud Run and Carlisle Junction.

Contractor McCann will soon complete the grading between Fairfield and Mud Run.

The Mud Run concrete trestle and the abutments for the Mad River bridge are completed. The Smith Ditch concrete trestle is seventy-five per cent completed.

Preparations have been made for the receipt of track material for this railway, 600 feet of yard track having been laid.

Albert Larsen, Division Engineer.

August 19, 1919.

RIVER AND WEATHER CONDITIONS

The rainfall at the District's stations during the month of July varied from 3.96 inches at Fort Laramie to 5.23 inches at the Englewood and Taylorsville Dams. The streams were comparatively low during the entire month, although small rises of from 3 to 4 feet were caused in some of the streams by the rainfall of from 1.5 to 3.0 inches which fell on July 20. The number of days on which the precipitation exceeded 0.01 of an inch varied from 5 to 8 at the different stations. The total precipitation at the Dayton U. S. Weather Bureau Station was 4.20 inches, or .92 inches greater than normal, reducing the accumulated deficiency since January 1 to 1.63 inches.

At the Dayton U. S. Weather Bureau Station the mean temperature for the month was 77.0° F., or 1° above normal; there were 20 clear days, 9 partly cloudy days, 2 cloudy days, and 6 days on which the precipitation exceeded 0.01 of an inch; the average wind velocity was 8.0 miles per hour, the prevailing direction being from the southwest; and the maximum wind velocity for five minutes was 51 miles per hour from the northwest on the 31st.

Ivan E. Houk, District Forecaster.

August 25, 1919.

The Construction Program at Hamilton

2,000,000 Cubic Yards of River Excavation to be Handled by Dragline Excavators and Dump Car Trains.

As indicated in the article in last month's Bulletin, the solution for the problem at Hamilton in general is to deepen and widen the present channel and to build levees along its banks, these levees and the adjacent edges of the channel to be lined with concrete.

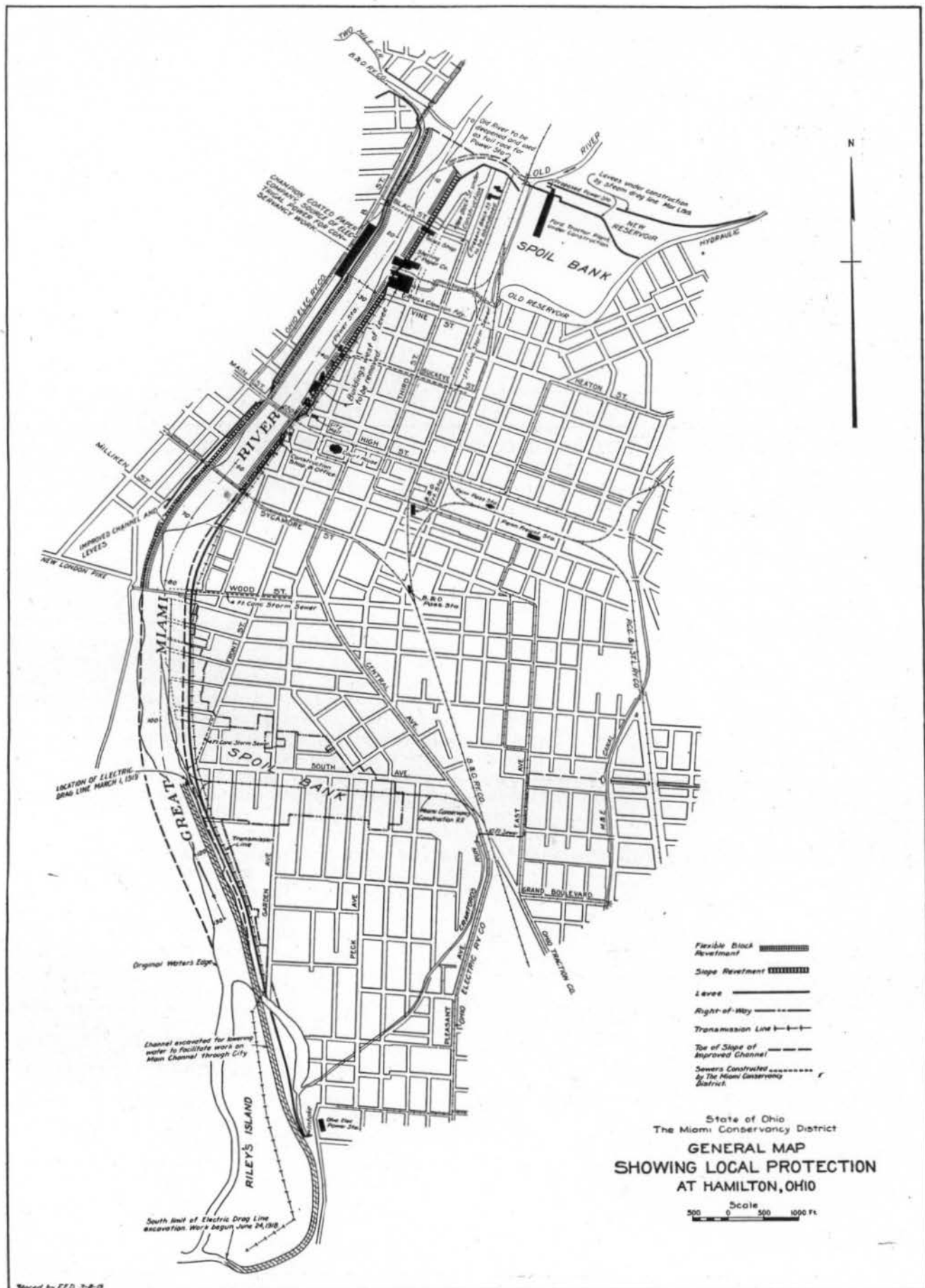
This work called as a principal item for the excavation and transportation of nearly 2,000,000 cubic yards of earth, the transportation item being increased by the fact that the levees would require but a small fraction of the excavated material. The methods to be employed in these operations furnished the main construction problem.

As at Dayton, steam shovels, dragline excavators, dipper dredges and hydraulic dredges were all considered, dragline excavators being finally chosen as best. Steam shovels, considering that a considerable part of the excavation would be near or below water level, were early eliminated from consideration. The fact that much of the excavation was above water level eliminated dipper dredges. Draglines being able to do the work efficiently both in the dry and the wet were given the decision. The fact that a considerable part of the excavation has proved to be in very coarse gravel and boulders, which could not be economically handled by hydraulic dredging, has emphasized the wisdom of the choice. The dragline has also been advantageous in the handling of a considerable amount of bridge and car wreckage, relics of the 1913 flood, buried in the river bed.

A reference to the cross section of the channel, figure 23, will show a strip nearly 150 feet wide at the left, in which the excavation will be in the dry. This strip is about a mile in length. Crossing

the river, it extends thence on the west bank nearly a mile and a half farther. It might be thought that this excavation could be done more economically by steam shovel. A study of the matter showed, however, that taking into consideration the labor of track shifting, the dragline, owing to its wide reach, will be superior even here. A steam shovel adapted to this bank could remove at one cut a section about 45 feet wide. The dragline in use (with 100 ft. boom and 4½-yard bucket) will take out at one cut a section 180 feet wide. The dragline will thus require in comparison, only about one-fourth the amount of loading track shifting in the course of the job, an advantage which outweighs the quicker swing and dumping action of the shovel.

At Dayton, as described in the Bulletin for May, materials are transported upon scows by stern-wheel tug-boat. At Hamilton the conditions make transportation by dump-car trains preferable. Three trains are in use, of ten cars each, drawn by 48-ton American, saddle-tank locomotives. One reason for the choice at Hamilton lies in the fact that the job at Hamilton is to a considerable degree a job of widening the channel rather than deepening it, as indicated in the section already mentioned, figure 23. During the rainy season this permits tracks to be used on top of the unexcavated shelf at the left in that section. There is no such shelf over most of the work at Dayton. Dump car train transportation at Hamilton has a further advantage in that it permits, by extending the construction tracks, the filling in of extensive low areas of the city. One of these areas, the north spoil bank, is that immediately adjacent to the new Fordson Tractor plant, at the north limit of the city. See page 27. The other



The protective covering is of concrete. The sloping part covers the lower portion of the levee, and extends toward the top as far as may be necessary in each particular locality. It is 6" thick, built in sections like a concrete sidewalk, and reinforced with galvanized steel wire mesh. The horizontal part (it really slopes slightly toward the center of the stream) is laid along the edge of the river bed. It is 35 feet wide and 5 inches thick, made in separate blocks woven together by galvanized steel wire rope strung through holes cast in them.

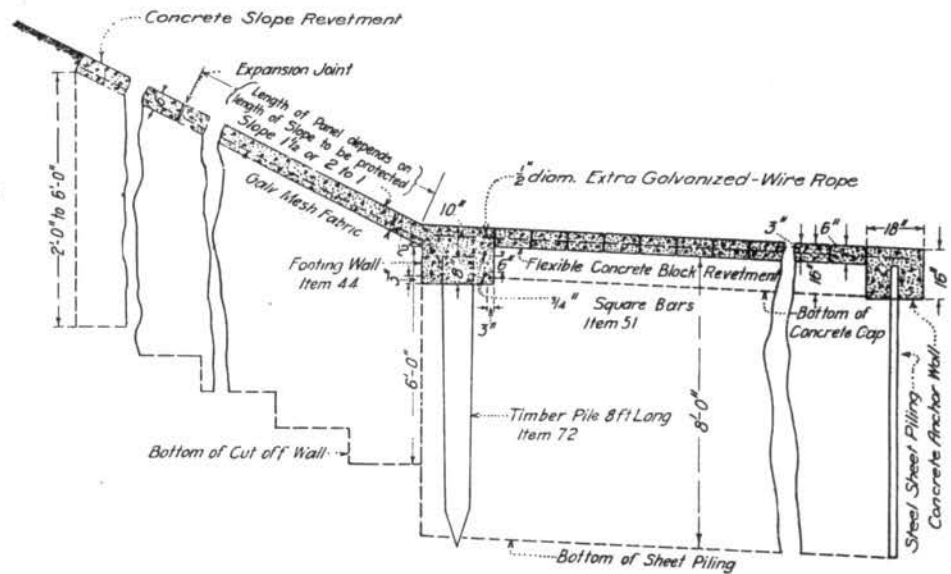


FIG. 22—CROSS SECTION OF CONCRETE REVETMENT, HAMILTON.

will become a much improved residential section (see area labeled "Spoil Bank" next the river in the southern part of the city). This latter area is three-fifths of a mile long east and west by a quarter of a mile wide north and south. Next the river it is over a mile long north and south. The north spoil bank is an approximate rectangle about 1,500 feet each way. The two areas together will receive about 1,500,000 cubic yards of excavated channel material.

During the dry months the construction tracks are located with more economy on the dry bottom of the old river bed, the stream flowing at one side in its narrowed summer channel. To lower the water surface and to narrow the flow still more, a deep water channel was dug for the stream by the dragline, beginning at the south end of Riley's Island, about 6,000 feet south of where the full river improvement begins. This channel is about fifty feet wide, the full width of the improved channel being 620 feet. It has lowered the river level about five feet, providing thus some additional margin for

summer storm flow before the construction tracks would be flooded. This deep water channel has now been carried as far north as the railway bridge at Sycamore Street. In addition, a considerable amount of the final channel excavation has been completed and the material placed in a levee along the east bank. This work is indicated in figure 25.

The experience at Hamilton indicates that river excavation by dragline is best done with the machine moving down stream, especially where the water runs fast. The reason is that in working up stream a sharp slope in the water surface is always created where the excavation meets the unexcavated river bed. The bucket works always at this sharp slope, and the rush of the water down the slope washes away much of the loosened material and carries it down stream, where it fills up in part the already excavated channel. A double loss is thus involved. By working down stream the excavation creates a quiet current at the point of digging, and the waste becomes negligible.

The sewerage system at Hamilton discharging

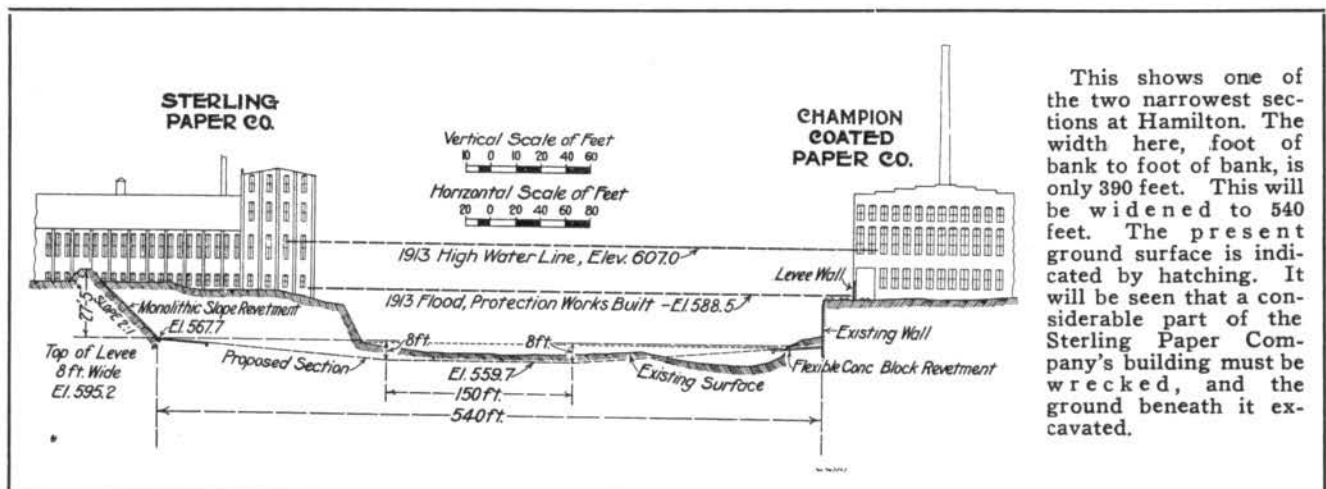


FIG. 23—NARROW SECTION OF RIVER AT HAMILTON.

This shows one of the two narrowest sections at Hamilton. The width here, foot of bank to foot of bank, is only 390 feet. This will be widened to 540 feet. The present ground surface is indicated by hatching. It will be seen that a considerable part of the Sterling Paper Company's building must be wrecked, and the ground beneath it excavated.

into the river through a number of outlets, the flood protection plan naturally provides that these be protected with flood gates to be closed in time of high water. In addition the District is providing several new sewer outlets. The largest of these, on Buckeye Street, has a vertical diameter of 5 ft. 8 in. and a length of 2,000 feet, and is laid at a depth of from twenty to twenty-five feet below street level. This sewer is completed. A four-foot sewer 1,500 feet long has also been completed on Wood Street. A second four-foot sewer, on Front Street, about 700 feet in length, is in process of construction.

The taking of the 150-foot strip along the east bank of the river, necessary to the improved channel, involves the wrecking of several important structures. One of these is the power plant of the Hamilton and Rossville Hydraulic Company. This plant lies at the outlet of a canal which had been originally built in 1840 for the purpose of bringing water from the Miami River above the city, to furnish power to mills and factories, the fall thus secured being about twenty-five feet. The course of this canal is indicated on the map, page 27, where it is shown entering the city at the northeast corner and flowing southwestward into the Old Reservoir; thence westward to the Black-Clawson works on the river bank; thence south along the river to the power station at Buckeye Street, whence the water discharges through the water-wheels into the river. This canal in time of flood is clearly a source of

danger, as affording a gate-way for flood water to enter the city. This source of danger the Conservancy engineers determined to remove entirely by extending the east river levee across the north end of the city to high ground, and carrying the canal to the river along the north side of this levee entirely outside the protected area. (See map, page 27). This involved rebuilding the power plant at a new location north of this new levee; also the construction of a new reservoir for power water storage north of the new levee and east of the proposed new location of the plant. The plan was the easier to carry out since the old power plant on the river at Buckeye Street had to be wrecked in any case, as already explained. The new power location is just north of the north "spoil bank," the low area to be filled with material excavated from the river heretofore referred to.

It is an interesting circumstance that in 1918, several years after this plan had been decided upon and in part carried into effect, the new power plant site should have been selected by Henry Ford as an excellent location for one of the new plants for the manufacture of the Fordson Tractor. He purchased a large part of the "spoil bank," together with a controlling interest in the Hydraulic Company. The tractor plant projected by him, and now in process of construction, is shown in the northwest corner of the spoil bank area. It will be a building of concrete and structural steel 600 feet in length

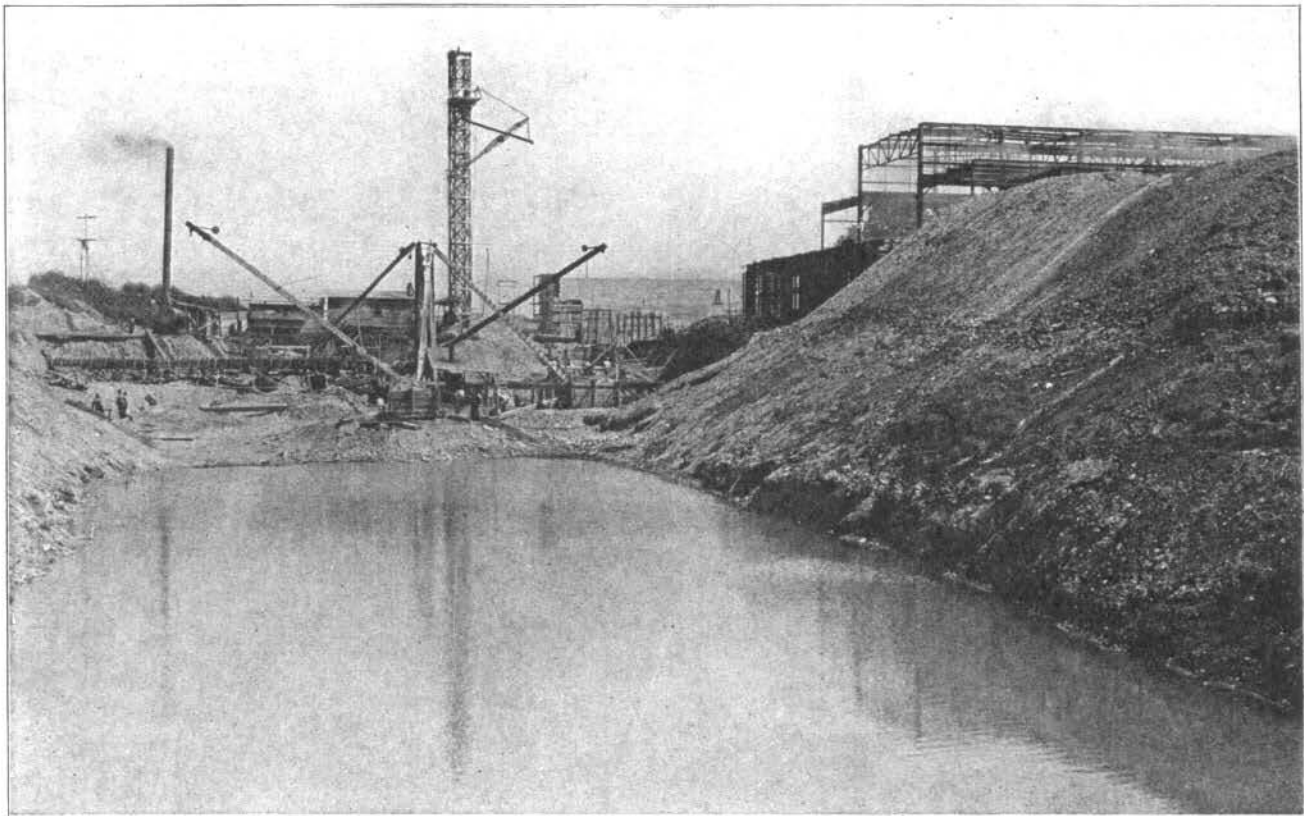


FIG. 24—PROTECTION LEVEE, TRACTOR PLANT AND NEW POWER PLANT, HAMILTON, AUG. 22, 1919

The view is a little south of east looking from the direction of the railway bridge across Old River, but a little nearer the Ford plant. (See Map, p. 27.) The protection levee on the north of the city is seen at the right. This will be carried around the north end of the Ford plant (seen just beyond it) by a concrete wall. Part of this wall is seen beyond the plant and at the right of the tower. The excavation in the foreground is for the water power tail race. The power plant foundations are now going in just beyond. The tower is used for elevating the concrete, which is then chuted by gravity into place. The head race and water reservoir are beyond the tower, between levees already built.

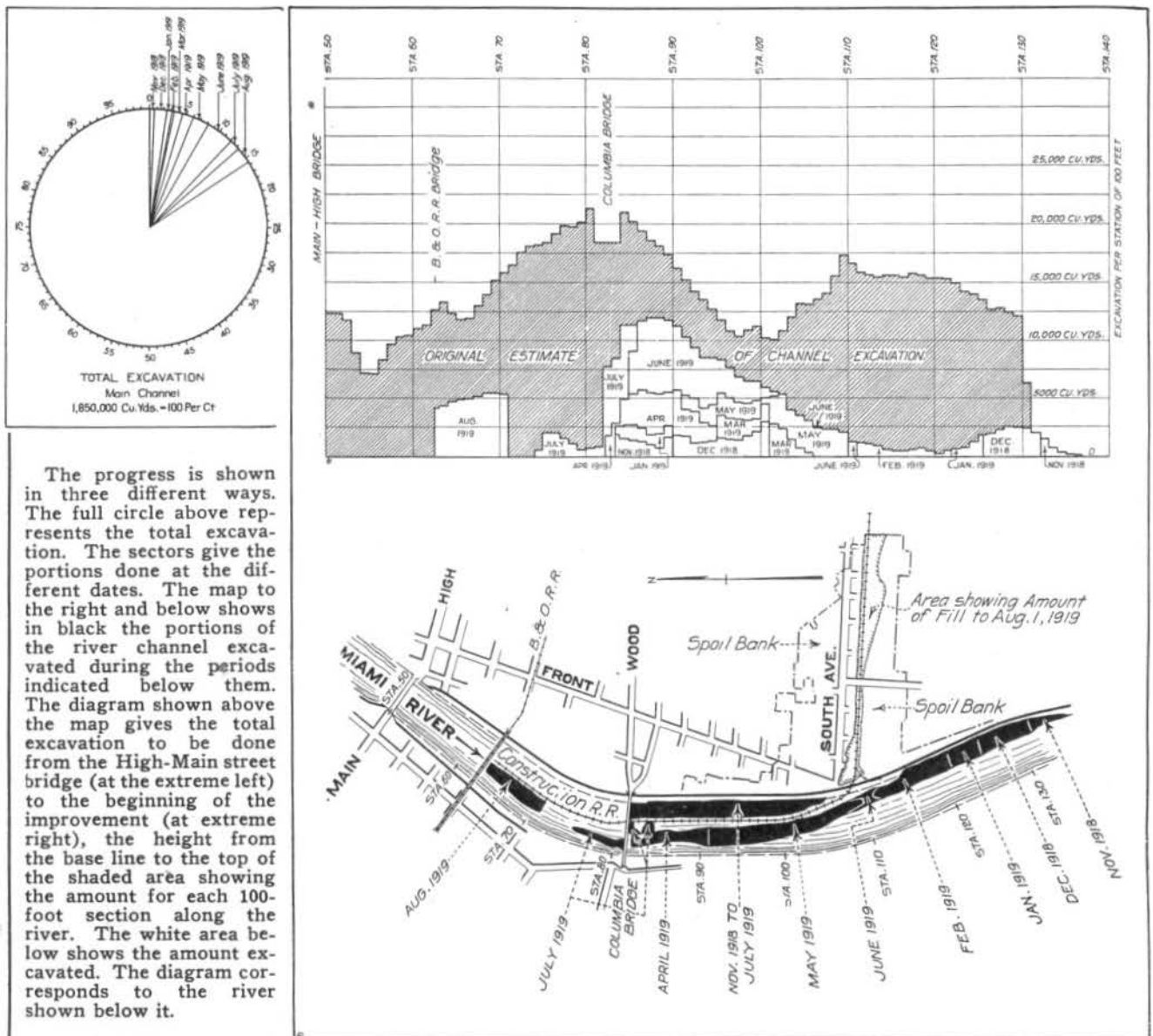


FIG. 25—PROGRESS ON THE RIVER EXCAVATION, HAMILTON, TO AUGUST 1, 1919.

by 150 feet in width. The new power plant, to be equipped with turbines developing 3500 H. P., is being built just to the north and outside of the protection levee. The tail race will discharge into the Old River, a former channel of the Miami, at the railway bridge, just west of the plant. The new protection levee at this point, and the levee north of it enclosing the new reservoir, have already been nearly completed, being a part of the regular Conservancy work. They are shown in part in figure 24, together with the excavation for the new power plant tail race and works accessory to it. By the original agreement the cost of the new head race and tailrace was to be paid for by the Conservancy District. The Ford plans require greater head and larger tailrace. The expense of these additions is borne by the Hydraulic Company. The cost of speeding up in the filling in of the low area, due to the new plans, is borne by the Ford Company.

The abandonment of the hydraulic canal through the city, while apparently a somewhat radical step,

was negotiated with less difficulty than might have been expected. As a source of water power for industries the canal had little by little fallen into disuse in the course of years, until only a few factories were still absorbing power. These leases the Conservancy District purchased. The old tail race, into which these wheels still discharge, was also used as an outlet for storm sewers. The tail race being abandoned with the canal, it was to provide a channel for these storm water outlets that the Buckeye Street main sewer was built, referred to above.

The protective armour of concrete revetment, to be placed on the slopes of the levees and on a 35-foot strip of the adjacent river channel, is an important item of the construction. A general description of it was given last month. Figure 22 shows a typical section. The flexible concrete mattresses, on the channel slope, will require about 225,000 concrete blocks. These are 1 ft. by 2 feet in size and 5 in. thick, cast with two $\frac{3}{4}$ -in. holes in the center of their thickness. Galvanized steel cables

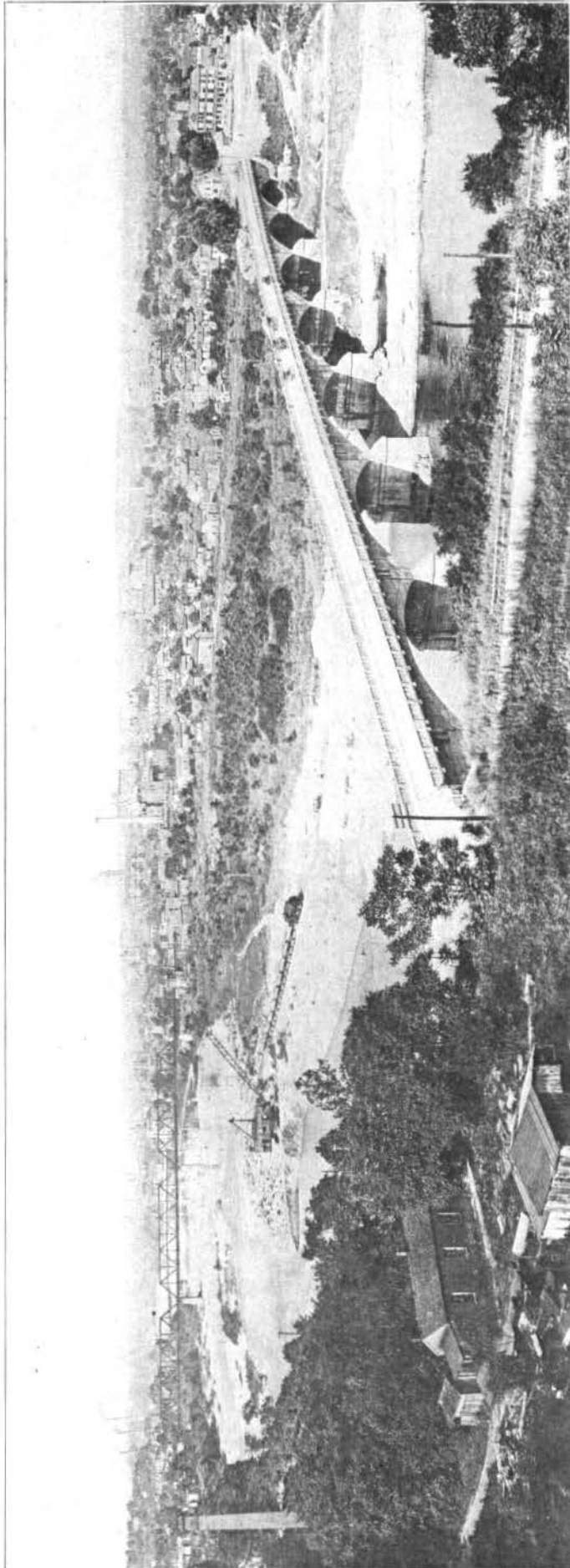


FIG. 26—WORKING ON THE RIVER EXCAVATION AT HAMILTON, JULY 29, 1919.

strung through the holes weave the blocks into a flexible fabric. The blocks and their manufacture were fully described in the August Bulletin. The machinery of the block plant, now working in Dayton, on completion of the work there, will be removed to Hamilton and set up beside the river. Excellent gravel in ample quantity occurs in the river bed at Hamilton in various localities. This gravel will also serve for the monolithic revetment, to be placed on the levee slopes, for the large concrete river walls and for the walls which will be used to top the levees in certain places where lack of space does not permit a wide enough embankment of earth. No large screening plant like those in use at the various dams will be used to assort the gravel. Instead, a smaller portable screen is contemplated.

Details of the various construction features will be given in later issues of the Bulletin.

The work at Hamilton is being carried out by C. H. Eiffert, Division Engineer, R. B. McWhorter, Assistant Division Engineer, and R. H. Rains, Superintendent of Construction.

Opening of Conservancy Schools

The Conservancy schools will open again on September 2 for their second season of work. There will be some changes in the staff of teachers. At Huffman Miss Sara B. Darnell will be in charge; at Germantown, Miss Julia M. Darnell. At Taylorsville the work will be under Mr. F. E. Floyd and Miss Opal Floyd. At Englewood Mrs. Everdell will continue her efficient service of last year. Mr. and Miss Floyd are from Dayton, and the Misses Darnell from Manchester, Ohio. Mr. Floyd comes to the Conservancy from the U. S. army service, and was a teacher of successful experience preceding his war work. The Misses Darnell also bring to the Conservancy the advantage of several years of successful teaching. Mr. A. A. Hauck will continue in charge of all the Conservancy schools, giving to them this year, as last, a part of his time, the remainder the coming season being given to work on the staff of the Moraine Park school. This connection of Mr. Hauck cannot but be of advantage to the Conservancy schools, the unusual excellence of the work at Moraine Park being well known. Mr. Hauck's place as Camp Inspector will be taken by Mr. H. F. Moyer of the U. S. Employment Bureau at Columbus.

The work of the schools will be like that of last year, the satisfactory character of which is attested by the fact that the County Superintendent of Schools granted to all graduates of the eighth grade the regular Ohio State certificates, the same as granted to Dayton city schools. The irregularity unavoidable in the opening of the Conservancy schools last year will be avoided, however, at the present opening.

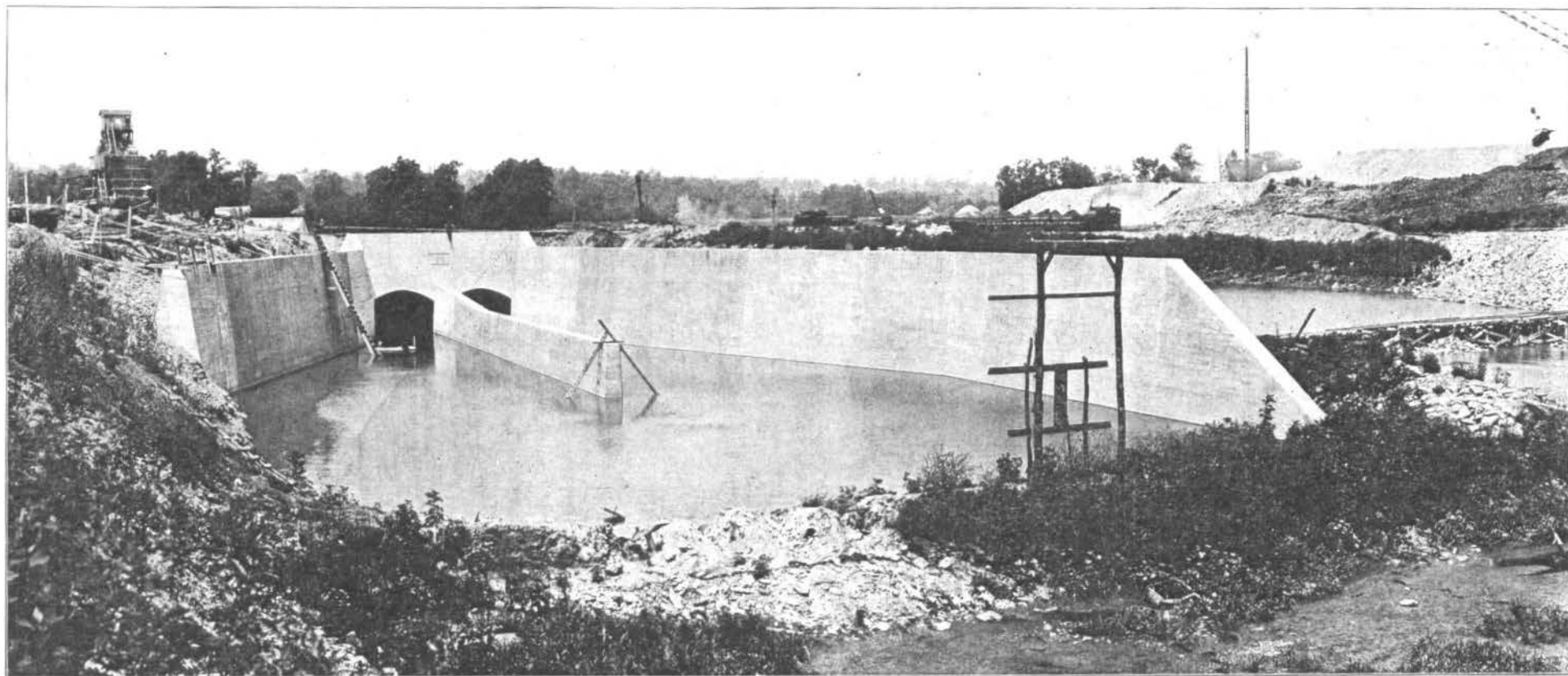


FIG. 27—STILLWATER RIVER COMING OUT OF THE ENGLEWOOD CONDUITS JULY 28, 1919.

The picture shows the conditions two days after the river was turned through the conduits. The exit for the water is not seen, being through a narrow channel hidden behind the embankment in the foreground, next to the river at the right. This channel is quite narrow, a large part of the river flow going through the tunnel to the monitor and dredge pumps and on through them to the hydraulic fill pool on top of the unfinished dam. The cross dam enclosing the river end of this pool is seen at the top and extreme right, with the bucket of the dragline excavator showing as a black spot at its right end, the boom, up in the extreme corner, being the only other portion of the excavator which appears. The top of this cross dam, July 28, the date of the picture, was 40 feet above the river level. The dragline machine referred to is used to build up this cross dam as the main dam rises, the materials being brought to it by dump car trains. One of these trains is seen bringing a load, just above the right hand wall of the conduit outlet. The material is dug by dragline excavators from the floor of the valley above the damsite, (in the distance in the left hand half of the picture). The boom of one of these draglines is seen against the trees to the right and above the conduit openings. The main part of this excavation, however, is carried to the "hog box" for the hydraulic fill.

The old location of the river is seen at the right of the right hand wall of the conduit outlet, with the water penned in by a dam, the timbers of which appear. A similar dam has been built across the old channel at the entrance to the conduits, about 1100 feet upstream, to divert the water into them. The water in the pool between the two dams has been pumped out since the picture was taken, and the bed of the river excavated practically down to rock, thus removing all material such as muck which might permit seepage of water along the old channel under the dam when completed. The top of the finished dam will be 122 feet above the old river bed.

The building at the left is the gravel washing and screening plant used in preparing this material for making the concrete of which the conduits are built. This plant, now temporarily idle, will be put to use again later for the concrete work of the spillway.

The water in the conduits appears about as it will after the dam is completed. The cross dam in the foreground, however, will then be removed. It was built to keep the river water out of the conduits while they were under construction. Not more than half the present depth of the conduits is seen, the rest being under water. The lower half of the present depth will be filled with selected gravel and floored over as explained by Mr. McCurdy on page 22.

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FIG. 28—BRIDGE OVER B. & O. R. R. RELOCATION AT TAYLORSVILLE DAM, SEPT. 17, 1919.



FIG. 29—HYDRAULIC FILL POOL AT GERMANTOWN DAM, SHOWING PRESSURE CELL TOWERS

The view is southward, across the damsite, nearly along the center line. The cleared hillslope in the distance is the south end of the damsite. The pool next it occupies the former bed of Twin Creek, now diverted through the conduits (which were too near the camera to be included in the picture). The dike between the two pools occupies the former north bank of the creek. It was thrown up to retain the waters of the nearer pool while the bed of the creek was being cleaned of objectionable materials not desired to incorporate in the dam. The wooden towers are built to carry the "pressure cells" (described on Page 45) used to measure the earth pressure in the core of the dam. This core is of fine consolidated silt and clay, pumped with the water and the rest of the earth from the "borrow pits" into the pool. The gravel and coarse materials are deposited on the sloping beaches (at the sides in the foreground). The silt and clay run into the pool with the water and settle slowly to the bottom. (See also opposite page). Taken Sept. 15, 1919.



FIG. 30—RELOCATED B. & O. R. R. AT TAYLORSVILLE DAM, SEPT. 9, 1919.

The view is southeastward. The new track, not yet ballasted, appears in the foreground. On each side of it appear the new levees (see Fig. 33 and p. 37) which are virtual extensions of the dam to meet the high ground from which the picture was taken. The bridge shown on the outside front cover page is seen at right in the distance. (See p. 39). The old railway tracks appear at the left in the distance, with the hydraulic fill pool on the damsite beyond. The tent is a contractor's stable tent. The cars are the "rolling hotel" which accommodates his men.

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THE MIAMI CONSERVANCY BULLETIN

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ters should be sent to Office Engineer, Miami Conservancy District, Dayton, Ohio. Matter for pub-
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Death of T. W. Jaycox

The death has been announced, in Denver, Col-
orado, on Monday, September 15, of Mr. Thomas
W. Jaycox of that city. The death of Mr. Jaycox
is especially deplored by the engineers of the Con-
servancy District because of his membership on the
Special Board of Consulting Engineers who were
called in by the Dayton Flood Prevention Com-
mittee in March, 1914, to report upon the adequacy
of the Conservancy plans. The effect of the report,
which approved and confirmed the work of the Mor-
gan Engineering Company, gave added weight and
momentum to help carry the plans through the legal
preliminaries that were necessary.

Mr. Jaycox was born in Poughkeepsie, N. Y., in
1851, and was graduated at Cornell University.
From 1874 to 1880, he had charge of sewer design
and construction, street paving and the water works
for the city of Washington, D. C. Following this,
in 1880, he began private practice at Leadville, Col-
orado, his work including construction and reports
on water power and mining projects. He was suc-
cessively Deputy State Engineer and State Engineer
of Colorado, holding the latter position four years,
during which time he was the executive in adminis-
tering the irrigation laws and in the designing and
building of many bridges and state roads. Since
1909, and following this experience, Mr. Jaycox had
specialized in the designing and construction of
reservoirs, water works and irrigation projects.
This work, with the previous study on hydraulic
problems in connection with the many projects
which he passed upon as State Engineer, gave spe-
cial weight and value to his judgment in such mat-

ters. As a member of the Special Consulting Board,
he was one of those who came as guests of the Flood
Prevention Committee last June to inspect the con-
crete outlet structures at Germantown, Englewood
and Lockington, just completed at that time. It
was the last occasion on which his friends of the
Conservancy were to see him.

It is noteworthy that of the special Board of
Engineers referred to, eight in number, three have
died since their report to the Flood Prevention
Committee was made, the other two being General
H. M. Chittenden of Seattle, Washington, and Mr.
Wm. A. O'Brien of Cape Girardeau, Mo.

Interesting Hydraulic Development at Germantown

Most of the material which will go into the dam
embankment at Germantown will be obtained in
the main borrow-pit, occupying the width of the val-
ley bottom just above the dam site, the excavation
being done by a large dragline excavator. The quan-
tity thus delivered up to date has not been equal
to the full capacity of the dredge pump, and it was
therefore considered advisable to supplement the
work of the excavator by sluicing material down
from the adjacent hill side through a sluice way, the
material being excavated in this case by a hydraulic
monitor. It was known that the hill side contained
more clay than the valley bottom, which would
provide thus an additional quantity of fine material
for the earth core of the dam. Also, at times when
the dragline stopped work for any reason, the hill
side borrow pit would be still feeding material to
the dredge pump.

On putting the plan outlined into operation, a result followed which had not been foreseen and which gave it an additional recommendation. It was found that the large percentage of clay in the hill side material, as compared with the valley bottom borrow pit, caused it to act upon the dredge pipe as a lubricant, diminishing the pipe friction to such an extent that in spite of the additional material put through by the dredge pump, the total head remained the same. There was no increase in the gage reading on either the pressure or the vacuum side. The readings are taken regularly every hour, and the records covering several days, both preceding and following the change, seem to give assurance that the conditions indicated are stable. The material from the valley bottom borrow pit amounts to about 1500 cubic yards per day of two ten-hour shifts. The hillside borrow pit supplies an additional 500 cubic yards. The main borrow pit material comes to the pump during about 13 hours out of the 20. The hillside material is supplied almost continuously during the double shift. The motor (alternating electric), while pumping the latter material, is run on the oil switch alone. Also the pipe was being lengthened for several days following the change. The facts, put together, would indicate (since the unchanged gage readings show no increase in work on the part of the pump) that perhaps $\frac{3}{4}$ of the additional 500 cubic yards per day—or about 25 percent of the total—is being put into the dam, as far as the dredge pump is concerned, for nothing. Taking all expenses into account due to the installation and operation of the hillside sluicing plant, it is estimated that the hill side material is deposited in the dam at a cost of about ten to twelve cents per cubic yard. The entire operation furnishes an interesting and valuable experiment, details regarding which will be published at a later date.

Farm Division Issues Circulars

The Conservancy District, through its Farm Division, has begun the issue of a series of circulars, to be seven in number, relating to its agricultural lands, some 30,000 acres in all, lying within the five retarding basins. Part of these lands are now on sale and the circulars are for the information of prospective purchasers. Circulars No. 1 and No. 2 are ready for distribution.

Circular No. 1 gives a general description of the retarding basins, with their relation to the cities of the District and their effect during flood upon the farms within their boundaries. It is illustrated by an excellent general map in two colors.

Circular No. 2 treats of the effect upon the farm lands of such back water overflow as may cover them during seasons of flood, especially with relation to the deposit of silt, sometimes several inches in depth, remaining upon the surface of the fields after a flood has subsided. This circular contains much original and valuable material. In searching for information on the subject, Mr. Graham Smith, the head of the Farm Division, found that practically nothing had been published in this country. In Europe, especially in Germany, Austria and France, where retarding basins have been long in use, there were various articles scattered through technical journals. These were collected and studied. Let-

ters of inquiry were also sent out to all the leading agricultural authorities in this country whose experience or observation might be expected to bear on the subject. A considerable amount of original matter came in answer to these letters. The entire mass of collected data was sifted, studied and compared and the results embodied in Circular No. 2 of the Farm Division. Such being its character, this circular may well have a wide circulation among all those who are interested in farm lands anywhere which are subject to overflow.

Five additional circulars will be prepared, one for each of the five retarding basins, describing in detail the local conditions peculiar to each case. Single leaflets will be devoted to individual farms, the number of which runs upward of 150.

The labor involved in the preparation of all this information has been very considerable, but when one remembers that there are 30,000 acres to be sold, worth from \$100 to \$300 per acre, it will be seen that the beneficial results to be obtained are certain to outrun the cost.

The circulars may be obtained on request, together with any other information relating to the sale of the lands, by addressing the Farm Division of the Miami Conservancy District.

R. M. Riegel Becomes Designing Engineer

The position of Designing Engineer for the District, left vacant by the departure of Walter M. Smith, has been filled by the appointment of R. M. Riegel. Mr. Riegel first entered the service of the Conservancy in August of 1915, leaving it in May of last year for Government service with the Emergency Fleet Corporation in the Housing Division, from which work he returned to the Conservancy at the beginning of the present year. He brings to his position the experience of a number of years devoted to hydraulic engineering, including service on the Mississippi River channel improvement, with the New York Board of Water Supply, the Hydro Electric Co. of West Virginia and the Pennsylvania Water Supply Commission, on which he had charge of the Water Power Investigations. He was awarded the Fuertes gold medal for 1919 by Cornell University for his part in the investigation and publication regarding the action of the hydraulic jump, as described in Part III of the Technical Reports of the work of the Conservancy District. Those interested in the District have excellent reason to feel assurance that the work of Mr. Smith has fallen into capable hands.

Completion of Outlet Works at Huffman

The concrete outlet structure at Huffman will be completed by the time the present issue of the Bulletin is in the hands of its readers. The general type of this structure is the same as that at Lockington, described in the August Bulletin. It will have, however, when the conduits are added, three conduit openings instead of two, each 15 feet wide by 16 feet, 4 inches high, and carrying at maximum flood 35000 cubic feet of water per second. The total length of the structure is 580 feet, its maximum width outside 190 feet, its maximum height 108 feet, its height from bottom of conduit to top of walls 78 feet. It contains 33000 cubic yards of concrete, which the spillway will bring to 37000 cubic yards.

The Baltimore and Ohio Railway Relocation

Old Line Shifted Up the Miami Valley Slope from the Valley Bottom, Lifting It Thus Out of the Taylorsville Retarding Basin.

The line relocated was that branch of the railway which runs north from Dayton up the Miami Valley, the relocation work covering a distance of about nine miles. The changes are indicated in the two maps, Figs. 32 and 33. The old line, crossing the Miami River a little out of Dayton, follows the edge of the broad valley bottom at the foot of the western slope. About seven miles north of Dayton it reaches the site of the Taylorsville Dam. This dam, when completed, will block the valley from hill to hill, with its crest, about three thousand feet in length, 51 feet above the former railway subgrade and extending about 1200 feet up the valley slope to the west of it. For a distance of about four miles north of the dam, the track lies within the flow line of the retarding basin at maximum flood. The necessity for relocation is evident.

The natural solution was to throw the railway line a sufficient distance up the western valley slope to clear the damsite. But the crest of the dam being at elevation 837 feet above sea level, and the railway yard in North Dayton at elevation 752.1, the gradient necessary to climb from the yard to the crest, the distance being $6\frac{1}{2}$ miles, would be steeper than was desired. The maximum gradient set for the new line by the Railway Company was 0.2% (2' in 1000), and less on curves by an amount necessary to compensate for the curvature. This made the highest elevation which it was possible to reach at the dam, 819 feet above sea level, which is 18 feet below

the crest. It was thus necessary to notch the top of the dam to this depth to permit the passage of the new line, and to enclose the tracks, as they proceed north, between levees. These levees, which are virtual extensions of the dam structure (see Fig. 33), stop about a thousand feet north of the dam center line, where they meet the mouth of a heavy cut in the railway line. Drainage for the country to the west at this point is provided by an 8-foot concrete arch 273 feet long passing under the railway tracks and both levees.

The 0.2% gradient, continued north from the dam, brings the subgrade at the mouth of the levees just one foot above water level as it will stand in the Taylorsville Basin for a flood 40% greater than that of 1913. To keep a flood greater than this, if it ever occurs, from running down the tracks between the levees, a wall of sand bags would have to be built across the right-of-way from levee to levee. In such a case, the new line up the valley would be temporarily out of use. It is not expected, however, that such a flood can ever occur.

The elevation of the old line, to permit the relocation to reach the elevation indicated at the dam, begins at Leo Street in the North Dayton yard. The old alignment is followed to the Miami River Bridge, 5300 feet further north, this bridge being elevated 7' 1". The gradient to the bridge, which is within the yard limit, is 0.255%. From the bridge north, the new line continues to follow the old one for 4800 feet, then swings to the left and climbs



FIG. 31—HEAVIEST CUT ON B. & O. R. R. RELOCATION, SEPT. 9, 1919.

This cut begins just opposite the camera set up in figure 30, and extends northward about 2200 feet. The view here is southwestward near the north end. The maximum depth (seen at the right) is 80 feet. The cut contained 145,000 cubic yards of earth. The roadbed is for double track, the subgrade 42 feet in width.

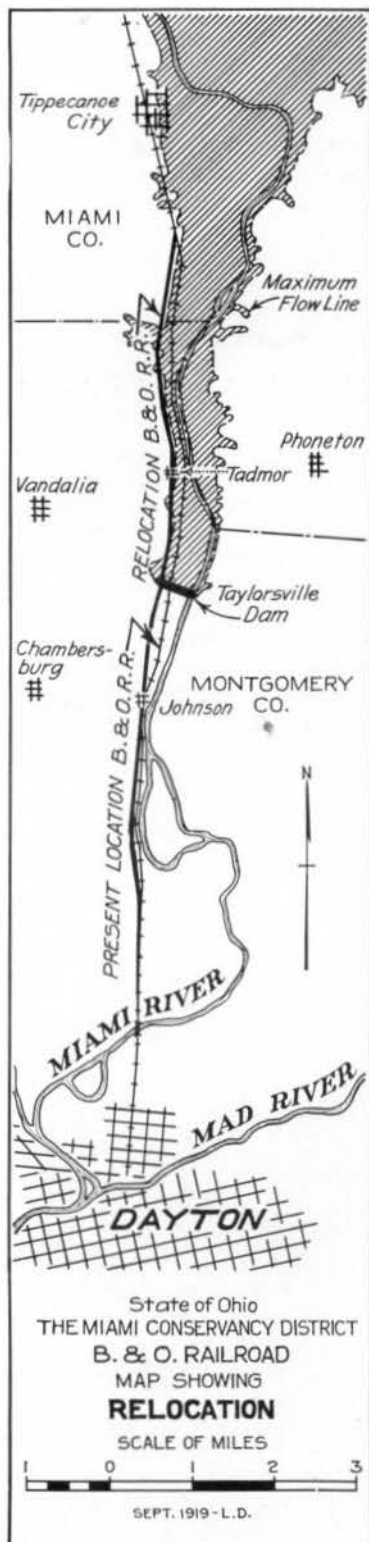


FIG. 32—B. & O. R. R.
RELOCATION

The old location is seen running north out of Dayton, with the relocation (the heavy line), branching off and running beside it a little to the left. The new line is about nine miles long, the roadbed (42 feet wide in cut and 34 feet in fill) built for double track, but only one track to be laid at present, with a passing track extending from Johnson Co. to Tadmor.

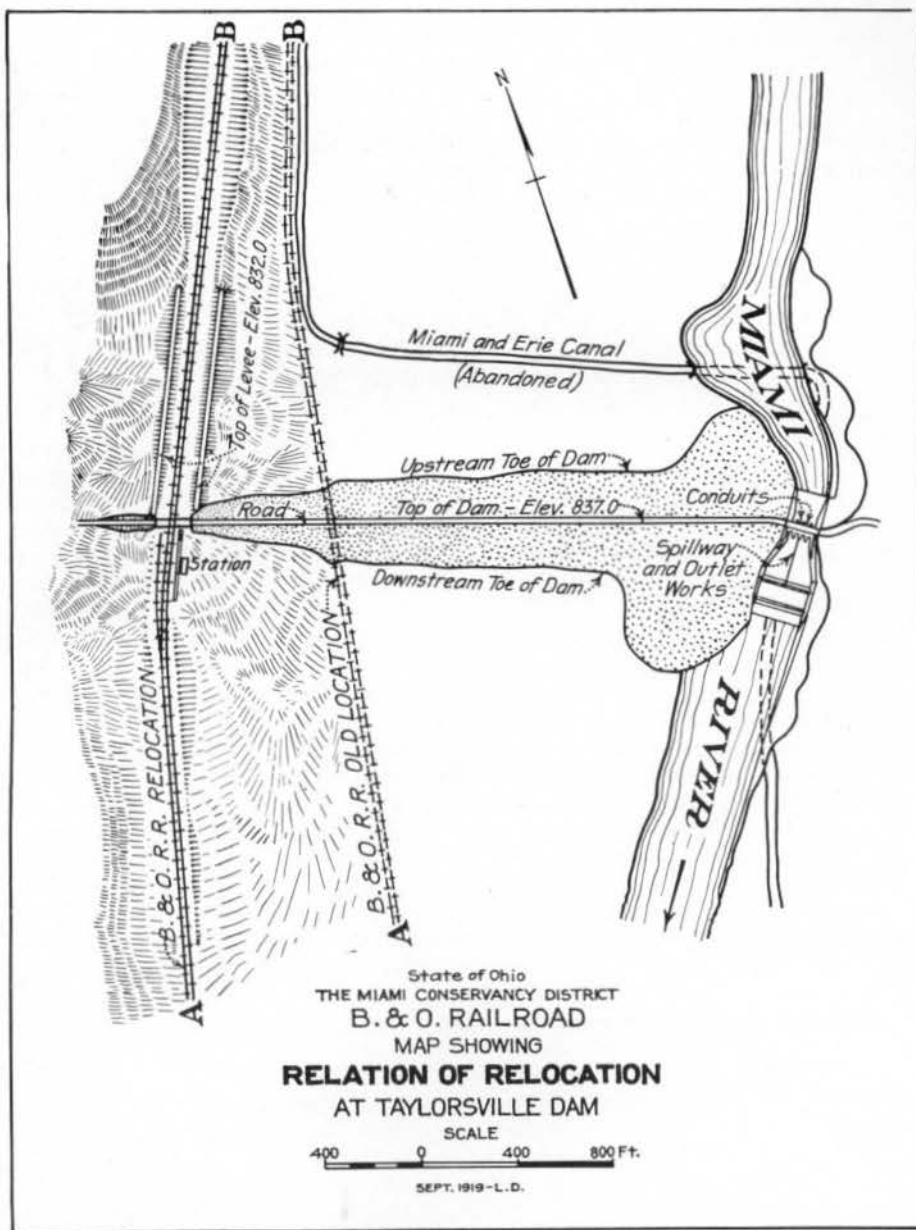


FIG. 33—B. & O. RELOCATION AT TAYLORSVILLE DAM.

The dams site is shown stippled, extending across the valley. The old tracks cross the dams site about 1200 feet from its western end. The new location is about 700 feet west of the old. The highway to be built across the dams site (the relocated National Road) crosses the new tracks on the bridge shown on the outside front cover. The railroad levees (see Fig. 30) carry the dam structure north to connect with the hill seen in the upper left-hand corner. The new station, to be built, is shown just south of the bridge.

along the western slope of the valley to the north end of the railway levees referred to, the 0.2% gradient being maintained the entire distance from the bridge. North of the levees the new line runs level to the end of the relocation, except for a single climb, on 0.05% grade, of one foot. The relocation is nine miles long and ends about four miles north of the dam. The length of the approach grade from Leo Street to the Miami River bridge is about 1.9 mile. Connecting the relocation with the Weston Division of the railway, there is a cut-off 3660 feet in length, beginning at Tate's Point and rising on a 0.3% grade to join the revised line just south of the Miami River bridge.

The old location of the railway was the natural one. Running as it did along the river bottom at the foot of the valley slope, most of the grading was light side hill work, or a light fill. The new location, being lifted vertically a maximum of about 32 feet, and shifted westward a

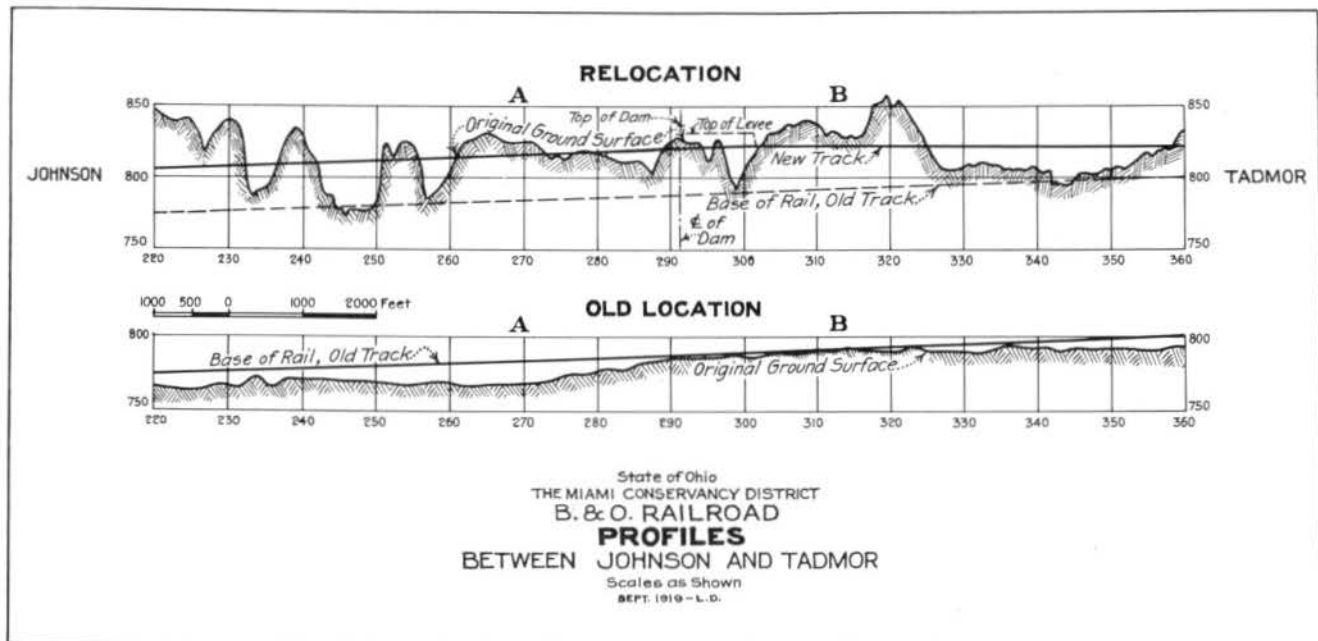


FIG. 34—PROFILES OF NEW AND OLD LINES, B. & O. R. R.

The profiles are shown side by side, for comparison, over the distance from Johnson's to Tadmor. (See Fig. 32). The portions from A to B cover the distances AB in Fig. 33. The top of the dam and the top of the adjacent levees are also shown. The figures at the ends of the profiles give elevations above sea level. The figures under the profiles give "station numbers" along the new line. The rougher country traversed by the relocation shows plainly.

maximum of 800 feet or more, is carried far up the side of the valley, where it must cross many gulleys and tributary valleys which furrow the main slope. These side valleys had to be filled up and the intermediate shoulders of the main valley cut through. This meant expensive construction. The contrast between the two lines in this respect is shown clearly by the two profiles in Fig. 34.

The old road is a single track line, with a passing track from Johnson to Tadmor. The new subgrade is built for two main tracks, although only one will be constructed at present, with passing tracks opposite the old ones. The extra width of subgrade is paid for by the Railroad Company. The total amount of earth excavation necessary was about 850,000 cubic yards. The heaviest cut is a little north of the Taylorsville dam, amounting to 145,000 cubic yards. Another, north of Johnson's, amounted to 135,000 cubic yards. The two heaviest fills are one north of Picayune Creek, and the other north of Taylorsville Damsite, each comprising about 100,000 cubic yards.

The excavation was done by several methods. The heavier cuts were made by 70-ton steam shovels, the material being transported on narrow gage tracks in 4-yard or 6-yard dump cars drawn by steam dinkies. The lighter cuts were made by teams and wheeled scrapers. The intermediate work was handled by elevating grader and by small revolving steam shovels, transportation in each case being by dump wagons. The exigencies of the relocation did not permit a balancing of cut and fill. The excess in the cuts went to widening embankments. The regular road bed width is 42 feet in cut and 34 feet in embankment. The slopes are finished $1\frac{1}{2}$ to 1 both in cut and fill.

The general contract for the work of grading was let to Grant Smith of New York. It was directly

handled, however, by H. C. Kahl of Davenport, Iowa, who sublet portions to Kahl Brothers, the Vang Construction Company, and Condon & Smith. The contract price for the entire work was 60 cents per yard "unclassified." The only rock encountered was a small yardage in the heavy cut north of Taylorsville. The grading was begun in May, 1918, and completed ready for track-laying in August of this year. This refers to the new line, which begins 4800 feet north of the Miami River bridge. The raising of the grade from this point back to the yard at Leo Street in Dayton, where it begins (a distance a little short of two miles), is handled by the Railway Company and is now in progress.

The most important bridge structure on the new line, is a concrete arch (see Fig. 28) built to carry a highway which is to lead across the top of the Taylorsville dam. It is of the three-hinged, two-ribbed type, the span of the main arch being 92 feet. To secure the necessary clearance above the double track railway below, the grade of the bridge floor is elevated ten feet above the dam crest, with approach grades from each end. To keep the ribs above the clearance line, the rib center line is raised 6 feet above the crown of the roadway at the center of the arch. This makes the middle 44 feet of the floor a suspended structure. The end portions of the floor are carried upon smaller concrete arches, there being three pairs of these at each end of the bridge. These arches are carried upon reinforced concrete posts and open abutments, the two inner pairs of posts resting upon the arch ribs, making the inner arches thus spandrel arches. The total length of the structure is about 135 feet.

The other principal bridges are a 30-foot arch at Poplar Creek, a 20-foot arch at Johnson's, and a 26-foot arch at Picayune Creek, all of concrete. At

Poplar Creek and Johnson's, the structures accommodate a highway undercrossing as well as the water way. The smaller water openings are standard B. & O. concrete arches, or concrete or cast iron pipe with concrete head walls. There are 78 openings in a distance of nine miles, as against 50 in the old line, the extra number bearing evidence of the rougher country traversed by the relocation. The viaduct at Taylorsville dam was built by the Conservancy District. All the other bridges and culverts were built by the contractors.

The cost of the new line was borne by the Conservancy District, except for certain features wherein it represents a betterment of the old. Such betterments are paid for by the Railway Company. For instance, the new line eliminated 38° of curvature, representing an operation expense which, capitalized, amounts to \$18,557. The benefit to the railway by elimination of possible flood damage was

assessed at \$493,097.00. On the other hand, the new line is 100 feet longer than the old, which little distance costs the District \$4,432.00 simply for capitalization of the additional expense of operating trains over it. The extra cost of maintaining the new line, as against the old one, for the first six years, gives an item of \$83,650.00. The total cost of construction, not including tracklaying, ballasting, fencing, telegraph line or signal system, is estimated to be approximately \$825,000.

Supervision of the work for the Conservancy District has been exercised by Albert Larsen, Division Engineer, with Wm. Kramer, Asst. Engineer, in direct charge, succeeded later by W. E. Duckett, Asst. Engineer, Mr. Kramer being transferred to a similar position on the Erie and Big Four work. The interests of the railway have been in charge of Mr. A. H. Griffith, Engineer of Construction, and P. A. Callahan, Assistant Engineer.

September Progress on the Work

GERMANTOWN

During the month of August slightly over 50,600 cubic yards of embankment were placed in the dam. This brings the total for the first two months of pumping to 85,600 cubic yards. A revolving screen has been installed to separate the oversize rock from the material fed to the pumps, taking the place of the revolving grizzly formerly used. The new screen increased the efficiency of the pumping plant to such an extent that the borrow pit dragline could not dig the material fast enough to maintain continuous pumping for a full day. A hydraulic giant was therefore placed on the hill north of the pumping plant, the eroded material being sluiced directly into the hog trough. This has greatly accelerated the amount of material pumped and consequently reduced the cost per yard.

Towers have been erected in the old creek channel for obtaining the vertical and horizontal earth pressures in the dam. These towers are to remain permanently in the dam and for this reason have been heavily guyed.

The small Marion dragline has finished excavating the cut-off trench in the old creek channel and is now at work grading the slopes of the dam.

Since the earth blanket has been placed in the old creek bed the teams used for that purpose have been shifted to the spillway, where they are making fair progress.

The railroad track along the borrow pit for hydraulic embankment is being extended up the valley for future use.

Arthur L. Pauls, Division Engineer.

September 19, 1919.

ENGLEWOOD

The Lidgerwood steam dragline has continued cleaning up the river bottom and is placing a four-foot blanket of impervious material over the gravel bottom on the east side of the river.

Work has continued on the cross dam which is now at elevation 829, within 11 feet of completion.

During August 113,000 cubic yards of embankment were placed in the dam, bringing the total to the end of August to 636,000 cubic yards and showing a completion of 18 per cent. On September 6, 7,380 cubic yards of material were pumped into the dam during the 20 hours covered by the day and night shifts, establishing a record for the day shift of 3,830 cubic yards and for the night shift of 3,550 cubic yards. A booster pump has been installed on the north side of the dam at the first berm and was put in operation today. Material for the easterly end of the dam will be pumped through this booster.

The graveling of Highway No. 4 was completed the latter part of August.

H. W. Horne, Assistant Division Engineer.

September 15, 1919.

LOCKINGTON

Since the first stage of the concrete outlet structure was finished in the latter part of May and Loramie Creek turned through its new channel, the principal work at Lockington has been placing the earth fill which forms the dam. On September 1 approximately 15 per cent of the total fill had been built.

The 3½-yard Lidgerwood dragline is building the western 3400 feet of the dam. This part is comparatively low and as the material can be taken from a borrow pit extending along the north side of the fill, the work can be particularly well handled by dragline. On the other hand it would not be economical to do it hydraulically as are the other parts of the dam. The small yardage, high lift, and long discharge pipe required are all factors against the hydraulic method for building this part of the dam.

The hydraulic fill now being placed in the main body of the dam across the original valley bottom is progressing favorably. Material is being deposited by a 12-inch discharge pipe along each toe of the dam. The material on the north side is placed inside (south) of the dyke recently built by the dragline. The material from the borrow pit has proven to be very satisfactory.

Construction of the roads connected with the dam is nearing completion. About two miles will soon be open to traffic. Road No. 9 was graded during the month from Lockington to a point one-half mile north, where it joins work previously done. A concrete slab bridge was built on Road 9 over the Canal Feeder at Lockington. The culverts are built and grading is well along on that part of Road 8 west of the dam. Roads 9 and 10 have been surfaced with gravel from the stock pile which was left from the concrete work. The remainder of the pile was shifted by the Class B (1½-yard) steam dragline to positions in the outer portions of the dam, where it will form a part of the permanent fill.

The soil stripping, now nearing completion, is being done by the steam dragline, which places the soil outside the south toe of the dam.

Barton M. Jones, Division Engineer.

September 19, 1919.

TAYLORSVILLE

The Lidgerwood Dragline continues to make good progress on the outlet works excavation. The output for the month of August was considerably larger than for any previous month, due, probably, to the fact that it was working over the hump between the two submerged wiers and had only a 41-foot face to work against as compared with the 53-foot face just south of this point. Also the 3-foot to 5-foot layers of solid rock that were encountered further north, at elevation 755 to 770, have disappeared and much thinner layers are now found at this elevation.

The Marion steam shovel has completed the excavation for the new loading track around the north end of the concrete inlet, and is held here as reserve equipment for digging ballast for the B. & O. relocation. This shovel also removed all material down to elevation 789 between this track and the old loading track near center line of dam.

The Bucyrus Dragline is digging gravel ballast for the B. & O. relocation.

One stiff leg derrick has been erected for placing concrete in the outlet works and the other one is being erected. Concreting will start in about two weeks, provided the delivery of ballast to the B. & O. does not interfere too much with the delivery of gravel to the gravel plant.

The sluicing has made fair progress. The face in the borrow pit is so high (50 to 55 feet) and the material so hard, that at times it overhangs badly and makes it dangerous to keep the monitor moved up close enough for the best service. To overcome this difficulty, a well drill was placed on top of the bank, and about 10,000 cubic yards were drilled and shaken heavily with black powder. This is largely an experiment, but apparently will prove to be an economy. Our estimates, of course, will show this a little later.

O. N. Floyd, Division Engineer.

September 17, 1919.

HUFFMAN

Work on the placing of concrete in the outlet structure has progressed to such a point that it can be safely estimated that practically all of this year's requirement will have been put in by October 1st. The upstream weir has been completed and the floor and walls are completed down to the downstream weir. This weir is 30 per cent completed and the concrete apron below the weir is 50 per cent complete. This leaves about 1,500 cubic yards of concrete remaining to finish this year's work.

The electric dragline has cleaned out all objectionable material from the old bed of Mad River and has been taken across the present river channel to the large borrow pit above the dam. The machine is receiving a general overhauling before starting the excavation of material for the earthen part of the dam.

The installation of the hydraulic pumping plant has been completed except setting up the pump, which is being transferred from one of the other jobs, so that the pumping of material into the dam will be started within the next few days.

Work has been started on the building of culverts for the relocation of the Valley Pike around the end of the dam.

Contractor Geiger has completed the impervious blanket on the upstream half of the dam.

C. C. Chambers, Division Engineer.

September 17, 1919.

DAYTON

Channel excavation to date amounts to 542,100 cubic yards. A total of 385,900 cubic yards has been placed in levees and spoil banks, including 60,000 cubic yards of levee embankment on Contract No. 41. In accomplishing this a total of 931,200 cubic yards has been handled.

The D-16 large dragline has completed its work above Dayton View Bridge and at this writing is dismantled and about to move under the bridge to begin work between



FIG. 35—HYDRAULICKING DOWN HILLSIDE AT GERMANTOWN

This shows the hillside borrowpit referred to on pages 35 and 36. The earth is excavated by "boring in" at the bottom of the face of the pit with a powerful jet from a hydraulic "monitor" (seen at the left) and thus undermining the face till the material falls down; then washing it into a trench which carries it down the slope to the "hog-box," whence it is pumped to the dam. Water is supplied to the monitor by two powerful centrifugal pumps. Additional water for washing the material down the trench is supplied by a third pump. Taken Sept. 15, 1919.

that bridge and Sunset Avenue dam.

The D-19 Class 9½ caterpillar dragline has completed its work on the left levee above Herman Avenue. It has also excavated a channel under Dayton View Bridge for the passage of D-16 and is now about to begin the enlargement of the right levee above Herman Avenue.

About half the concrete in the retaining wall on the north bank of the river west of Main Street has been placed.

Scow No. 3 is being repaired in the Sunset Avenue dry dock.

At Price Brothers' plant approximately 145,000 concrete blocks have been completed, this being about 80 per cent of the number required for the work at Dayton.

C. A. Bock, Division Engineer.

September 17, 1919.

HAMILTON

The total amount of excavation for the two drag lines to September 1, 1919, was 795,000 cubic yards. The electric dragline has completed the center cut between the railroad bridge and the Columbia Bridge and will now take out the remaining cut south of the Columbia Bridge on the east side of the channel. The steam drag line has placed about 12,000 cubic yards in the levee between the Ford plant and the B. & O. R. R. and has done miscellaneous work around the Ford plant.

The work of driving steel sheet piling under the B. & O. bridge at Old River has been about 50 per cent completed. Considerable difficulty has been experienced on this work on account of the low arches giving insufficient head room for the pile driver.

Excavation on the Front Street sewer has been completed. The concrete work has been completed to the gate man-hole in the levee. The work remaining to be done is that of driving piling for the outlet section and concreting the same.

Old bridge iron, wreckage from the 1913 flood, amounting to 67 tons, has been removed from the river.

Frank McGillicuddy & Co. have completed their excavation contract north of Black Street.

C. H. Eiffert, Division Engineer.

September 20, 1919.

RAILWAY RELOCATION

B. & O. Relocation. The grading is practically completed. There remains some ditching and finishing. Roberts Bros. have finished laying the main track. The passing track will be laid by September 25. The tracklaying machine has been transferred to the Big Four and Erie at Enon.

Some ballasting has been done and it is expected that this will proceed at a rapid rate so that the Baltimore & Ohio traffic can be diverted to the new line by November 1, 1919. The ballast is gravel, obtained from the valley floor just below Taylorsville damsite.

The elevating of the B. & O. tracks south of Needmore Road is now about 50 per cent completed.

Most of the material for the right-of-way fence is on the ground and fencing will be started soon.

Big Four and Erie. All excavation in the big cut at Huffman for the Big Four and Erie and the Ohio Electric Railway is completed. The Walsh Construction Company have moved the shovel to the borrow pit near Harshman.

George W. Condon's shovel has finished its work and it is now being repaired.

Roberts Bros. are unloading track material and laying track at Enon.

The District has begun work on the overhead highway bridge at Huffman and has about 50 per cent of the false work erected.

Ohio Electric Railway. The District has finished the grading between Mud Run and Carlisle Junction. The

two draglines which were used are now being dismantled and will be sent to Dayton on river work.

All concrete work is completed.

McCann has all grading finished except a small cut at Springfield Pike.

The tracklaying and ballasting between Huffman Hill and Fairfield will start just as soon as the Big Four and Erie track work is completed.

A. Larsen, Division Engineer.

September 22, 1919.

RIVER AND WEATHER CONDITIONS

The streams throughout the valley were comparatively low during the month of August. The rainfall at the District's stations was about normal, varying from 1.90 inches at Fort Loramie to 3.38 inches at Ingomar. The number of days on which the precipitation exceeded 0.01 of an inch varied from 5 to 9 at the different stations. The total precipitation at the Dayton U. S. Weather Bureau Station was 3.12 inches, or 0.11 inches greater than normal, reducing the accumulated deficiency since January 1 to 1.52 inches.

At the Dayton U. S. Weather Bureau Station the mean temperature for the month was 71.5 degrees F., or 1.9 degree less than normal; there were 14 clear days, 133 partly cloudy days, 4 cloudy days, and 11 days on which the precipitation exceeded 0.01 of an inch; the average wind velocity was 8.2 miles per hour, the prevailing direction being from the southwest; and the maximum wind velocity was 57 miles per hour from the west on the 16th.

Ivan E. Houk, District Forecaster.

September 24, 1919.

The Conduit Forms at Englewood and Germantown

Interior Forms Built in Upper and Lower Sections Which Loosen from the Walls and Roll Forward on Casters.

By Walter M. Smith, Designing Engineer

The outlet conduits of the separate type so far completed,—those at Englewood, described by Mr. McCurdy in the last issue of the Bulletin, and those at Germantown described in the June issue—are of practically the same design. They consist in each case of two parallel concrete tubes, opening and expanding at the ends for entrance and for exit of the stream flow. The interiors of the tubes, in their present condition, are practically alike not only in design but in dimensions. At present the interior area of each single conduit is 252 square feet, the maximum width 13 feet, the length at Englewood 709 feet, at Germantown 546 feet, the maximum height at Englewood 22 feet 6 inches, at Germantown 22 feet 10 inches. At both places the conduits were built in sections about 30 feet long, the interior dimensions of all sections being the same except at the upstream and downstream ends.

Concreting was carried on in each section in five successive stages as indicated in Fig. 37, joints being introduced at each of the stages. The four joints thus introduced into the arches were for the purpose of avoiding high temperature stresses which would have occurred if fixed arches had been used. These joints made the construction of the arches much slower and more expensive than that of the walls, but this additional cost was believed worth while considering the added safety gained.

The conduits being built in a trench cut in rock, (see Fig. 37), exterior forms were not necessary except for the arches, the rock itself taking the place of exterior forms for the walls and floor.

To save expense the twin conduits were carried forward in the construction simultaneously, in sec-

tions 30 feet in length, the interior forms for each conduit being exactly similar, set side by side, and enclosed at the ends by transverse bulkheads (see Fig. 36). When the concrete of a section had set, the forms were collapsed, rolled forward 30 feet along the excavation and set up again. The forms rolled on truck casters attached to the bottom pieces, track being furnished by the already finished floor or, in the case of the upper forms, by shoulders in the lower walls. These shoulders will also furnish side support to the floor of the permanent conduits, as explained in Mr. McCurdy's article. The collapsing of the forms was really not complete collapsing, but simply slackening to detach them from the concrete, as explained below.

The Lower Forms

These are built in two entirely separate similar halves, in order to permit them to collapse free from the finished concrete and roll forward in the manner just indicated. One of the halves is shown in the lower part of the left-hand portion of Fig. 36, and the two together, side by side, in the right-hand conduit in the same figure. Each of these independent sections consists of a set of cross frames held in position by longitudinal and diagonal bracing in both horizontal and vertical planes, thus creating vertical and horizontal trusses. The horizontal trusses are required to hold the form rigid against the pressure of the poured conduit, since each 30-foot section could be held rigidly in position only at the ends.

The two sections were held together at the center by steel plates on each side of the upper and lower

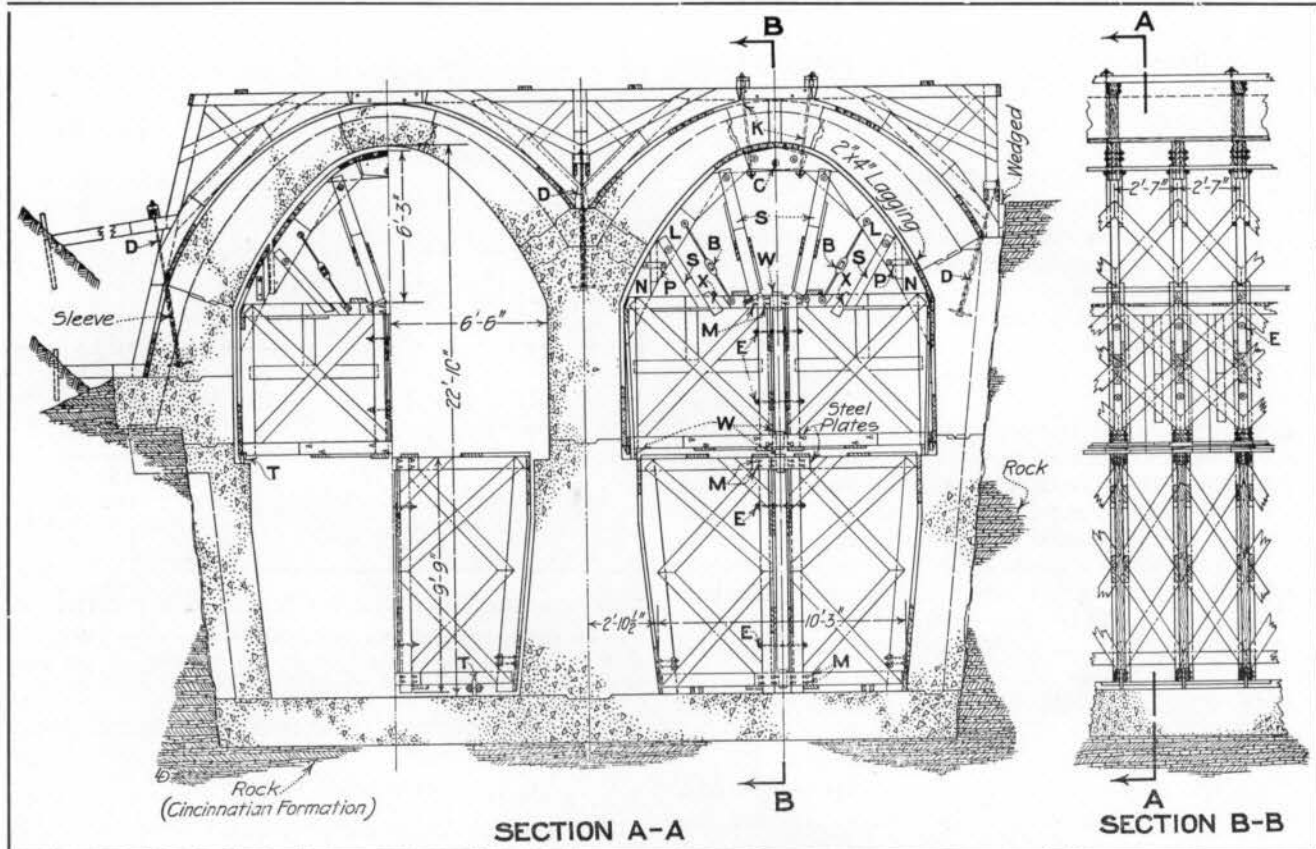


FIG. 36—CONDUIT FORMS AT ENGLEWOOD AND GERMANTOWN

chord members of the cross frames, and also by two bolts EE, through the inside vertical members of the cross frames. These bolts were threaded their entire length and had four nuts and washers each. They were used to draw the sections together when desiring to move ahead and also to force them apart when setting up in the new position. The steel plates on the chords had slotted holes so that when the nuts were loosened on bolts M the sections could be drawn together. When the forms were in position for concreting reliance was placed neither on the bolts M through the plates nor on the adjusting bolts E, but upon oak wedges, driven between the ends of upper and lower chords along the center line. (The wedges correspond to those marked "W" in the upper form.)

When the form was to be moved ahead the bolts M were loosened, the wedges driven out and the two sections drawn together a sufficient distance by means of bolts E; then raised by a set of jacks and a set of heavy truck wheels placed in position as shown in left-hand conduit. The sections were then lowered until the truck wheels rested on the floor, and the form moved ahead to the new position and set by reversing the processes.

The lagging consisted of 2" dressed pine and was not protected by steel sheathing. The forms were in fact built of wood throughout, steel being discarded as too expensive. With a little care in the selection and handling of the lagging a perfectly true and smooth surface was obtained.

At Englewood these lower forms were set up and used 22 times in succession; at Germantown 18 times, and except for the lagging becoming some-

what rough by spading of the concrete along its surface, they were still in good condition when the conduits were finished.

The weight of one complete 30-foot lower section for one conduit was 10 tons.

Upper Interior Forms

These consisted of two main parts, a rectangular part for the upper side walls and a segmental part for the arches.

The general design of the rectangular portion was similar to that of the lower forms, including the two separate halves with the steel side plates, wedges, and adjusting bolts E. There being no supports under the center, however, the side plates on the lower chord members were made 8 feet long, in order to keep this member in line. The truck casters on which the form rolled forward are indicated at T, to the left in Fig. 36.

To facilitate collapsing, the arch ribs of the segmental part of the form were built in four parts. The triangular pieces NN at the lower ends were rigidly attached to the rectangular form below. The segments LL were pivoted together at C. They were bolted together also by the bolts adjacent to C. LL and NN were connected by slotted straps PP tightened by bolts and nuts.

The weight of these parts was carried to the rectangular form below by means of the diagonal struts SSSS, the lower ends of these bearing directly upon the upper chord of the form, and the pieces LL were held rigidly in place for the concrete by forcing the lower ends of the struts away from the center line of the forms by means of threaded straps for the

two inner struts, and by wedges for the two outer ones. (See Fig. 36.)

To collapse the forms: The straps PP are loosened. The straps and wedges holding the bottoms of all four struts are loosened and the strut bottoms driven toward the center line of the forms. The turnbuckles BB are then tightened, pulling down and in on the two pieces LL, the latter turning on the pivot C, the other two pins near C having first been pulled out. The rectangular part of the form is then collapsed like the lower form, drawing the entire upper form away from the walls and down from the arch, permitting it to be rolled forward on its castors into its new position.

The carrying of the weight of the arch form by the rectangular section below necessitated the making of the latter into a very rigid truss. This was done by means of the diagonal braces shown. The arch ribs consisted of three layers of 2" plank cut to shape and spiked together, the layers interlocking where the parts of the rib were pivoted together. The interior and exterior arch forms were bolted together by the bolts KK. These bolts were removed of course to collapse the interior form.

One 30-foot section of upper interior forms weighed 15 tons, yet in many cases the moving ahead only took about eight minutes.

Both the upper and lower forms were made sufficiently long for one end to bear inside on the finished concrete of the preceding section and for brackets to be bolted upon the other end to hold the ends bulkhead. These brackets were detached and the bulkhead removed before collapsing the interior forms.

In rolling the forms forward during construction many of the truck wheels (used on the lower forms) and casters (used on the upper forms) were broken. This was due to the irregularity in the elevation of the concrete upon which they rolled. This would sometimes throw a load many times as great as was intended on the wheels or casters and break them. A special wheel and caster was then designed and no further trouble was experienced.

It will be noticed by referring to Fig. 37 that when the concrete was poured in the lower portion it was carried about 8 inches above the side shoulders to act as a guide in setting the upper forms. This was very easy to do and was very important.

The number of forms to be provided was based on the estimate that one floor section could be placed every 2 days, one lower side wall section every 3 days, and one upper side wall and arch section every 6 days. One set of lower interior and two of upper interior forms were therefore provided. One set of upper forms was planned to be set up over the first completed section of the lower portion as soon as the latter had aged 2 weeks. A second upper set of forms was planned to start when the lower forms, which began concreting at one end of the conduits, had passed the center line of the dam. In this way the upper and lower parts of the conduits would be finished about the same time. This program in the beginning was realized, but labor scarcity due to the war led to some lagging in the schedule for the upper halves of the conduits. The slower relative speed in building the arch sections was in part due

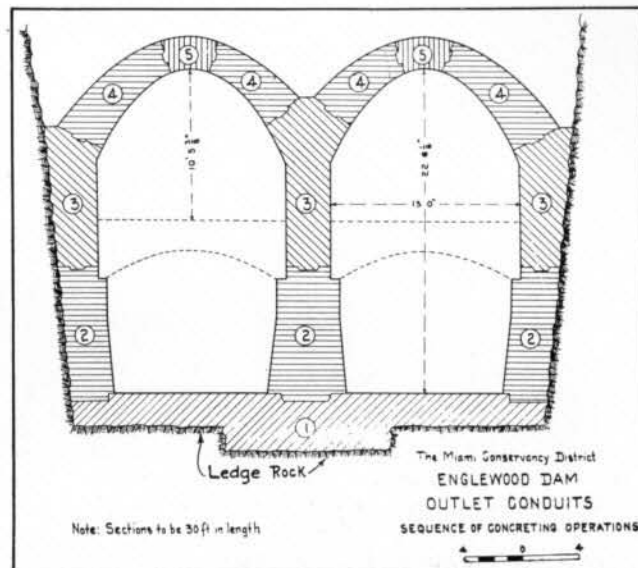


FIG. 37—SECTION OF ENGLEWOOD CONDUITS

Shows the setting of the conduits in the ledge rock, and also the five successive stages in the pouring of the concrete, longitudinal joints being introduced at each stage.

to the introduction of the four longitudinal joints into the arch design.

Exterior Forms.

The general design of these is indicated in Fig. 36. The conduits being built in deep rock excavation, exterior forms were only necessary for the arches. To facilitate handling, they were designed in three parts, one for the two inner halves of the arches and one for each of the two outer halves. The parts were held together at the conduit crowns by steel side plates in the same manner as the interior forms, except that the holes in the plates were not slotted. They were held down by bolts D along the center line of the twin conduits and along the outside of each conduit, and were rigidly held to the interior arch forms by means of the bolts K at the crown. The holding down bolts D passed through large plate washers buried in the concrete at the lower end, with a nut on the under side of the plate, and were incased in a tin sleeve in the concrete so that they might be unscrewed and taken out when there is no further use for them. The concrete surrounding these plate washers as a rule was only 36 to 48 hours old when the haunch arch sections were poured. On this account these plate washers had to be very large so that they would hold almost solely by the weight of the concrete above them, especially as nearly all of the work was done in the six coldest months when the concrete set very slowly.

After the haunch sections had set for a day the bolts K were taken out and the crown key section concreted without a top form.

After the upper interior form was moved ahead the exterior form was taken apart and moved ahead in sections, then reassembled in position over the interior form and the bulkhead forms set in position. On account of the variation in thickness of the arches, this thickness increasing steadily from the ends of the conduits to the center line of the dam (to give support to the steadily increasing thickness of the superincumbent earth in the finished dam), the same

exterior form could only be used a few times—three times at Englewood and twice at Germantown.

The cost of the forms set in position for the first pouring was about 35c per cubic yard of the concrete placed against them, less than half what it

would have been for steel forms. By taking more time and building all of the upper portions with one set of forms the price could have been reduced below 25c per cubic yard. The necessity for pushing the work, however, did not permit this.

Earth Pressures in the Conservancy Dams

Experience has shown that the feature most needing to be watched in a hydraulic fill dam is the core, deposited by the water of the pool along the middle of the structure. Being somewhat plastic in the earlier stages of consolidation, it might, unless precautions were taken, give trouble through its tendency to thrust the dam shoulders aside and flatten out, as explained later. This tendency is increased if the core is built very thick and the shoulders proportionately thin. In the Conservancy dams, therefore, the core thickness is carefully restricted.

The flattening tendency is due to sidewise pressure in the material of the core, resulting from its plasticity. If a standpipe 1000 feet high were filled with moist earth, and an opening made in the side of it near the bottom, there can be no doubt that the contents would "squash" out through the opening, flowing like molasses under the pressure due the superincumbent weight of its own mass. This sidewise flow indicates a sidewise pressure; is in fact the proof of it.

Now at the bottom of an earth dam, in the somewhat plastic materials of the core, the same sidewise pressure exists, tending to make the dam "squash" out at the base, just as a barrel of cold asphalt, with the hoops knocked off, will slowly flatten. As time goes on, the core slowly stiffens and consolidates. At all times the sidewise thrust is counterbalanced by the resistance of the upper and lower shoulders of the dam, built of gravel and sand, which act as powerful and massive buttresses preventing any possibility of movement.

The period requiring most watchfulness is naturally during and immediately following construction, when the core is most plastic, after deposition from the water of the pool. What needs to be known is the intensity of the earth pressure in the core interior, which measures in turn the side thrust, the tendency to flatten. Few measurements of this pressure have hitherto been made, and it was determined that in the Conservancy dams this lack should be remedied.

The central feature of the measuring apparatus is the "pressure cell," buried in the earth of the core at the point where the determination of pres-

sure is desired. The indicating devices are at the top of the dam, over the cell, and connected with it by small gas pipes which transmit the pressure, and by electric wires inside the pipes. The cell is a flat, hollow disc, one side of which is formed by a metallic diaphragm which receives the earth pressure. This pressure is balanced by air pressure pumped into the cell interior by a pump at the top through the pipes, the air pressure being measured by an ordinary gage. The earth pressure thus registers as directly on the air gage as the steam pressure in a boiler registers on a steam gage, except that the connecting pipe in the first case is longer. The pressure cell, buried in the dam, is virtually a diaphragm-balance, equilibrium of which is indicated by the breaking of an electrical contact carried by the center of the diaphragm, adjusted to happen just when the air pressure from the pump equals the earth pressure. An electric indicator at the top of the dam, connected with the contact point through the pipe wires, shows when the balance has been established. The air gage is read at this instant. By increasing the length of the pipes, as the dam is built up, such a cell may be made to give the pressures at any depth desired.

To make such a study complete, the pressures at all depths in the core need to be known. To secure these, cells are buried at regular intervals as the

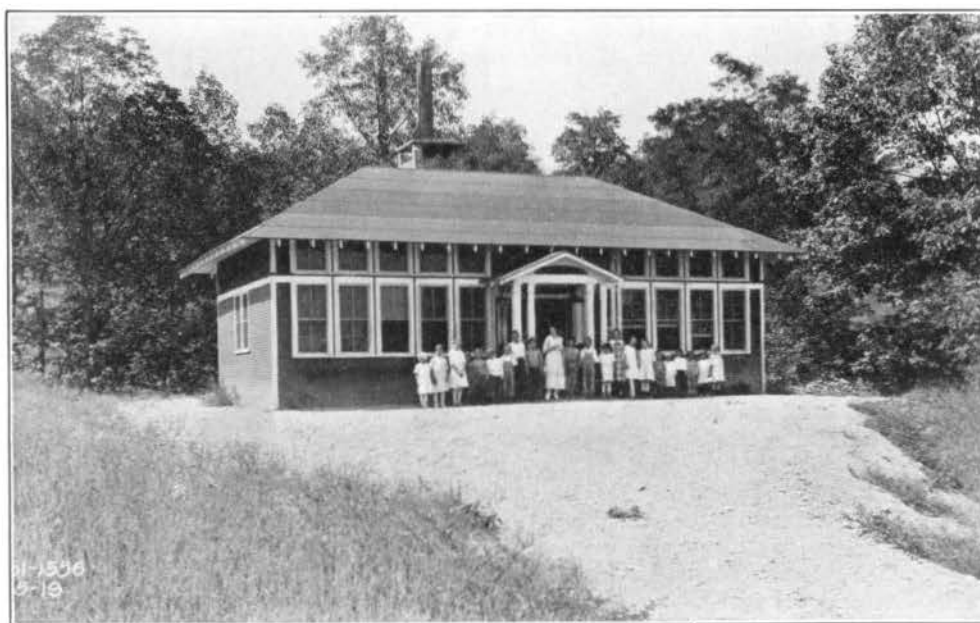


FIG. 38—CONSERVANCY SCHOOL AT GERMANTOWN

The school is pleasantly located in the edge of the woods on the hill just above and overlooking the camp. It is attractively furnished within, including a piano and a library supplied by the Germantown Camp Association. The work includes Domestic Science and Manual Training. Graduates receive the regular Ohio Eighth Grade Certificates, admitting them into any high school.

dam rises, and readings taken on all the cells. Thus a complete record will be made, giving the conditions as to pressure at all depths in the dam, and covering the entire period of construction, and also following construction. With this information at hand, as the work progresses, any corrections in the design or the construction methods can be made which may be advisable.

At the Germantown dam, the cells are suspended from wooden towers which are built up as the dam rises in height. Three of these towers are shown in figure 29, their relation to the center line of the dam being indicated by the center line trench in the hillslope beyond them. Three sets of cells are being used here to investigate the relation of pressures at the center and near the edges of the core. Similar cells will be placed in the core at all the other dams. Details regarding this work will appear later.

Elephants in the Miami Valley

By Professor August F. Foerste
Steele High School, Dayton, Ohio.

An interesting elephant tooth was found in Hamilton, Ohio, while digging a deep sewer trench, three blocks north of the court house. Three species of elephants formerly lived in the Miami valley, called the mastodon, the hairy mammoth, and the Columbian mammoth. All three ranged over wide areas on the North American continent. A fourth species, the royal mammoth, has been found only in the region of the Great Plains, from Iowa southwestward. The Hamilton tooth belonged to a hairy mammoth. It was the second tooth from the rear, in the lower jaw, on the right side, and the mammoth it came from was old. That the tooth belonged to one of the mammoths is indicated by numerous flat lozenge-shaped plates of enamel visible on the grinding surface of the tooth. That it belonged to the hairy mammoth is indicated by the closeness of the arrangement of these plates and the slightness of their curvature from right to left across the tooth. That it was a lower tooth is indicated by the concave curvature of the grinding surface. That it was the second tooth from the rear of the jaw is indicated by the fact that the number of enamel plates is 16. The rear tooth usually has 24 enamel plates, and the third from the front usually has 12 or 13 plates. The narrow end of the tooth is its front end. Its curvature to the left indicates that the tooth came from the right jaw. That the animal was old is indicated by the fact that the tooth is worn down at its front end almost to the roots.

The hairy mammoth is the best known fossil elephant. Its remains are found in Ireland and England, thence across northern Europe and Asia to Alaska, and across northern North America to the Atlantic ocean. It thus overran the entire land area of the northern hemisphere in the present arctic and temperate regions. It lived only in cold climates, during the glacial period, when the northern part of North America was covered largely with ice. To protect it against cold it was covered with a dense coat of woolly hair, the hairs two inches long. In addition to this wool there were coarse, long, stiff hairs, under the chin, on the shoulders and thighs, and under the belly, sometimes 20 inches long. Specimens of this elephant have been found encased in the ice of northern Siberia, with the meat

still fresh enough to be eaten by dogs. Parts of bodies, including flesh, skin, and hair, have been found in Alaska, but no complete specimens. So much is known about fossil elephants that large books could be written on this subject. For the present it will be sufficient to state that the Hamilton tooth came from the most common of all fossil elephants: that this species of elephant lived on the North American continent probably half a million years ago, and that it has become extinct only recently. Possibly some of the early Indians saw these elephants alive. Pipes curved into the form of elephants are known, but their genuineness as Indian relics is in doubt.

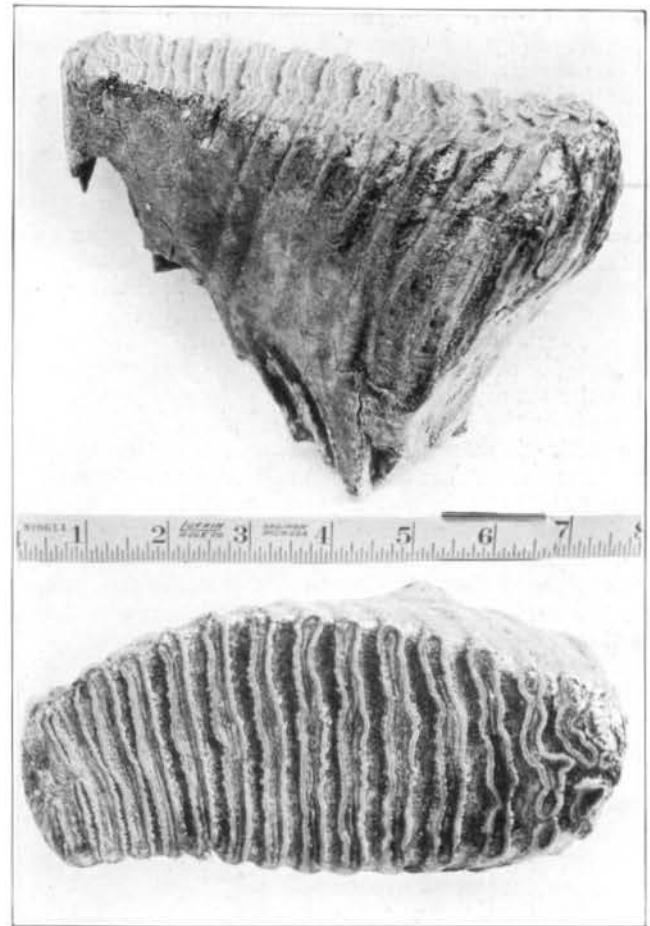


FIG. 39—TOOTH OF HAIRY MAMMOTH

The picture shows the tooth a little less than one-half of the actual size. (The rule seen is divided into inches.) It is from the right lower jaw, second tooth from the rear. The top view is shown below; the side view (as seen from inside, not outside of the animal's mouth) is shown above, the front end of the tooth, as it sets in the jaw, being at the left in the picture. Being found by itself, imbedded in gravel some distance below the surface, it seems probable this tooth was brought down from the north by a glacier. It is the actual tooth, not a petrification. On exposure to the air, it began slowly to crack and decompose, and had to be shellaced to preserve it. The cracks show plainly in the picture.

Visiting Chinese Engineers

Mention has been made before of the not infrequent visits to the Conservancy District of engineers from foreign countries who are interested in the problem of flood prevention. Among recent visitors are two young Chinese engineers who have

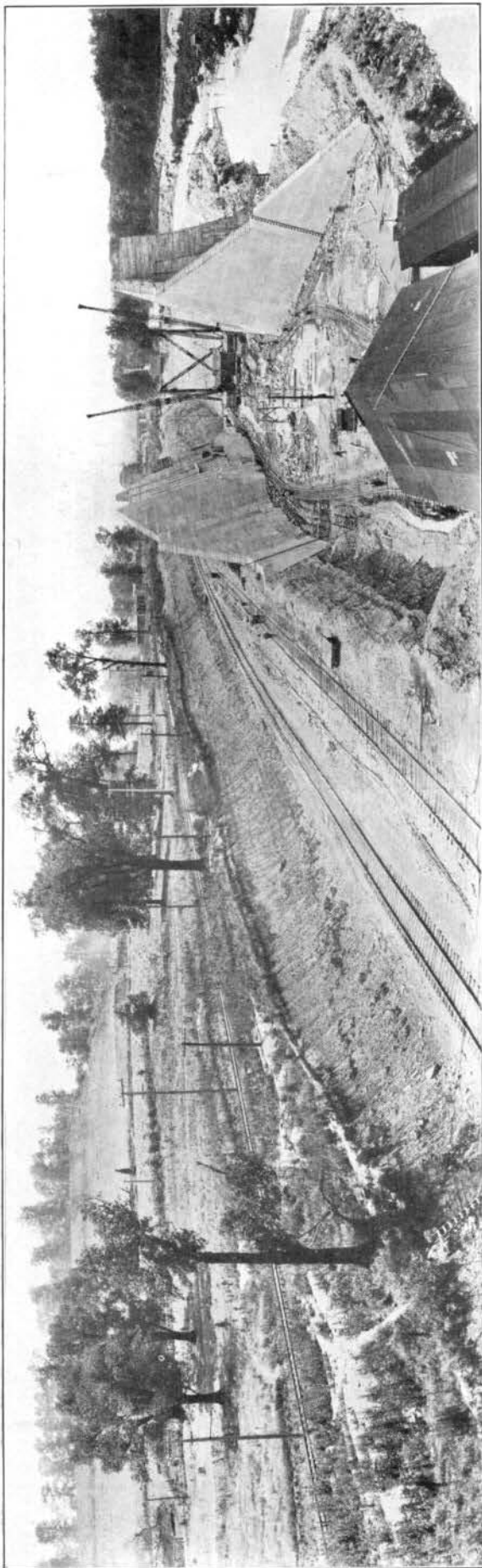


FIG. 40—PANORAMA SHOWING RELATION OF HUFFMAN OUTLET WORKS TO THE RAILWAY RELOCATION

been studying in this country and who are about to go back to their own country for service on what is probably its most important engineering project, the reconstruction of the Grand Canal. This canal is the longest, the oldest, and in future will probably be the most important in the world. It is over a thousand miles long and dates back 2500 years. It is a coastwise canal cutting across the Yangste Kiang and Hwang Ho rivers and is therefore subject to extensive overflow. The problem of flood prevention thus becomes one of the most important in connection with the great project of canal improvement now about beginning. The Chinese engineers mentioned are Messrs. H. Tan and N. Z. Zee, both of whom came to us from study in American technical schools, the former from the Massachusetts Institute of Technology and the latter from Cornell University. Their work in China will be under the direction of Joseph Ripley, Chief Engineer, and John R. Freeman, Consulting Engineer, the latter of whom has also been a visitor to the Miami Valley project.

Railways and Outlet Works at Huffman

The view shown in figure 40 is the first we have been able to print showing relation of the dam construction at Huffman to the relocation of the railway lines made necessary at this point. The view is southwest across the end of the damsite from the top of the gravel washing plant. At the right are the concrete walls of the outlet structure, built to their full height. They occupy the old bed of Mad River which was diverted to permit them to be built. The left-hand wall occupies also in part the old right of way of the Big Four Railway, which also had to be moved to permit the outlet construction. The roadbed was moved, temporarily, to the position indicated by the second track to the left of the left wall. (The first track is a construction track). The track next the Big Four is the temporary location of the Ohio Electric, which also had to be moved, its old position being only a little to the left of the old track of the Big Four. The final position of the Big Four is indicated by the heavy cut at the extreme left, this distance representing the total shift necessary to get the railway off the damsite. The Erie, which is to be shifted from the other side of the valley, (a distance at this point of about 3200 feet), will run beside the Big Four in the same cut, the two being operated together as a double track system. The final location of the Ohio Electric will be just this side of the big cut (as seen in the picture). The top of the concrete walls marks the crest of the finished dam, which will run to the left from the top of the walls until it reaches the Ohio Electric. A levee will extend up the valley on each side of the steam railways, the north levee acting also for the electric road, as a railway embankment. Near the dam, the levees rise about 26' above the steam railway tracks. They will extend eastward from the end of the dam for a distance of about $1\frac{1}{2}$ miles. It would seem natural to lift all three railways to a level with the top of the dam, making the levees unnecessary, but the already established gradients for the steam traffic did not permit this. The steam railways run through the cut at the dam 21.5 feet below spillway level.

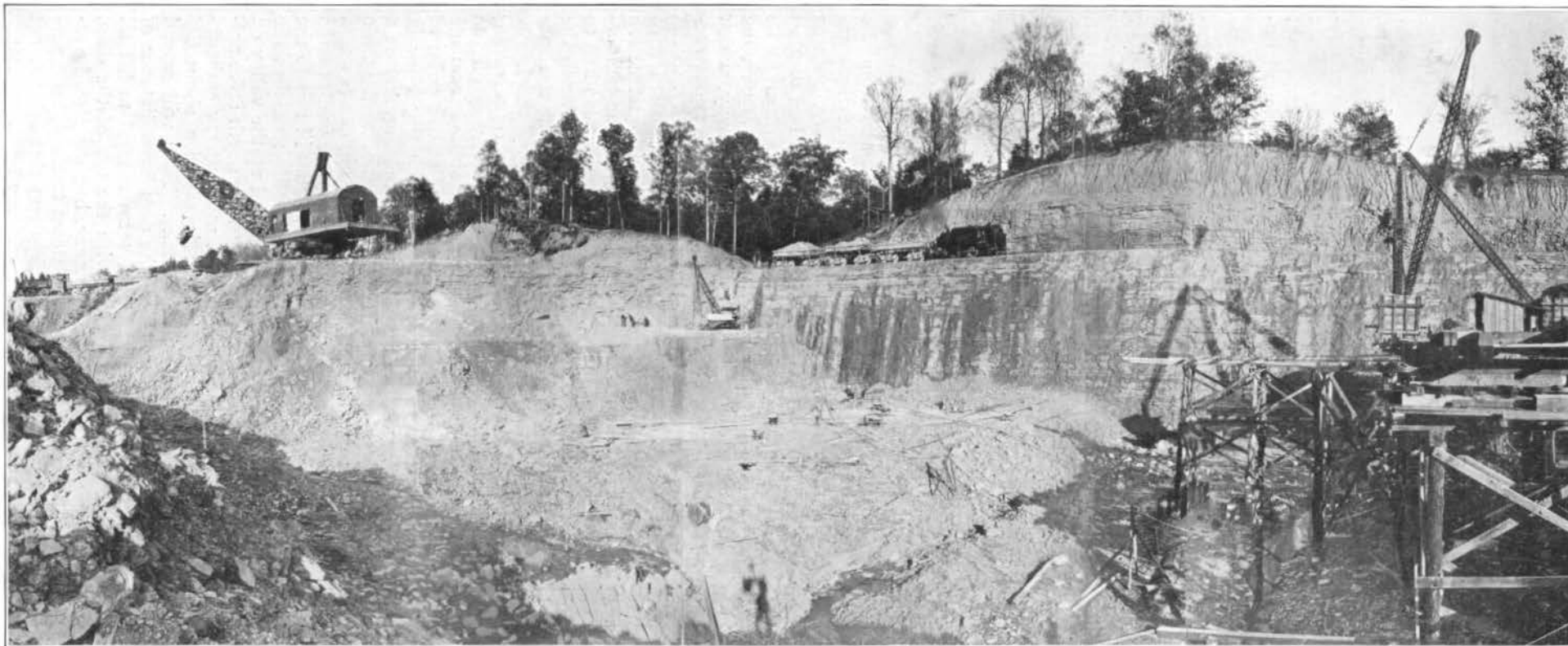


FIG. 41—EXCAVATION FOR OUTLET WORKS AT TAYLORSVILLE DAM SEPT. 24, 1919

The view is northeast and diagonally upstream, the river, just out of the picture to the left, here flowing nearly south. It shows the heaviest work of excavation at any of the dams, made necessary to provide space and foundation for the concrete structure which will carry the waters of the Miami River through the base of the dam after the latter is completed. Four tunnels, side by side, each 15 feet wide and 19 feet 2 inches high, and occupying a total space about 92 feet in width, will pierce the base of a heavy concrete cross wall located about where the dragline excavator stands in the picture. The water coming through these tunnels will flow down a concrete stairway about at the rock slope to the right and below the machine. This stairway will widen at the bottom into the hydraulic jump pool, 200 feet wide, in the middle foreground. The stilling pool, separated from the first by a high and heavy wall, will receive the water from it and pass it on to the river channel below (at the right in the picture). The flow provided for through the four tunnels, at maximum flood, (40% greater than in 1913) will be 55,000 cubic feet (about 1700 tons) per second.

The total excavation necessary will be about 845,000 cubic yards. 219,000 cubic yards of this is in rock, and is being dug by The Lidgerwood electric dragline excavator seen in the picture, equipped with 100-foot boom and $2\frac{1}{2}$ -yard bucket. The machine did the work standing on the rock shelf level it is seen to occupy (789 above

sea level). Its performance is believed to establish a record in respect of depth reached by the bucket, the lowest point of the excavation being 63 feet below the dragline mats, at elevation 726. It exceeds by 3 feet the performance of the machine at Huffman, mentioned in the Bulletin for June. The total depth of the cut, from the top of the earth slope at the right of the locomotive is 100 feet. The total length of the excavation is 2500 feet. Total depth of rock cut is 77 feet. The material is transported in 12-yard dump car trains, (two of which appear in the cut), drawn by 40-ton locomotives. The rock is used to build the upper toe of the dam; also as an extension to the lower toe, giving it weight and mass.

The rock was drilled and blasted before excavating. The heavy drilling was done by Cyclone drills like the one seen in the angle of the excavation. Ring bolts were fixed to the four corners of the drill frame and by means of four hooks and cables, which could be attached to the dragline bucket, the drills were hoisted into the air by the excavator and set wherever they were wanted, either on the upper shelf or below. Big blocks left by the shooting of the larger drill holes, and the faces and corners of the excavation, were finished up by air and Jap drills, some of which are seen at work at the left of the Cyclone drill.

The timbers at the right are the trestles supporting the two stiff-leg derricks which will handle the concrete used in building the outlet structure. One of these derricks is seen above, already erected. The concreting is now about to begin.

THE MIAMI CONSERVANCY BULLETIN SUPPLEMENT

"The News Letter"

To Promote the Conservancy Spirit on the Work

October 1919

DAYTON

To Build Smokers' Pavilion?

It is rumored that a petition is in circulation asking the Board of Directors to erect a smoker's pavilion beside the front door of the Headquarter's Office. The Bulletin editor will sign his name to such a petition in large capitals. To see one of our smokers lingering outside the doorway, exposed to wind and storm, taking a few last sad pulls at cigar or "pill" before casting the forbidden brand into the street, is a moving spectacle, which we are sure would touch the hearts if not the pocketbooks of the Board.

Miss Herbig Goes to California

It is with unusual regret that her friends and associates of the District note the departure of Miss Minnie Herbig, for several years the stenographer in Chief Engineer Morgan's office. Miss Herbig has been connected with the Conservancy project from a period before the District was formed, having entered the employ of the Morgan Engineering Company when its offices were in the Third National Bank Building, in 1914. The fact that she remained for so long in her responsible position is in itself evidence both as to her personality and the quality of her work. Miss Herbig will go to California, where she will make her home with relatives residing in Pasadena. She has resigned her place on account of her health, which she thinks the California climate will benefit. All of us surely hope so and wish that every good fortune may go with her.

Neukom Fills Position of Chief Engineer

Our colleague Neukom is much set up these days over filling the place of Chief Engineer Morgan. We refer to his position behind the steering wheel of our Chief's Buick, which Mr. Neukom recently purchased.

Stockman Heads Off Runaway

Chief Stockman, of the Traffic Division, had a warm chase recently in pursuit of a pair of fifteen hundred pound side plate castings for one of the Englewood dredge pumps. He discovered one of them in a box car at a little Ohio station, just starting back for St. Louis, after its trip from Chicago, and headed it off just in the nick of time.

L. F. Wilcock Goes With the J. E. Lowes Construction Company

The Bulletin notes with regret the departure of L. F. Wilcock, to enter the service of Mr. J. E. Lowes, Construction Engineer, of Dayton. Mr. Wilcock has been a year and seven months in the Conservancy service. His figure became familiar to almost all of us, through his long connection with Headquarters as assistant office engineer. A pleasant feature of his work there, for the Bulletin editor, was his many months of service with the publication as business manager. His many friends of the District will wish him the greatest success in his new venture, and are glad that it does not take him out of Dayton.

Organize for Web-Foot Work

A good move among the girls is the organization of the Mermaid Club, to take exercise regularly in the swimming pool at the Y. W. C. A.

D. E. Field of the Drafting Division returned on October 1 from a vacation spent with "the home folks" in Amherst and Springfield, Mass.

THE WOMAN'S CLUB

Conducted by Miss Mayme McGraw

Beginning the Day Right

Miss Winifred Stoecklein of the Purchasing Department decided a home of her own was better than a position with the Miami Conservancy District. The ceremony took place on Tuesday, September 23, at 6:30 a. m., the groom being Mr. Joseph Walsh. Miss Stoecklein is succeeded in the office by Miss Mary Nealon.

Miss Herbig and relatives, twenty-one in number, visited Englewood recently. A sumptuous meal was spread before them, not to be forgotten. Mr. Cornish proved himself an excellent guide over the work, and made it intensely interesting. The measure of our thanks to Mr. McCurdy is indicated by the remark of the youngest member of the party (four years old) after reaching home, "Let's do it every day!" It expressed the sentiment of all. Five of the same party also enjoyed a trip to Lockington, where we had another splendid meal, an interesting trip around the work, and a pleasant visit with Mr. Jones and his dear little baby girl. We appreciate the cordial welcome given us.

M. H.

Miss Helmig spent a pleasant vacation at Cedar Springs and various points in Indiana.

Miss Van Horne has returned from her vacation, which she spent in Columbus.

Miss Alexander is touring, with relatives, to Laramie, Wyoming, in a sedan motor car. She will be gone a month.

Miss Eberly has had the pleasure of entertaining guests at Huffman Dam several times recently. One of the very attractive features of these visits has been the hospitality of the people at the Mess Hall.

Miss Ruth A. Osgood of the Warehouse Office left Tuesday, Sept. 23rd, to attend school at Western Reserve in Cleveland. Her many friends, who regret her departure, wish her success in her school life.

B-larney!

Miss McGraw has just returned from a two weeks' trip to Killarney (Ireland). The voyage was smooth and soothing.

Age of Discretion

As a general thing a woman has to be about 80 years old before she realizes that no fancy waist is forth \$18.

Clairvoyant

Miss Dubbs, Miami Conservancy District, Headquarters Office; anyone wishing to have his fortune told, call Main 2903.—Adv.

Miss Plance Becomes Stenographer to Chief Engineer

Miss Herbig's place as stenographer in the Chief Engineer's office has been taken by Miss Gertrude M. Plance. Miss Plance has been with the Conservancy since July 5, 1918, coming to us from The M. J. Gibbons Supply Company. Her efficient service in the Stenographic Division has well won her the promotion she has now received, and her friends all wish and expect for her continued success in her new position.

Telegram from Bob (away on a survey job) to wife in town: "Have forgotten drawing tools; please forward at once."

Wire in reply from Mrs. Bob: "Dear Bob, do you want your triangles or a corkscrew?"

THE MIAMI CONSERVANCY BULLETIN

The Melancholy Daylets

The days are growing shorter, Bill, the nights are getting cooler; the babe, more comfy in its crib, is chewing on its fooler.

The farmers in the country, Bill, are busy with their sickles a-harvesting the yams and clams, forgetmenots and pickles.

The lightning bugs are scarcer, Bill—the snakes are growing drowsy; the hoboes on the passing freights are looking wan and frowsy.

The garden toads are fatter, Bill—the roasting ears are tuffer; the thought of coming furnace bills is making father gruffer.

The melancholy daylets, Bill, will soon be down upon us; but let's be happy while we can—we should not fret, doggone us!

—Elldce.

BOWLING

Through the efforts of the Bowling Committee, quite a novel arrangement has been perfected in connection with the bowling schedule for this season, i. e., that all six teams bowl at the same time on adjoining alleys.

It was indeed quite interesting to see thirty Conservancy "stars" toe the mark at 5:30 on the evening of Wednesday, Sept. 10th. On each Wednesday evening at this hour the six teams will clash for ten-pin honors.

It is not a great surprise to see the Warehouse team lead off easily at the head of the league, considering the showing they made last season and the addition of still stronger players this year. The other teams in the league have well balanced crews and will by no means hand the pennant to the Warehouse "rustlers" without an effort. At that the season is still young.

The Bowling Committee, F. A. Everhardt, E. B. Maltby and W. L. Sylvester, has arranged a very interesting program for the winter and last year's averages appear beaten already.

In order that the alleys may be released promptly for teams that follow, it is quite important that all players be ready to start exactly at 5:30. Failure to do this may lead to changes by the Royal management that would seriously interfere with the schedule.

Echoes from the Alley

The lead-off man for the Tee Squares—Robinson—is showing up in the alley with his fist full of wood. After the "racket" he made on the tennis courts during the summer, brow-beating Brower, this is nothing to be surprised at.

Watch out for Capt. Hall's Mekanix. After losing a battle by three pins, then coming back and winning the next by one, interesting things are bound to happen.

"Roll 'em to beat H-I-I, boys!" shouted Brower. (For the benefit of Brower's Sunday School class, we will state that the omitted letter is an "a," not an "e.")

The saddest feature of the season so far has been the absence of the senior editor and his well-known foot wear. (Cheer up—the editor says that when he gets back from his vacation, he'll be there with both shoes.)

Chandler of the River Imps has been rolling in fine form ever since the opening of the series.

Olaf!—Where art thou? Come out from under thy flivver! Thy team needeth thee!

CONSERVANCY BOWLING LEAGUE Standing of the Teams September 24, 1919

Team	Won	Lost	Pct.
Rustlers	9	0	1.000
Purpicks	6	3	.666
Mekanix	5	4	.555
Tee Squares	3	6	.333
Railroads	1	5	.166
River Imps	0	6	.000

The Railroads and River Imps have three postponed games to roll off in the near future.

Conservancy Fame Again

It seems the American Radiator Company of Chicago has also heard about us. The Headquarters office received a letter from them recently directed "Mrs. Miami Conservance," and beginning "Dear Madam," the super-scription followed by a glowing account of the American Radiator. Similar humorous errors in getting our name straight occur not infrequently in the correspondence re-

ceived; for instance "Miami Conservance." Taking our cue from the American Radiator error, we suggest "Miami" as a name for the next girl baby born to the Conservancy personnel.

Petrified Mud Turtle from Taylorsville

Opinions differ as to a curious object which has lain for several days on the editorial table and which has aroused much curiosity. Olaf Froseth, our next neighbor east, was especially interested.

"Is it alive?" he asked.

"Well, what do you think?" returned the editor.

Olaf polked a cautious finger at it and shook his head dubiously. He refused to commit himself. Some affirm that it is a Petrified Scaly-Backed Mud Turtle of the Post Pliocene Epoch, dug up out of the Cincinnati formation at Taylorsville.

Later—Olaf finally discovered it to be a sun flower gone to seed, with the stem cut off, which our friend Robinson, knowing our love of flowers, lately presented to us for a button hole bouquet.

ENGLEWOOD

Division Engineer on Vacation

Mr. and Mrs. McCurdy are enjoying a very interesting and extended vacation. With Boston as the objective they are leisurely motoring eastward, stopping at the points of interest enroute. After returning to Dayton they will again depart in quest of pleasure and recreation, this time accompanied by daughter Elizabeth and son Richard.

Later. Mr. and Mrs. McCurdy have just returned from a two weeks' motor trip to the East. Their route took them to Cleveland, thence to Buffalo on the steamer Seeandbee. Following closely the line of the New York barge canal the trip led to Albany and thence over the famous Mohawk Trail and through the Berkshires to Boston. The police strike was in full swing in the latter city, but they found perfect order maintained by the militia, which were stationed all over the city. Side trips took them to historic Plymouth and to Gloucester, famed for its fishing fleet.

The return trip was made by way of New York, Philadelphia, the Cumberland Valley, taking in the Gettysburg battlefield, Washington and over the Cumberland Mountains through Wheeling, W. Va.

Outside of Ohio the roads are uniformly excellent and no more pleasant mode of travel can be had than by motor, independent of train schedules and reservations.

They Seem to Prefer Marbles

The warehouse team is ready at "any time" to play "any team" in the league for "marbles or dough." Such was their defiant challenge in the September Bulletin. Can their manager possibly have forgotten Englewood's challenge to play for dough without the marbles? Perhaps the cold weather has affected the feet of the warehouse manager and players.

Purchasing Agents See Englewood Dam

Thursday evening, September 11, a group of purchasing agents representing the larger industries of Dayton visited Englewood, viewing the dam and camp, after which they dined in the Mess Hall.

First Movies of the Season

Young and old gathered in the Community Hall Thursday evening, September 11, the attraction being a three-reeler. Our camp manager promises us a steady supply of entertainment this winter, trusting that the camp residents will continue to show the interest and enthusiasm demonstrated at the opening event.

Another Reason Why Englewood Leads the March

We took a quick start September 8, Miss Quick in the Mess Hall and Mr. Start on the Dam.

Score Another for Englewood—Easley's Vaccinated Ham!

Stop in at the hog pen some Sunday morning and learn a few things about meat conservation. Modie Easley says "the hogs just simply must be vaccinated and no one else will do it."

Wald Goes to Briar-Hopper State to Get Married

Albert Wald, office timekeeper, was married September 16, 1919, to Helen Cahill of Newport, Ky. After an extended honeymoon through the south Mr. and Mrs. Wald will live at Riverside.

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.....	Mrs. C. C. Chambers
Hamilton.....	R. B. McWhorter
Dayton.....	Miss Mayme McGraw

Movies of Conservancy Work

The Lecture Room of the N. C. R. has begun taking a series of moving pictures which, when completed, will illustrate all the characteristic features of the construction work of the Conservancy District. In connection with the pictures, Mr. C. E. Bratten, head of the N. C. R. Lecture Bureau, is preparing a lecture in explanation.

He is doing an unusually thorough job in study of the engineering features of the work, as adapted to a movie talk or lecture, and has prepared an excellent preliminary sketch which will be further elaborated. The staff of the District, including naturally Messrs. Matthes, Neukom, and the Bulletin editor, are co-operating, and we believe the results will be interesting to the public and especially to the Conservancy workers themselves. The camera work is under the direction of Mr. Gilbert, the N. C. R. photographer. Pictures have already been taken showing the big Dayton dragline, digging up a Miami river island, complete views of the hydraulic fill work at Germantown, and the steps of the concreting operations at Huffman, from the borrow pit to the concrete forms. More pictures are to be taken. When you see a "machine gun" outfit bearing down on you, setting up and unlimbering for action, you will know what it means.

Inauguration of New Editors

Brother Brower of the Purchasing Division, came breezing into the Bulletin office the other day, full of pep from his vacation, which he spent in Columbus with his family. He and Stockman have agreed to edit the Bowling League column for the readers of the Bulletin, with the aid of the League Committee, Messrs. Rogers and Earl Maltby. The fans will find that our new associates can roll 'em down with the editorial ink bottle as well as with a ten pin ball.

Prize to Junior Editor

The Bulletin editor hereby offers a prize of the value of three dollars to the pupil in the Conservancy schools who submits the best short article or essay offered for publication in The Bulletin during the coming year, the award to be made by a suitable board.

Two Engineers Leave

Two of the engineers of the Englewood job have given up their positions to take up new activities in Illinois. Mr. Southworth having accepted a position with the Illinois Waterways Commission at Chicago and Louis Hills with the State Highway Department of Illinois. We regret their departure and wish them success in their new activities.

Riverside to Annex Englewood

On September 12 the Riverside Community Association called a meeting to take up the matter of annexing the town of Englewood. It was decided that when Englewood completed repairing the main road and the one side street, that the annexing would be given more consideration.

GERMANTOWN

A farewell party was given at the school house recently in honor of Mr. and Mrs. MacKinnon, who will move shortly to Englewood. Mr. MacKinnon having been transferred to that place as Camp Overseer.

The school here opened on September 2 in charge of Miss Darnell, of Manchester, Ohio. The Camp extends a hearty welcome to Miss Darnell and wishes her much success in her work.

A farewell party was given Mr. and Mrs. Austin Philpott. We regret very much to see them leave. Mrs. Philpott served on the Social Committee here and will be missed greatly. They are moving to Ada, Ohio.

OUR JUNIOR EDITORS

Taylorville

Taylorville School. The Taylorville school has improved very much. We have two teachers, also new blackboards, two recitation benches, and a new curtain. Miss Floyd is teaching from the first to the fifth and Mr. Floyd is teaching from the fifth to the eighth. The boys in school are planning on playing ball with Vandalia next Friday. The Domestic Science and Manual Training are going to start as soon as we get the place fixed.

Agnes Hinton, Seventh Grade.

Domestic Science. School girls are going to have domestic science in the garage this year. We will have it twice a week, on Tuesdays and Thursdays. On one day we will have sewing and fancy work and the next time we will have cooking.

Miss Floyd will be our teacher. The children from the fifth grade on will take it, but it depends much upon their size and capabilities.

The room is 10x20 feet and is equipped with steam and electricity.

Hazel O'Neal, Seventh Grade.

Manual Training. The new manual training room is about completed at Taylorville and the school boys are eager to participate in the learning of manual training.

The room is built in the garage under the Community Hall, and it is a 10x20 foot room.

It is a well-lighted, well-ventilated room containing the tools and necessities needed.

Albert Proteau, Sixth Grade.

Germantown

Our First Entertainment. One rainy afternoon a small entertainment was given by the school children. Though the day was dark and dreary, all was sunshine in the schoolroom.

The first number on the program was the song "Sunshine and Rain." A reading was then given by little Robert Wehrly of the Primary Department. The next number was a vocal solo by Mary Marcelletti which was enjoyed by everyone. Kenneth Wehrly gave one of Eugene Field's popular poems, "Wynken, Blynken and Nod." An interesting playlet, entitled "The Camp at Valley Forge," was given by the pupils of the Fifth Grade. The closing number was a song by the school.

Martha Hancock, Seventh Grade.

Our First Domestic Science Work. We have decided to have our Domestic Science classes on Wednesdays and Thursdays.

On Wednesday we will have sewing, and we are planning to make most of our Christmas presents. We are always glad to see Thursday come, because that is the day for cooking.

September 11 we baked sugar cookies. On September 18 we baked biscuits. After the biscuits were baked we served a light lunch.

We had better luck this year than last year with the oven. A few more lessons and we will be the chief bakers of our household.

Elizabeth Stewart, Sixth Grade.

Englewood

Our School.—We have three study rooms. Our great big study room has a fireplace in it. We have four blackboards in our big school. We have a library leading out from our study room, and leading out from the library is the girls' Domestic Science room. We have a great big porch and we study out on the porch. Leading out from the back porch is the boys' Manual Training shop. When it is too hot to make a fire in the furnace, we have it in the fireplace.

Louise Knerr, Fourth Grade.

Our Bird Picture Gallery.—We have a Bird Picture Gallery at one end of our school porch. It is very interesting. In it there are about forty-five pictures of birds. We are going to have a Bird Contest soon to see who can name and write the names of the most kinds.

Chester Patrick, Seventh Grade.

THE MIAMI CONSERVANCY BULLETIN

Our School Grounds—We have a very attractive school house with shrubbery all around it. There are over twenty kinds of trees in our grounds. In the school grounds are five swings, one tennis court, one merry-go-round, three see-saws and a croquet set. Our teacher is real nice, because she lets us have such grand times.

Isabel Williams, Fourth Grade.

Our Library—Our school library has two bookcases and a magazine rack made by the manual training class. One bookcase is for text books and reference books, and the other is for story books. In the middle of the room is a reading table, and on one side there is a piano. There are some pictures by Corot, among them "The Gleaners" and the "Angelus." Then there is a door leading off on a cement floored court with an urn in the middle with different colored plants in it. It is a room we like to be in after studying.

Clarence MacKinnon, Seventh Grade.

TAYLORSVILLE

The following residents of the camp have been away on vacation during the month of September: Mr. and Mrs. O. N. Floyd, Mr. Daubenspeck, Mr. and Mrs. Tizzard, Mr. and Mrs. Fred Meyer, Mr. and Mrs. C. Z. Miller, and Mr. Maisel Floyd.

Mr. and Mrs. Swenson are the happy parents of a fine baby boy, born Sept. 10. Mother and baby are both getting along well.

Mr. F. E. Floyd and sister, Miss Opal and mother moved to the camp recently. Mr. Floyd is the new Camp manager and he will also devote part of his time assisting Miss Floyd in the school work.

No social gatherings were held during the month, but plans are being perfected for having moving picture shows and other entertainments weekly, during the fall and winter months.

Religious Work

On September 7 the Rev. Lefever of Dayton preached an interesting sermon in Community Hall.

The Rev. Julian P. Love of Dayton conducted religious services on the afternoon of Sunday, Sept. 28.

The Sunday School has started to raise a special fund for Missionary work by reserving the entire collection on the last Sunday in each month for missions.

The Propoganda League

As the outcome of a discussion as to which Conservancy job is receiving the most publicity through the columns of the Bulletin, one of the Taylorsville Boosters delved into the back numbers of said monthly to settle the argument. The results of this investigation are extremely interesting and illuminating to say the least. The number of pictures and diagrams accredited to each job up to and including the September issue are as follows:

League Standing

Dayton	28
Germantown	26
Hamilton	23
Huffman	20
Lockington	20
TAYLORSVILLE	18
Miscellaneous	15
Railroads	7
Shop	4
Englewood	47

The low standing of Englewood came as a big surprise to everyone.

HAMILTON

H. B. Linden, operator on the electric dragline, has returned to duty after spending a pleasant vacation in the West.

Nelson Messner, transitman on the survey party, has returned to work after an illness of several days.

Jimmy Rains, son of Supt. W. T. Rains, spent the latter part of the summer with his uncle in New York state. He returned to Hamilton recently to enter school.

Miss Lois Faist, daughter of Office Engineer John E. Faist, left for Oxford September 15, where she will enter Miami University.

Thomas Bowen, operator on the electric dragline, who suffered an injury to his hand several days ago, is again able to take his place on the job.

The Hamilton Bowling team is being reorganized, and the regular weekly meets will start October 1.

Frank E. Davis, draftsman, was away on a two weeks' vacation this month. During this time he and his family enjoyed several of the interesting places in Cincinnati.

Supt. John D. Allen and family have returned to Hamilton. They motored to northern Michigan and to Canada, and report a most pleasant vacation.

We all extend our sympathy to Mr. and Mrs. Marshall Agnew, who had the misfortune to lose their infant daughter this month. Mr. Agnew is operator of the gasoline locomotive on the sewer work.

Frank McGillicuddy & Co. finished their excavation contract September 22 and are preparing to leave Hamilton. Our best wishes go with Mr. McGillicuddy.

HUFFMAN

Wednesday evening, Aug. 20, Mr. and Mrs. Ben Rogers were host and hostess at a dinner party at the Miami Hotel in honor of Mr. Ray Clawson, guest of Mr. and Mrs. Verne Clawson.

August 28 Mrs. L. C. Zull entertained at her home in honor of the Misses Julia and Sara Darnell, teachers for the present school year at Germantown and Huffman.

Messrs. Clawson, McMillan, Schertzinger and Pauls were in Cincinnati on the 14th getting a first-hand line on the Reds for the coming World's Series. It is rumored that the lines they left in the little Ohio River town were also "red."

Mr. and Mrs. Mark have moved from Huffman to Westerville, Ohio, where Mr. Mark has accepted a position as manager of a large farm. The Huffman Sunday School presented Mr. Mark with a handsome watch chain in appreciation of his splendid work as their first superintendent. The success of this school during the past year has been due very largely to his untiring efforts and faithfulness. The Mark family will be missed in camp more than we can tell. They were always good neighbors to everybody and gave a helpful hand to all those things that make Huffman an enjoyable place to live in.

About twenty-five of Mr. Clawson's friends helped him celebrate his birthday, August 22, with a picnic supper at Triangle Park, followed by dancing at the pavilion.

Mr. Maynard's father and mother recently spent a week with him in camp.

The friends of Mrs. Hodge were grieved to hear the news of the death of her mother at Evansville, Indiana. The entire camp extends its sympathy to Mrs. Hodge.

The stork visited Huffman on September 7, leaving a baby girl with Mr. and Mrs. John Nance.

Three in One

Mrs. T. C. Shuler entertained the Sunshine Circle at her home on Edgewood Avenue, September 10. This date happened to be the second birthday for little Leeta Jane Shuler; also the nth birthday for Mrs. R. M. Mark. These two were the honored guests for the day, and the adult members showered Mrs. Mark with handkerchiefs, the junior members presenting Leeta Jane with a handsome doll carriage.

Mr. and Mrs. Lutjoltz and son of Knightstown, Ind., visited with her sister, Mrs. C. C. Chambers, August 22 to September 2.

Mr. Gena terms the return of his wife and baby as a change from a period of existence to a period of living. Mrs. Gena and Mary Frances have spent the summer with Mrs. Gena's parents in eastern Pennsylvania.

The ladies of the camp entertained the men at a wiener roast and camp supper in the grove on top of the hill, on September 17. After an abundance of eats the crowd gathered around a big camp fire, sang songs and told stories. It was a jolly good time, but as this report is being sent the next morning after, the doctor has been too busy to give us a reliable bulletin on the condition of some of the hungry ones.

Why We Couldn't Keep Miss Rahm

The following, received by Mr. Chambers, is self-explanatory:

"Mr. and Mrs. John C. Rahm of 34 Cotton Street (Leominster, Mass.) announce the engagement of their daughter, Lillie D., to Edmund F. Garland of 21 First Street."

We congratulate the young man, who, we understand, is an ex-"doughboy."

It is Miss Goss' turn next.

THE MIAMI CONSERVANCY BULLETIN

NOVEMBER 1919

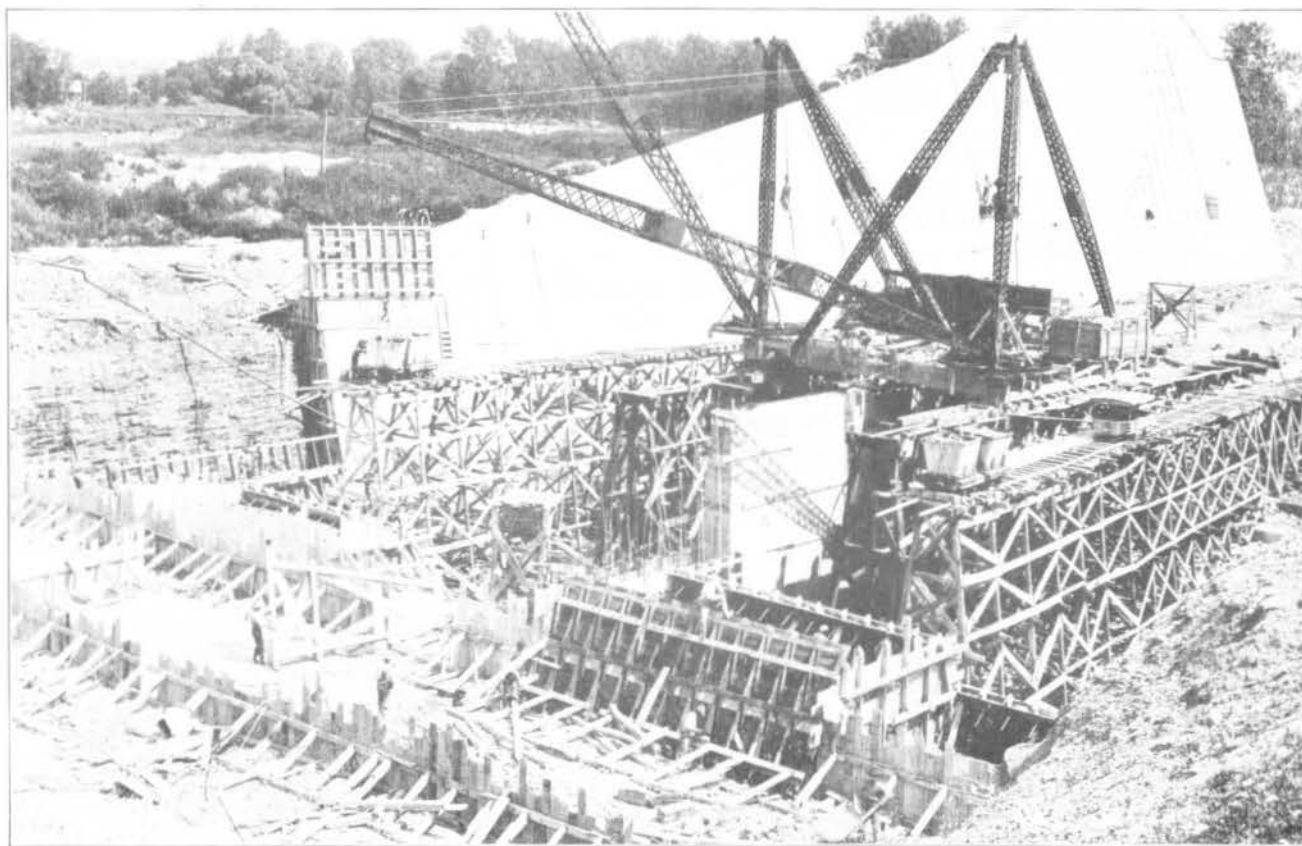


FIG. 42—BUILDING THE OUTLET STRUCTURE AT HUFFMAN DAM, AUG. 15, 1919.



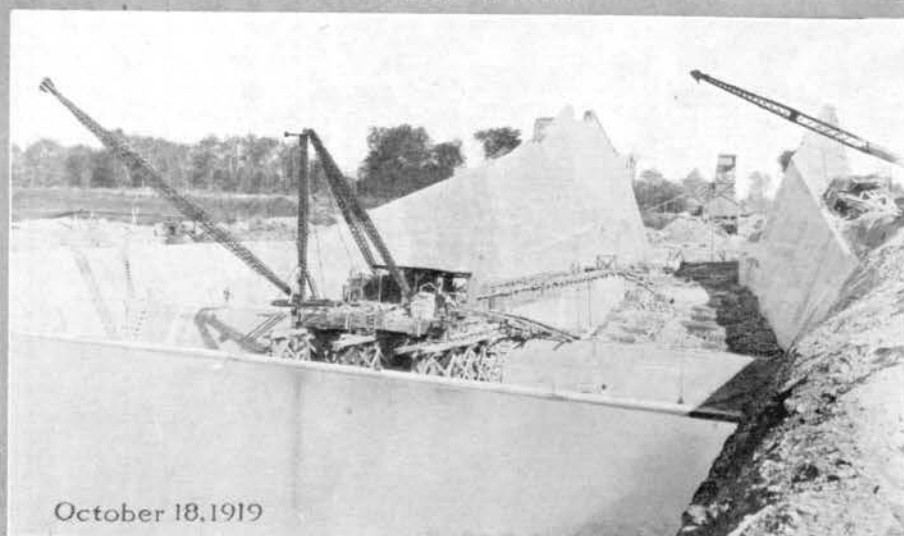
January 16, 1919



March 7, 1918



October 18, 1919



October 18, 1919

FIG. 43—A RECORD OF PROGRESS AT HUFFMAN DAM OUTLET WORKS.

The two left hand views were taken from the top of the gravel washing plant, looking down stream, and show the progress made during the past nine months. The two right hand views show the same locality, but look upstream. The changes that have taken place at Huffman in a year and a half as revealed in these two pictures, are truly remarkable. The upper right view shows the Big Four Railroad track at the left and the Ohio Electric Railroad track at the right, as they existed originally. The lower right hand picture is taken from the same spot, and covers the same field of view, except that the camera should have taken in about one inch more on the right to match the picture above.

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THE MIAMI CONSERVANCY BULLETIN

PUBLISHED BY THE MIAMI CONSERVANCY DISTRICT
DAYTON, OHIO

Volume 2

November 1919

Number 4

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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.

Second Annual Conservancy Assessment

The Taxation Department of the District has just finished the Tax Duplicate for the collection of the second annual installment of the Conservancy assessment. The preparation of this annual duplicate requires between six and seven months, and represents the combined labor of about fifteen persons. Triplicate copies of thirty tax duplicates have to be prepared and made ready for the bindery. In addition, forty-seven bound volumes of Tax Receipts to be used with these duplicates have to be filled out. The fifty thousand odd calculations involved were made on two Monroe calculating machines and two adding machines. These were in constant use for a period of five months. Four columns of figures are carried on each page, and each column must balance before the page is passed.

Three weeks were required to complete the delinquent tax records, and have them ready for the bindery. The penalties were all calculated and carried forward in proper columns as of August 31, 1919. These records, which also have just been completed, present some remarkably favorable figures. Out of the total collection for the year in Montgomery County but 1.98 per cent has been returned as delinquent, and of this amount only about one per cent remains delinquent as of October 1, 1919. Butler County with 1.42 per cent, Warren County with 0.85 per cent and Miami County with 2.41 per cent, is the record of the other counties. The average rate of delinquency for the entire District is 1.8 per cent. To those familiar with the collection of special assessments on the general tax duplicate, this is a remarkable showing. Such collections fre-

quently run as high as 10 or 12 per cent delinquent. The result in this case is therefore all the more gratifying. The total collection for the past year was about \$1,800,000.

All tax records relating to the 1919 collection of taxes are now completed and filed with the proper county officials. These collections start on December 20 of this year, and end June 20, 1920. The rate this year is 5.6 per cent of the total assessment, as against 6.8 per cent last year, the decrease being due to the fact that the interest requirements are not quite as heavy as a year ago. When the balance of the bonds of the District are sold, the rate will be about the same as last year.

J. E. Feight, who has had general charge of the operations of the Taxation Department since April, 1918, directed the preparation of the 1919 tax records, assisted by James Shine, chief clerk.

Concrete Block Paving for Dayton Levees Started

A beginning was made October 16, with the placing of flexible concrete block paving along the Miami River at Dayton, just below the Island Park Dam. Here a strip about 400 feet long will be paved over a width of 30 feet along the toe of the east levee, to protect against erosion by the water coming over the dam during high stages. Downstream from this strip, the block paving is to continue over an additional 450 feet, but only 10 feet wide. The levee slope above the block paving is to be protected by a concrete slab revetment.

The flexible concrete block paving and the manner in which it is fastened together by means of galvanized cables is described in the August issue

of the Bulletin. Figure 133 in the May issue shows the extent and location of concrete protection for the Dayton levees.

Price Brothers, who have had the contract for manufacturing the concrete blocks, completed their work the latter part of October, with a total of 180,000 blocks made.

Progress on the Outlet Works

The completion of the concrete outlet works at Huffman Dam on October 4, marks another mile post in the progress of the Conservancy construction program. The outlet works at four dams are now completed. To be accurate, the structures have been completed as far as the safety of the earth dams under construction now permits. As built, they possess ample capacity to pass flood waters, and safeguard the unfinished earth structures against being overtopped. When the latter reach a safe height, the remainder of the concrete will be placed and the discharging capacity of the outlets reduced to that called for in the Official Plan.

On October 17, the first concrete was placed in the Taylorsville Dam outlets. The heavy rock excavation necessary at the site of this structure has been responsible for its late start. Fig. 44 shows the first buckets full of concrete as they arrived on the job ready to be poured. *

The Huffman outlet works and their construction are described in detail in this issue. The relocation of the railroads and highways made necessary by the construction of this dam was one of the more complex problems that had to be solved. Its solution, which has remained a puzzle to many, is clearly brought out in the drawings, Figs. 48, 49 and 50.

Conservancy Cases in Butler County Disposed Of

The 43 Conservancy cases in Butler County, resulting from appeals taken from the amounts of benefits and damages fixed by the Board of Appraisers, have practically all been disposed of. There were only four appeals from damage appraisals and these were readily adjusted some time ago to the satisfaction of both the owners and the District. The remaining 39 cases related to benefits. Only four of these were actually tried out before juries in Judge Harlan's Court of Common Pleas at Hamilton. In each instance the finding of the jury was for the exact amount of benefits fixed by the Appraisers. On October 27, Messrs. Boyd and Burke, attorneys for the property holders, withdrew 15 cases, which added to the 17 cases previously withdrawn by them, made a total of 32 cases dismissed up to date. It is confidently expected that the remaining three cases will be similarly disposed of in the near future.

The Miami Conservancy District is represented by Attorneys W. C. Shepherd and John Neilan of Hamilton, and Ben. Harwitz of Middletown.

Mud as a Fertilizer

So much interest is centering at the present time in the sale of the lands owned by the Miami Conservancy District in the five retarding basins, that it has seemed opportune to call attention in this issue to the increased fertility that is bound to result from the overflow that will take place in after years when

the dams are in operation. The office of the Farm Division, at the headquarters building, has found it a big task to furnish information to all those seeking it. Some inquiries about lands were received lately from points as remote as Louisiana and New England. The Farm Circulars, mentioned in a previous issue of the Bulletin, are proving of much assistance in disseminating information, especially to parties in distant localities. The article in this issue on the value of river mud as a fertilizer, reviews at length the contents of Circular No. 2, which has some interesting facts in it not generally known.

Visit from Australian Engineers

Two noted Australian engineers visited the Conservancy District during the month. They were W. Farrow, general manager of the underground railway system and terminal station being built at Sydney, Australia; and A. Farrow, also of Sydney, who has the contract for the enlargement of the Murrumbidgee Irrigation works. This latter project extends over a distance of 68 miles and involves the moving of 4,000,000 cubic yards of earth. Mr. A. Farrow was particularly interested in our use of dragline excavators, which he thinks will be adapted to his work. Both men had read about the work being done by the District in the Conservancy Bulletin, before they left their native shores.

Progress Reports for Work at Smaller Cities

The activities of the Department of Engineering and Construction at the smaller cities in the Valley, have increased lately to a point where it will become of interest to print in the Bulletin the monthly reports of progress at the various localities. Beginning with this issue, there will appear regularly reports by F. G. Blackwell, Assistant Engineer, covering the work at Miamisburg, Franklin and Middletown. As soon as the operations now being started at Troy are under way, monthly reports for that locality will be supplied by E. W. Lane, Assistant Engineer.

A Heavy October Rainfall

The rainfall of October 26 and 27 amounting to from one and a half to two and a half inches over the Miami Valley, caused rises of from two to six feet in the various streams. However, no damage was done to any of the construction equipment or to any part of the flood protection work of the District. The absorptive condition of the soil, at this time of the year, prevented a rapid runoff. Higher stages would have resulted had this rain fallen in the winter or early spring on saturated ground.

China Has Conservancy School

Word comes from the president of the University of Nanking, China, advising that his institution has a "Waterways Conservancy Engineering School." He requests that the Miami Conservancy Bulletin be sent regularly to the university library. This is the third Chinese school of learning that has sent for literature published by the District. The establishment of a conservancy school at Nanking is indicative of the nation-wide importance which attaches to the reconstruction of China's inland waterways. The Grand Canal, alone, presents a stupendous problem.

The Value of River Mud as a Fertilizer

How River Mud, the Greatest of all Fertilizers, will Benefit the Lands in the Retarding Basins.

The great value of mud or silt as a fertilizer when deposited on overflowed lands by floods, has not in this country received the recognition that it has in the older civilized sections of the globe. The reason for this is obvious.

When our forefathers began farming in the New England states, they found a virgin soil. As time went on and civilization spread southward and westward, the fertility of the American farm became proverbial the world over, and excited the wonder of the peoples of Europe, where the soils will yield crops only in return for thorough fertilizing. With characteristic American profligacy we have tilled our soil and reduced its productivity until we also find it necessary to apply fertilizer, and do all those things which nowadays are recognized as indispensable to prevent the soil from becoming impoverished. Stable manure is the best fertilizer the farmer can use, but he never can get enough. Leguminous green manure crops and mineral fertilizer must eventually make up the shortage. But the purchase of mineral fertilizer and the use of land to grow green manure are both expensive, and although in the end the consumer must pay the cost, nevertheless, any farmer who can avoid this expense, in whole or in part, possesses an advantage over the farmer who can not. In some of our southern states, this summer, the cost of fertilizer constituted nearly twelve per cent of the price paid the farmers for their cotton.

The only lands known which have been maintained in fertility despite years, sometimes thousands of years of continuous cropping, without the artificial application of fertilizing materials, are those which are subject to periodical submergence by the flood waters of a silt-carrying stream.

Probably the most historic thing of its kind in the world is the cultivation of the delta lands of the Nile River, kept fertile by the annual overflows. Here crops have been grown without any fertilizer other than that left by the river, not only for a few paltry thousands of years, but for nearly 20,000 years and possibly longer.*

The mud deposits of the Nile have in the course of time grown to an enormous thickness. Remains of some of these earliest agriculturists and of some of their pottery have been unearthed at the southern apex of the Nile delta at depths of seventy and more feet below the present surface level.

In the United States, in a few localities, farmers have not been slow to reap the benefits of river deposits left on their lands by overflow. In the Miami Valley the Ballentine Farm, about a mile southwest of Franklin, Warren County, Ohio, is an interesting example. This farm, according to Mr. C. F. Thirkield, of Franklin, has been owned by his family for over a hundred years. A field of about eighty acres in the southwest corner of the farm, where Clear Creek empties into the Miami River, has the astonishing record of having produced on an average of 75 bushels of corn to the acre for the last 56 con-

secutive years, without requiring artificial fertilizer of any kind. This ideal condition is directly attributable to the fact that the Miami River goes out of its banks almost every year, either in January, February or March, and covers this field for a few days, leaving upon it a small silt deposit containing the very elements essential to corn production. During sixty years Mr. Thirkield recalls but once that any damage whatever was done to a crop by a late flood; and even in that instance, by replanting in June and hogging off in the fall, the field still showed a handsome profit.

East of the 80-acre field is a smaller tract, lying much higher, which was never known to be overflowed till the big flood of 1913, when it was submerged. This latter field has been handled in the ordinary way, receiving its share of farm manure and its periodical meal of fertilizer; it had been rotated in corn, wheat, clover, etc., and returned in yields just the ordinary expectation. After the 1913 flood this field was planted in wheat — and the "wheat grew so rankly it fell over and was almost impossible to reap. It has yielded 35 bushels of wheat per acre since."

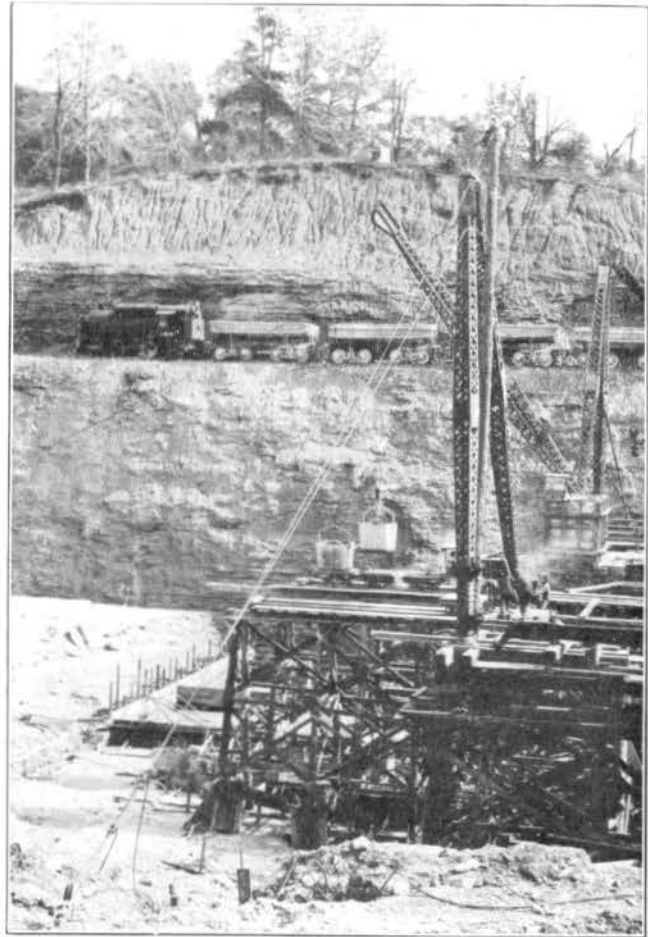


FIG. 44—TAYLORSVILLE'S FIRST CONCRETE

This shows the first buckets full of concrete going into the foundation of the outlet for the Taylorsville Dam, at its extreme downstream end, where the structure is 206 feet wide between rock faces. October 17, 1919.

*The Origins of Civilization, by Prof. James H. Breasted, The Scientific Monthly, October, 1919.

Many other similar instances are on record in the Miami Conservancy District.

In order to focus attention on the great value of river mud, as a fertilizer, the Miami Conservancy District has recently published Farm Circular No. 2 entitled "The Beneficial Effect of Backwater Overflow on Agricultural Lands." This pamphlet, the second of a series of circulars issued by the District in connection with the sale of the 30,000 acres lying within its retarding basins, will prove of special interest to prospective purchasers of these lands. Much of the information contained in it was brought together from various sources, principally foreign ones, by S. Graham Smith, head of the Farm Division. The following, in part has been taken from the Circular:

The effect on the productivity of the lands overflowed within our retarding basins may be estimated from the experience in Europe with backwater above retarding dams, and from the history of overflow along streams both here and abroad.

In Europe retarding dams have been in use a long time. About the year 1711 there were built on the head waters of the Loire River, in France, three retarding dams for the purpose of reducing the size of floods in that stream. One of these at Pinay, about seven miles above the city of Roanne, best serves as an example, since above this dam there is a plain of considerable extent quite suitable for agriculture, and regularly and intensively cultivated. In the flood of 1856 this dam raised the level of the water above the plain 70 feet and stored temporarily on this farm land 3531 million cubic feet of water. This is some 300 million cubic feet more than the Germantown Basin would contain if a flood of the magnitude of the immense one of March, 1913, were repeated after the completion of the dam, and is nearly 500 million cubic feet more than the Lockington Basin would contain if full, level with its spillway.

An official report on the Pinay Dam has been received from the President of Council, Minister of Foreign Affairs, dated May 24, 1916, more than 200 years after this dam was built, from which the following information was obtained:

Since the construction of the dam great floods have occurred in 1790, 1846, 1856, 1866 and 1907. The greatest of these was that of 1846, during which the lands above the dam were flooded for about 16 hours, and a total of 6180 acres was submerged.

The silt deposit left on the land varied from 8 inches in depth where the land is protected by submergible levees which require the flood waters to back in from below, to 1.2 inches on lands not thus protected. In the 200 years during which the dam has been in operation vegetable matter has accumulated in places to a depth of over 6 feet.

These deposits have proved very beneficial to the crops, and the lands flooded need no other fertilizer. The price of these lands runs as high as \$485 per acre, and averages \$400. Similar lands not flooded by the dam are valued at \$325 per acre.

The crops grown are cereals, beets, potatoes, and fodder crops. In the case of cereals and beets the returns from the flooded lands are estimated to be at least fifty per cent above those obtained from similar lands not flooded, while in the case of potatoes the yield is one-third greater.

Lands exposed to rapid currents when flooded are not cultivated but are maintained as meadows.

Of special interest is the fact that the principal floods occur in the summer and fall, and are therefore likely to damage or destroy crops. In spite of this the improved yield of the land in after years more than compensates for such losses, as is evidenced by the increased value of the land.

In contrast with this, the flood season on the Miami River is in the late winter and early spring. It is rare for large floods to occur here during the crop-growing season, as will be seen by reference to figure 45, which shows the acreage in the various retarding basins that would have been submerged by floods during the 25-year period 1893-1917, assuming that the dams had been in operation.

The "Handbuch der Ingenieur Wissenschaften," or Handbook of Engineering Science, which is one of the best known authorities on engineering science, repeatedly refers to the fertilizing action of the silt deposited by floods. The following statements are taken from this authority:

A flood occurring in a river passing through farming country, if it overflows before growing time begins, is very beneficial. It deposits silt and increases productivity. A meadow thus overflowed requires no other fertilizer, and the low meadows of the Weser, Elbe, and Rhine generally produce three crops a year, or are used as pastures of inexhaustible fodder.

It is known that the natural silt-fertilizing of the stream valleys between the levees steadily proceeds, * * * * * that the silting of the meadows stops after the diking (which prevents overflow by floods) and hence the soil requires artificial fertilizing, * * * * * while the fruitful silt flows by the meadows unused.

Scholars, farmers, and technical experts have for many centuries called attention to the loss by the carrying away of fruitful silt into the sea, and Torricelli declared in the middle of the 17th century that the silt of the rivers was as valuable as gold sand.

A regulated application of the fertilizing flood water tends to increase the productiveness of the lowlands.

The diked-in lowlands are deprived * * * * * especially of the silt which was deposited during floods. A falling off in the agricultural products occurs, especially upon these areas which are used as pastures and are not fertilized. In contrast thereto the profits on the areas outside the levees are very great in all places when the silt remains as deposited. They often furnish more than double the returns of the areas diked-in, without having to carry their burdens (of fertilizer expense.)

The value of flooding is so clearly recognized in Germany that when the improvements of the Rhine above Mannheim were carried out, the levees were lowered sufficiently so that "the newly made lands are regularly overflowed by the ordinary floods for fertilizing purposes." The large Waldeck Reservoir on the Eder River, a tributary of the Weser in Western Germany, was completed in 1913. In order that the lowlands below the dam might not lose the fertilizing action of the annual overflow of floods, the dam is so designed as to let out enough water to submerge these bottom lands.

The flood protection work on the Durance River in Southeastern France is described in a paper presented in *Annales des Ponts et Chaussées*, 1892. These works were built after the great flood of 1843. They consist of cross dikes running across the lowlands from high ground out to the edge of the normal channel, where they have T-shaped ends. The author states that as a result of these works, the stream has been kept in a fixed channel. Overflow

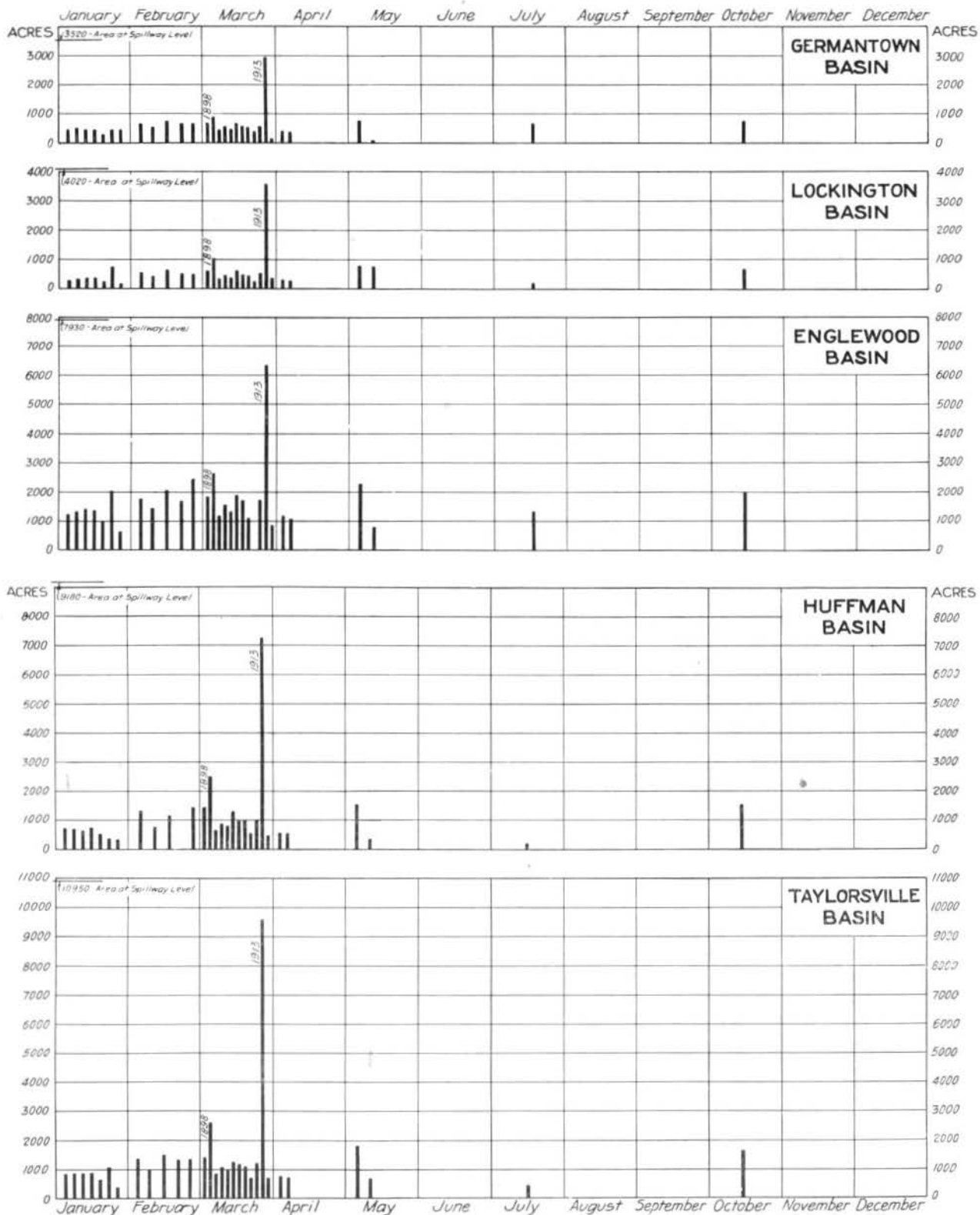


FIG. 45—AREAS FLOODED WITHIN THE RETARDING BASINS

Had our dams been completed in 1893 the amount of land overflowed by floods during the 25-year period 1893-1917 would have been as shown in the diagram. Each flood is represented by a heavy line, the height of which indicates the number of acres overflowed. Floods are grouped by months; thus, in the January space the 7 lines represent all the January floods that have occurred in that 25-year period, and so on. The diagram brings out strikingly how few floods happen during the growing seasons. Of the 30 floods shown, 24 occurred during January, February and March; and one-half of these occurred between the first and last days of March. There is a notable scarcity and even absence of floods during the spring, summer and fall. A flood like that of March, 1898, is likely to occur on an average once in 15 years; one like that of March, 1913, not as often as once in a century.

has taken place between the transverse dikes, but with quiet water, which has left deposits valuable for agriculture.

In reply to an inquiry addressed to the Agricultural Experiment Station of one of our leading corn states, at the head of whose soil department is a man recognized as a national authority on soil fertility, we have received the following:

There is no doubt but that during annual overflows an immense amount of fertility is deposited in the sediment that is carried by the streams, and if this continues, even with the heaviest cropping that can be given, there is no danger whatever of depleting the land of its fertility. This will increase the yield, and men on such land as that can perhaps afford to lose a crop occasionally, if these losses do not occur too often. An inch of sediment deposited in ten years would undoubtedly carry sufficient phosphorus and potassium to more than supply the crops that would be raised during that time.

And from an answer to a letter addressed to the financial representative of a very large insurance company which has tens of millions of dollars loaned on farm mortgages, we quote:

I am somewhat familiar with the Miami Conservancy District's work, building dams, above which in flood time the land would be perhaps covered with water for a few days only, and I am of the opinion that it enhances the value of the land very much, and I so informed the Company recently in answer to an inquiry on the same subject.

From a letter written by one whom we believe to be the highest and best authority in Tennessee, we quote in part:

Our most valuable farm lands are what we call river bottoms which are apt to be overflowed every year, but the overflows are not apt to come at a time which will damage seriously the summer-grown crops. These lands are used chiefly for the production of corn.

The gist of another letter from Kentucky is:

We have a tremendous quantity of bottom lands in western Kentucky, and while occasionally the crop is lost by a late overflow, say in June or July, in about four years out of five, there is no overflow after corn planting time; so that the risk would be about 20 per cent. These lands are so productive, however, because of the silt deposit on them each year, that a crop of corn can be grown every year, and of course this fact makes them valuable just as the Illinois corn lands are valuable—because corn can be grown on them for such a large proportion of the time.

The United States Government Soil Survey of Montgomery County, in referring to a certain type of bottom soils of the Miami Valley, says:

It is the manner of their origin, during the many floods of the rivers, which accumulates a thick deposit of mixed sand and silt and vegetable refuse, and gives them their great productive value.

It ought to be added, however, regarding these benefits from flood overflow, that only a part of the Conservancy lands are so situated as to receive them. The farms as offered for sale all have some higher ground for dwellings and barns. The balance, in

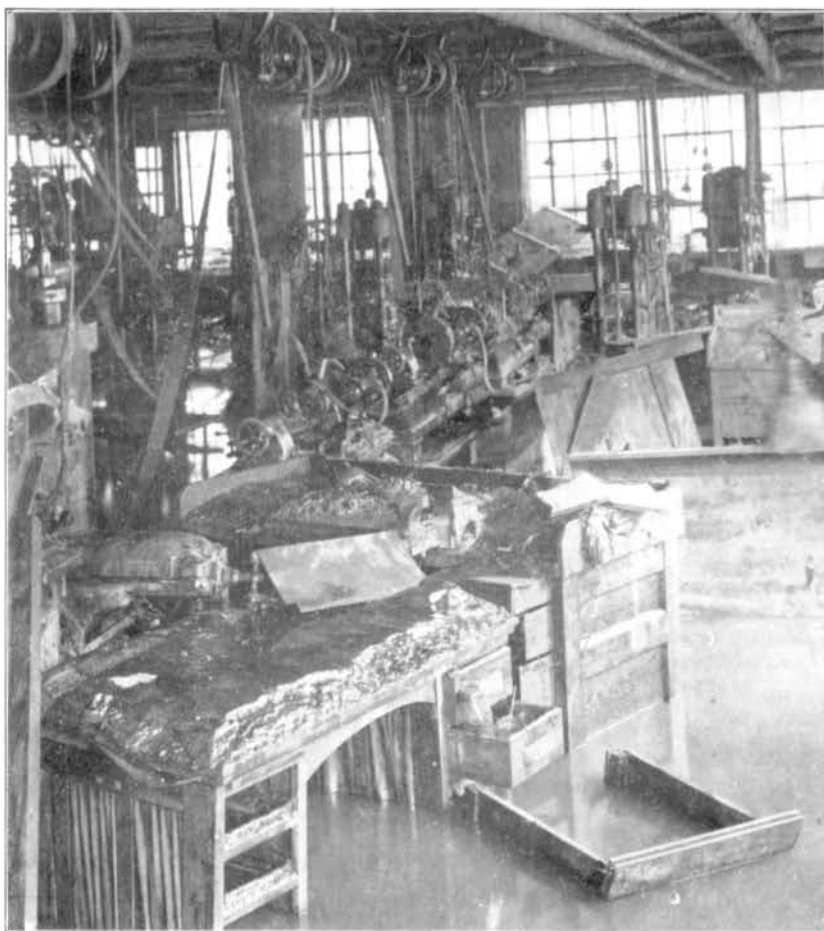


FIG. 46—THE DELCO PLANT AFTER THE 1913 FLOOD

On the desks is a layer several inches thick of the real thing—Miami River mud, just as it was left by the great flood of 1913. The view is in the Delco Plant, and was taken before the last of the water had disappeared and while the mud, still fresh, shone like frosting on a cake. This mud, landing as it did in a factory full of costly machinery did great damage. If it could have settled out undisturbed on the country lands it would have been a godsend to the farmers. The completion of the dams will make this very thing possible, and the retarding basin lands in the future will be greatly enriched by deposits of this kind.

practically all cases, extends down to the river bottoms where it will be subject to overflow. Of the total area for sale, amounting to some 30,000 acres, during the past 25 years, had the dams been in operation, 20,000 acres would not have been overflowed except by the great flood of 1913, and 23,000 acres would not have been overflowed at all during the crop-growing season, but would have been flooded only in January, February and March. Nevertheless, although only a part of a farm is thus directly benefitted, the benefit indirectly extends to the entire farm, since the manures from crops grown on overflowed lands can be used to fertilize the fields not flooded.

Farm Circular No. 2 will be mailed free of charge to any one desiring a copy. Write to Farm Division, The Miami Conservancy District, Dayton, Ohio.

Prominent Editor Visits Works

F. E. Schmitt, Associate Editor of Engineering News-Record, has been with us recently, looking over the work of the District.

October Progress on the Work

GERMANTOWN

During the month of September 58,250 cubic yards of embankment were placed in the dam, bringing the total at the end of September to 176,625 cubic yards. This is approximately 21 per cent of the total hydraulic embankment to be placed.

The sluicing from the borrow pit north of the pumping plant is making good progress. The material, mostly clay, can be obtained at a low cost, thus reducing somewhat the total unit cost for placing the embankment.

The Marion dragline is being used to build the slopes of the dam. The material deposited by pumping is replaced by the dragline on the face of the dam in order to more quickly raise the slopes of the dam as a precaution against overtopping by fall and spring floods. Thus far the downstream slope has been graded to five feet above the first berm, across the entire width of the dam.

Work on the spillway has progressed favorably during the past month. To date 8300 cubic yards have been excavated.

Arthur L. Pauls, Division Engineer.

October 15, 1919.

ENGLEWOOD

The four-foot layer of clayey earth, placed over the porous gravel in the river bed to insure water-tightness, has been completed and the dragline moved to the east end of the dam to work on the second location for the dredge pumps.

Work on the cross dam near the easterly bank of the river has continued, but rather slowly, owing to the desire to send a maximum amount of material to the dredge pumps.

During the month of September 93,900 cubic yards of hydraulic fill were pumped into the dam. In addition, 2400 cubic yards of rolled fill were placed in the cross dam, making a monthly yardage of 96,300 and bringing the total to date to 733,600 cubic yards, or 21 per cent of the entire dam.

Work has begun on the second installation of the dredge pumps, favorably located for placing material in the easterly end of the dam.

H. S. R. McCurdy, Division Engineer.

October 15, 1919.

LOCKINGTON

Placing of earth fill in the dam by sluicing and pumping has proceeded satisfactorily throughout the month. A marked improvement in the rate of progress was noted when a better type of pump runner was put in service. The hydraulic fill placed to date is 101,000 cubic yards. A third dredge pump unit is being installed to take the place of one of the cast iron pumps which has given much trouble recently from broken casings.

Instead of protecting the slopes of the dam by a soil dressing and grassing, as first intended, it has been decided to do a part of this by paving the surface with rock furnished by the hydraulic operations. Much of the stone for this is discharged through the pipes with the finer material, and the balance is waste hauled from the borrow pit where the sluiceways must be kept clear from stones. Sufficient stones will probably be available to pave the dam in this way on both slopes to the upper berm.

The western part of the dam, upon the higher ground, is being built at a rapid rate. About 1150 feet of it has been completed to full height, and by the end of November it is expected that it will all be completed, making a total of 3325 feet. This is being built by the Class K Lidgerwood electric dragline which handles a $3\frac{1}{2}$ cubic yard bucket. The material which goes into the central part of the dam is being wetted before it is dug from the borrow pit. This wet material which is mostly clay forms the impervious core of the structure. None of the portion of dam built by the dragline is over 26 feet in height.

Excavation for the cut-off trench on the higher ground, for the eastern portion of the dam, has been commenced by the Lidgerwood Class B steam dragline machine using a $1\frac{1}{2}$ cubic yard bucket. The cut-off trench across the bottom ground east of the outlet structure will not be

started until late in the spring when danger to the work from high water is past.

The only work done on the roads this month was the building of some guard rails.

Barton M. Jones, Division Engineer.

October 20, 1919.

TAYLORSVILLE

The progress of the Lidgerwood dragline on the outlet works excavation continues to be well ahead of schedule for this work. The deep part of the excavation above the upper weir is very nearly finished, so that from now on the high face will be reduced rapidly because of the upward slope in the bottom beginning at this point. Also the sides are drawing in at a considerable angle, so that the upstream progress should increase rapidly if the same monthly yardage is maintained.

Concreting will start in the lower apron and east wall in a few days.

The sluicing has made about the usual progress. For a few days, to the regular output from the nozzle was added the output from the Marion steam shovel. This earth was dumped into a sort of improvised hogbox about 100 feet from the sump and near the regular ground sluice, and was driven into the ground sluice by a two-inch nozzle. It developed that there were so many large boulders in this material that it would require a revolving grizzly and a derrick to keep this process going, so it was stopped as the earth available for this work would not justify this layout at this time.

Later a six-inch, three-stage pump was installed in the pit so as to take water from the low pressure line. This supplies a two-inch nozzle at 120 pounds pressure. This nozzle is used in the west end of the pit and the three-inch nozzle is in the east end. It appears that this layout will easily justify the extra expense.

The Bucyrus dragline and from one to two dinkeys have been on the ballasting for the B. & O. Relocation. Just recently Roberts Brothers have been able to take the ballast a little faster and this work has been running two shifts.

Kahl Brothers have finished the west approach to the concrete bridge over the B. & O. Relocation, and built an end dike and farm road approach at the east end of this bridge. They have also built that part of the approach of Cedar Road to Road No. 12 on top of the dam, that lies south of the toe of the dam.

O. N. Floyd, Division Engineer.

October 17, 1919.

HUFFMAN

With the exception of the spillway weir, which cannot be built at the present time, the concrete work in the outlet structure was completed on October 4th. This is three days less than seven months from the time the first concrete was poured. The derricks and other plant used in the placing of the concrete are being dismantled, and the structure is being cleaned out preparatory to diverting the flow of the river through this permanent outlet.

Pumping of the hydraulic fill into the dam began on September 25, and is progressing at a very satisfactory rate. The first lift has been placed along the east side from the diversion channel to the Erie Railroad; a pipe line has been carried across the center pool to the downstream toe and the first lift along the west side has been started. The $1\frac{1}{4}$ -yard steam dragline is building the levee for the second lift along the east side.

Preparations are about complete for starting the delivery of ballast gravel for surfacing the road bed for the relocation of the Big Four, Erie, and Ohio Electric Railroads. This gravel will be excavated from the main borrow pit in the river valley above the dam with the $4\frac{1}{2}$ -yard electric dragline, and transported to the new railroad lines with Huffman locomotives and side-dump cars. This will for a short time interrupt, to some extent, the pumping of material into the dam.

Contractor McCann has a small steam shovel at work on the excavation for the relocation of the Valley Pike, and this work is progressing as the weather permits.

C. C. Chambers, Division Engineer.

October 16, 1919.

DAYTON

Channel excavation to date amounts to 594,600 cubic yards. A total of 435,300 cubic yards has been placed in levees and spoil banks, including 60,000 cubic yards of levee embankment on Contract No. 41. In accomplishing this work a total of 1,034,600 cubic yards has been handled.

The D-16, Class 175 dragline has continued excavation below Dayton View bridge, loading the material on scows, the other large machine, D-15, unloading the material and placing it in the spoil bank below Herman Avenue on the west bank.

The D-19, Class 9½ caterpillar dragline has made the channel excavation required along the retaining wall on the north bank of the river west of Main Street, has placed about 500 cubic yards of gravel at Price Brothers' concrete block plant and is now loading material into cars for the enlargement of the west levee above Herman Avenue.

The retaining wall at Main Street and the wall along the land side of the levee at Hershey Street, have been completed.

Work has been started on the revetment below Island Park Dam. Blocks for the flexible revetment are now being laid. Price Brothers Company drove the piles for this job under contract.

The gravel washing plant has been placed in operation.

The construction plant for the South Robert Boulevard river wall is nearly completed and excavation will be started in a few days.

At Price Brothers' plant approximately 170,000 concrete blocks have been completed, this being 93 per cent of the number required for the Dayton work.

October 17, 1919. C. A. Bock, Division Engineer.

HAMILTON

The total amount of earth handled by the two draglines to October 1, 1919, was 874,000 cubic yards. The total for item 9, including McGillicuddy's contract, was 425,700 cubic yards.

The electric dragline, D-16-18, is taking out the last cut on the east side of the river south of the Columbia Bridge. After completing this cut it will move again to the north of the bridge and work on the higher ground during the winter months. A track is now being laid for hauling this excavation into the spoil bank. A total of 150 tons of old bridge steel has been removed from the river by this machine.

The steam dragline has completed the tailrace and levee between the B. & O. R. R. and the Ford plant, has crossed the B. & O. tracks and started work on the tailrace and levee west of the railroad.

The work of driving the steel sheet piling under the B. & O. bridge over Old River has been 88 per cent completed and the excavation is well under way.

The Front Street sewer has been completed with the exception of the gate manhole. This is the last one of the large sewers and completes the work on Feature 60 with the exception of repaving Wood Street. The derrick used on Feature 60 for excavation will be used to handle gravel for the screening plant, and the remaining plant and organization have been transferred to the concrete wall work on Feature 58.

A stiff leg derrick has been erected and work begun drilling and blasting the remains of the old concrete wall south of the Soldiers' Monument. A new wall will be erected in this location.

October 18, 1919. C. H. Eiffert, Division Engineer.

FRANKLIN

Jeffrey, Boorhem & Company have started excavation in the river nearly opposite the village water works pumping station. At this point material for the levee and the elevation of road approaches will require the throwing of material from the river in two or three moves. The section of the levee between the Cincinnati and Northern Railroad embankment at the pumping station and the suspension bridge will be the first to be built. The machine will then move from the suspension bridge to a point near the north corporation line, leaving a gap in which there is a considerable amount of retaining wall construction. This will probably be built by the District's forces.

MIAMISBURG

Jeffrey, Boorhem & Company have placed the levee embankment on the line north of the Groendyke twine factory, from the high ground at the west to Bear Creek road. This section has a length of about 1,000 feet. The Monaghan walking dragline, which was used on this work, has now moved across the Bear Creek road and is loading cars for the levee extending along the west side of the B. & O. Railroad adjacent to the Sycamore street bridge. A small trestle, for the support of the track, was built on the west side of the river embankment. Two dinky locomotives, each with a train of ten 4-yard cars, are hauling the material.

MIDDLETOWN

The cut-off channel which required the excavation of 72,000 cubic yards has been completed by the Cole Brothers Construction Company. Their dragline machine has been moved over to the levee work and the machine is now engaged in the placing of the embankment between Fourth and Sixth streets. Between Fifth and Sixth streets, the presence of the rock in the river bed prevents the construction of the levee in its entirety by the dragline machine. Between these points about 15,000 cubic yards of levee must be hauled in by teams. About 8,000 cubic yards of embankment has been placed in the easterly end of the levee just above and below the Poasttown road.

October 15, 1919. F. G. Blackwell, Assistant Engineer.

RAILWAY RELOCATION

Baltimore & Ohio. Grading is entirely completed on the relocated portion of this railroad. There remain two arches to be built and the old tracks to be elevated north of the connection where the new line departs from the old line, one mile south of Tippecanoe City. The masonry in these culverts is being constructed by Superintendent Leslie Wiley of the District. The raising of the tracks at this point has not been commenced. The Baltimore & Ohio are raising the tracks south of Needmore Road to Leo Street and have the District's portion about 65 per cent completed. Roberts Brothers have completed the tracklaying and have given the ballasting a first lift from Needmore Road to the National Road. Miller Brothers have started building the right-of-way fence.

Big Four and Erie. The grading on these two railroads is rapidly nearing completion. The Walsh Construction Company are excavating in a borrow pit at Harshman, and will complete the embankments between East Dayton and the big cut at Huffman by the first of November, as well as the back fill for the roadbed section in the big cut where the excavation was carried one foot below subgrade because of the rock. After this borrow pit excavation at Harshman is completed the contractors will borrow material at the east end near Enon to widen the narrow embankments at that end.

Tracklaying is under way also, and almost 5 miles of track has been laid on the Erie. The steel rails have all been received and about 60 per cent of the ties have been received. Roberts Brothers are doing the tracklaying, and Walsh Construction Company will start ballasting the track before the first of November.

The overhead concrete arch bridge at Huffman is being constructed by the District with Leslie Wiley in charge as superintendent. The false work is completed, the form work well under way, and the two concrete abutments are completed.

The construction of the fencing is being done by G. S. and C. Funderburg who have three miles constructed to date.

The Big Four bridge department have completed driving the piles for the temporary trestle west of the underpass at Huffman and have part of the framing completed.

Ohio Electric Railway. All the grading and masonry is completed as far as can be done at present. As soon as the Big Four and Erie are diverted to the new line the gap which now exists east of Osborn will be graded. Erection of the steel truss bridge at Mad River is being postponed until the track is laid to this point.

Tracklaying will be the next work to be done, which will be dependent upon the completion of similar work on the Big Four and Erie Railroads.

October 20, 1919. A. Larson, Division Engineer.

RIVER AND WEATHER CONDITIONS

The streams throughout the Miami Valley were comparatively low during the month of September. The rainfall was less than normal, varying from 1.18 to 1.92 inches at the District's stations. At the Dayton Weather Bureau Station the total precipitation during the month was 1.26 inches or 1.24 inches less than normal, raising the accumulated deficiency since January to 2.76 inches.

Information furnished by the local office of the U. S. Weather Bureau at Dayton shows that at Dayton, the mean temperature for the month was 68.8° F., or 2.0° greater than normal; there were 16 clear days, 10 partly cloudy days, 4 cloudy days, and 6 days on which the precipitation exceeded .01 of an inch; the average wind velocity was 8.1 miles per hour, the prevailing direction being from the southwest; and the maximum wind velocity was 47 miles per hour from the southwest on the 19th.

Ivan E. Houk, District Forecaster.

October 20, 1919.

Dayton Gravel Washing Plant

Since about the first of October, the gravel screening and washing plant erected at Sunrise Avenue, near the mouth of Wolf Creek, in Dayton, has been in commission. It is the same plant that functioned at Germantown, having been brought from there knocked down. As now operated, there is no concrete mixing plant in the structure itself. Sand and gravel are merely washed, screened, and stored in bins; it is then hauled in trucks to the site of the work. The scattered nature of the concreting to be done along the river channel in Dayton made such an arrangement necessary.

Germantown Dam Now Capable of Handling Large Floods

The rapidity with which the hydraulic fill at Germantown dam is growing in height is a source of gratification to Conservancy officials. At the close of October the dam had attained an elevation sufficient to enable it to cope with floods as large as that of March, 1898. Floods of this magnitude are not frequent, there being only three on record within the past fifty years.

The Germantown dam is the only one of the five dams in which the hydraulic fill is being placed over the full length of the dam, each lift carrying the entire structure to a new elevation.

The flow of Twin Creek must now all pass through the outlet conduits, the old creek bed being completely blocked by the dam.

Conservancy Farm Sales

A number of sales were effected by the Farm Department during the past month, the lands being located mainly in the Englewood and Germantown retarding basins. Among the larger tracts sold is the one formerly owned by Ira Fudge in the Germantown Basin, in Preble County. Its 268 acres, with the buildings on it, brought \$41,000. The purchaser was J. W. Wilson of Middletown, Ohio.

THE MCKINLEY PARK SEWER EXTENSION

We publish herewith a picture taken August 12, 1919, of the extension built to the McKinley Park storm sewer at Dayton. The extension was made necessary by an earth fill to correct the irregular

alignment of the river bank at that point. At this writing this fill has been placed and the structure is hardly visible, except for its top slab which shows above the water level at low stages.



FIG. 47—THE MCKINLEY PARK SEWER EXTENSION, AUGUST 12, 1919.

The structure is of reinforced concrete, 8 feet wide by 6 feet high, inside dimensions, with an overall length of 102 feet. It is built on a curve with a radius of 100 feet, and contains 160 cubic yards of concrete. In order to build this extension a cofferdam was constructed and the water within it pumped out. A deep deposit of mud and debris which had collected at the mouth of the sewer, in the course of time, did not present a suitable foundation for the concrete structure. It was therefore necessary to remove this with a dragline excavator and refill the excavation so made with sand and gravel.

The covering up of the old masonry structure which shows in Fig. 47 marks the final obliteration of one of Dayton's historic features, the Tate's mill race, which had its intake at the old Steele dam, and extended down what is now Miami Boulevard and through McKinley Park, emptying into the Miami at this point. It furnished water power to the old Stillwell-Bierce plant. The masonry bulhead originally had four openings in it controlled by iron sluice gates. When the mill race was discontinued, a storm sewer took its place emptying through one of the four openings. The concrete structure built by the District continues this sewer to the toe of the new levee.

The Outlet Works at Huffman Dam

Mad River will be made to Flow through a Concrete Structure 67 feet wide on the Bottom, with Walls 70 feet high.

By C. C. Chambers, Division Engineer

The Huffman Dam is being built across the Mad River Valley about six miles northeast of Dayton. It is an earthen dam with a concrete outlet structure for passing the flow of the river. One of the larger obstacles to be overcome in the construction of this dam has been the readjustment of public utilities which existed at the site of the dam and in the basin above it. The dam runs at right angles across the valley and interferes with two railroad lines, one electric interurban line, and two main highways. The Erie Railroad and the highway from Dayton to Springfield, known as the Valley Pike, follow up the north side of the valley; south of the river are the Big Four Railroad, the Ohio Electric Railroad and the Springfield Pike. By referring to the cross section of the valley (see Fig. 48), it is seen that these lines crossed the site of the dam at comparatively low elevations.

The massive concrete outlet structure which requires a substantial rock foundation, had been located with great care, thanks to the many borings and test pits put down during the early investigations to determine the extent and location of the rock formations. As finally planned its north edge projected into the channel of Mad River, its center line coincided nearly with that of the Big Four Railroad track, and its south wall came about where the Ohio Electric Railway track was. The situation can be gaged at a glance from the two right hand views in Fig. 43, which were taken very nearly from the same point.

Serious as were these obstacles, there was little choice in the matter of locating a dam across the Mad River valley. Damsites not only were scarce, but all of them involved interference with railroads and highways. The Huffman site with its high hills on both sides of the valley and large basin capacity was found to be the most advantageous of all. The problem, therefore, consisted of raising and shifting these lines of communication so as not to inter-

fere with the dam and also to elevate these lines through the basin high enough to prevent their being inundated by backwater in time of floods. In the case of the highways, which allowed of fairly steep grades, the answer was comparatively easy. But the railroads, which were limited to prescribed ruling grades, presented more difficult problems.

The relocation of the Valley Pike involved departing from its present location at a point about one-half mile below the dam, following along the hillside on a 5 per cent grade and reaching the elevation of the top of the dam at the north end of the latter. The road then continues on the north side of the basin, at an elevation high enough to prevent frequent flooding, and joins the old location nearly 5000 feet above the dam. The old Springfield Pike crosses the axis of the dam at the very south end and at an elevation only five feet below the top of the dam, so that it was necessary to raise the grade only by that amount. The relocation of the railroads made necessary a slight shift of this highway west of the dam, and above the dam it follows in a general way the edge of the basin, detouring over existing roads and joining its old location at Fairfield, 5 miles up the valley.

The relocation of the railroads has required the placing of the two main roads, the Big Four and the Erie, side by side on one roadbed, commencing at the yards in East Dayton. They climb on a maximum permissible grade of 3 feet in one thousand, compensated for curvature. Even with this grade they are still 35 feet below the top of the dam where they pass the center line of the latter. In order to prevent leaving a gap in the dam, and to protect the tracks from the backwater, they are taken through a cut in the hill just south of the end of the dam, the north side of this cut forming a barrier to the backwater. Where the railroads emerge from this cut into the basin above the dam, they are protected against flooding by a levee on each side of

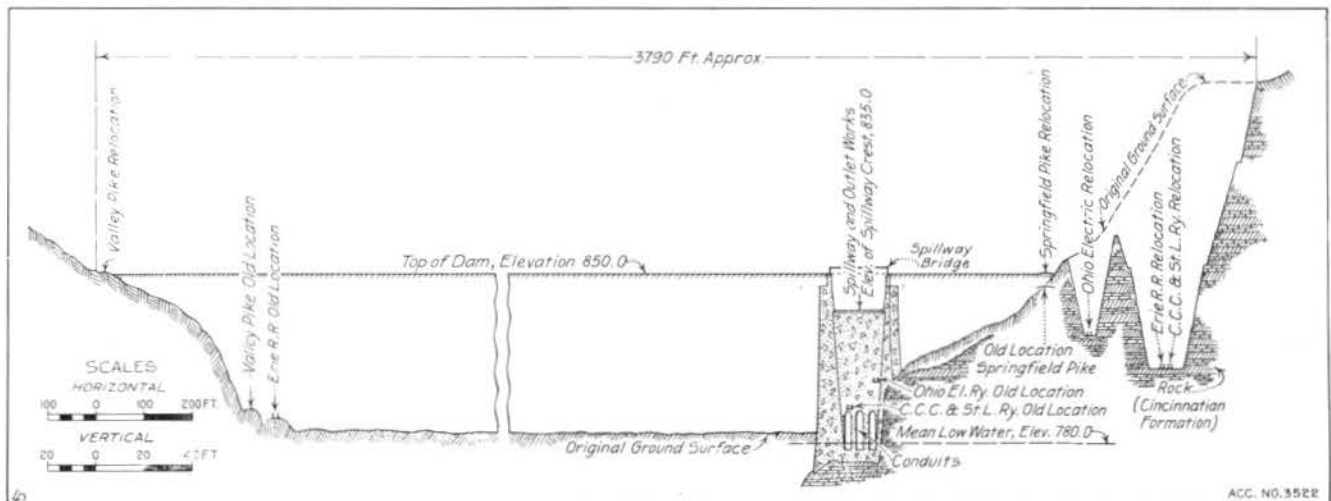


FIG. 48—LONGITUDINAL PROFILE TAKEN ON CENTER LINE OF HUFFMAN DAM

This shows clearly the relative positions of the old and new locations of the highways and railroads with respect to the dam and outlet works.

the roadbed for a distance of about two miles up the valley to a point where the road reaches an elevation above flood water. The railroads then continue along the south edge of the basin until they join their former location at Enon, 15 miles northeast of Dayton. A more detailed description of these levees and the cut near the dam will be found in the September, 1918, issue of the Bulletin. The north levee was made to serve also as a roadbed, through the basin, for the Ohio Electric Railway. This line

At Huffman, as at the other dams, one of the main features to be built first was the concrete outlet structure. During its construction the river had to be diverted through a new channel excavated about 500 feet north of the original channel, and cofferdams were built across the latter above and below the structure. To have postponed the building of this concrete structure until the railroads had been moved to their final locations, would have meant a delay of one or two years in its completion, result-

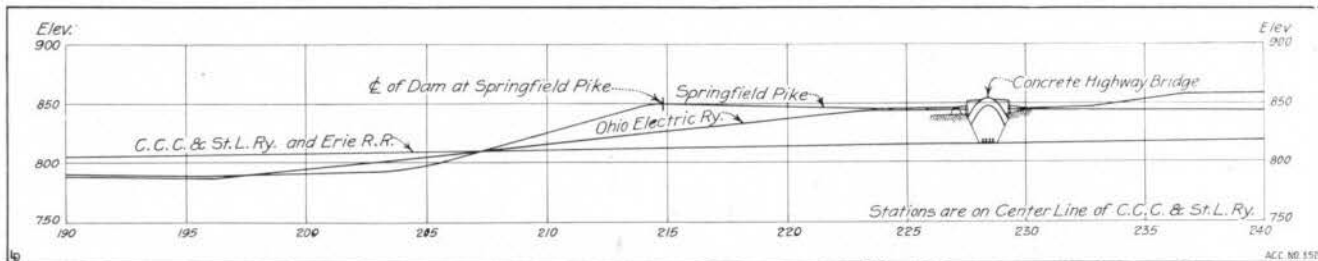


FIG. 49—PROFILES OF RELOCATED RAILROADS AND SPRINGFIELD PIKE SOUTH OF HUFFMAN DAM

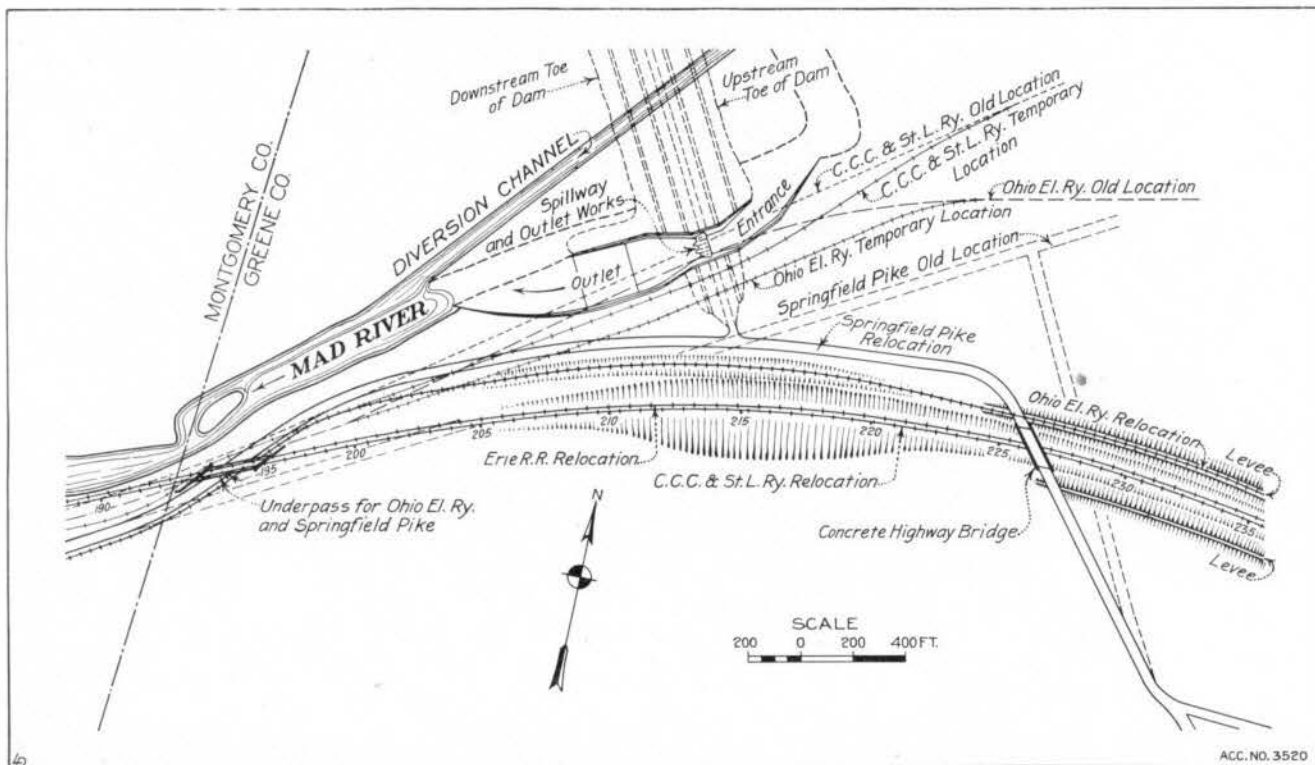


FIG. 50—PLAN SHOWING OLD, TEMPORARY, AND NEW LOCATIONS OF RAILROADS AND HIGHWAY SOUTH OF HUFFMAN DAM

Note the position of the dam and its outlet with reference to the old locations of the Big Four and Ohio Electric Railroads. These roads are now operating on the tracks marked "temporary location," and will soon shift to the relocated tracks.

permits of somewhat heavier grades than the steam railroads, so that it was shifted over to pass around the south end of the dam and onto this levee. The grading for all the railroad relocations has been practically completed at this writing. The traffic will be diverted over the new locations as soon as the track laying and ballasting, now well under way, have been completed. The relocated grades of railways and pike south of the dam are shown in the profile, Fig. 49.

ing in an equally later date for the completion of the entire dam. In order to prevent this delay the Big Four and Ohio Electric railroads were temporarily moved to other locations going around the south side of the structure, as shown in Fig. 50.

The design of the concrete outlet structure is similar to that of the one built at Lockington and described in the August, 1919, issue of the Bulletin. The Huffman structure, however, is much larger than the one at Lockington, and when finished will

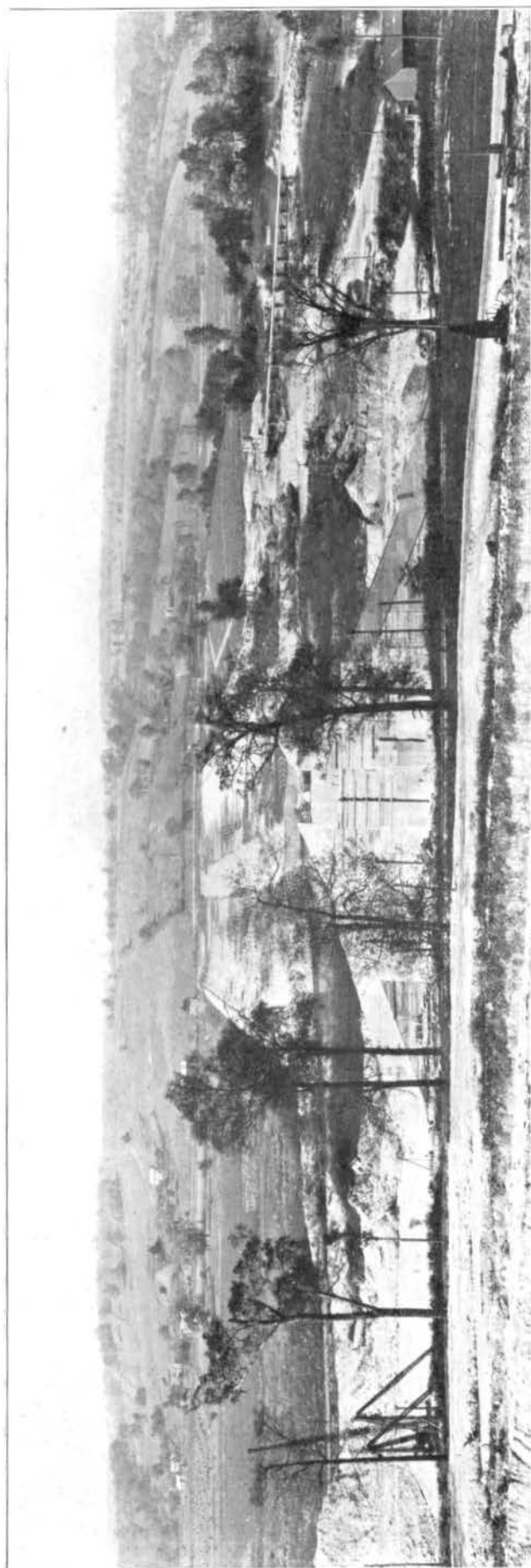


FIG. 51—GENERAL VIEW OF HUFFMAN DAM SITE, LOOKING NORTH, OCTOBER 8, 1919.

have three conduit openings instead of two. These conduits will be $16\frac{1}{3}$ feet high by 15 feet wide each, and their joint discharge capacity, in case of a flood like that of 1913, will run as high as 32,600 cubic feet per second.

The foundation for this structure required a heavy rock cut running in places as deep as 65 feet. The rock was drilled and blasted, and the removal of the loose material was affected with an electric dragline. It was loaded onto cars and placed in the fill required to raise the roadbed of the railroads between Dayton and Huffman. The June, 1919, issue of the Bulletin contains two illustrations which show the extent and depth of the excavation made.

The aggregate for the concrete was excavated in the river valley at a point about 2000 feet away, and run through a washing and screening plant, similar in nearly all respects to that used at the other dams. The concrete was mixed and hauled to the distributing derricks with a plant layout similar to the one described for Lockington in the November, 1918, issue of the Bulletin.

The two steel stiff-leg distributing derricks each had a 95-foot boom and were operated by electric hoists. They were mounted side by side on a 40 by 40-foot timber platform, the two side timbers of which formed runners under which 8-inch wooden rollers were placed. The derricks rolled ahead on the finished concrete floor as the work progressed, generally moving about 30 feet at a time. The dragline making the excavation was kept a few hundred feet ahead of the concrete work, and its power was used to pull the derrick platform ahead by means of a long cable fastened to the dragline bucket and connecting with a double block on the front of the platform.

The track leading from the concrete mixer branched just above the derricks, with a line running down each side of the derrick platform. Thus, concrete buckets could be placed alongside of each derrick, and both derricks could be in operation at the same time. All of the concrete now in the structure was placed with the aid of these derricks, including the floor and both walls to their full height. This method was at times supplemented by a small chuting system, whenever it was found necessary to pour the floors some distance ahead of the derricks while the latter were engaged in finishing a high wall section. This system consisted of an elevated hopper, placed as far as the derrick boom could reach, and from which the concrete was run through chutes to the forms, the hopper being fed from a concrete dump bucket suspended from the boom. In this manner all of the floor in the bottom of the stilling pool, and in the steps leading down into this pool, was poured before the derricks were far enough advanced to reach the top of the steps.

The walls were all built in five-foot lifts. The cantilever type of wooden forms was used, built in sections 20 and 30 feet long. These forms were handled with the aid of the derricks, it requiring only a few minutes to remove a section of form and place it in its new location. The placing of concrete began on March 7, 1919, at the upper end of the structure, and proceeded down stream. The last bucket full of concrete was placed on October 4, 1919. The amount

placed in the entire structure during this period was 32,450 cubic yards, making an average rate of progress of 4636 cubic yards per month, or 182 cubic yards per day, not counting Sundays and holidays. The maximum poured on any one day was 321 cubic yards.

The floor elevation of the bottom of the stilling pool is $28\frac{1}{2}$ feet lower than the floor of the conduits on which the derricks were rolled forward. It was found desirable to take the derricks intact on their platform across this pool, in order to place the concrete in that part of the structure below the pool. To do this, trestles were built across the pool main-

taining the derricks at the same elevation as the floor of the conduits. An excellent view of the manner in which this was done is given in Fig. 42 on the front cover of this issue.

This view shows also the two lighter trestles, on each side of the derrick platform, which supported the narrow gage tracks for conveying concrete from the mixer to the derricks. One section of cantilever forms may be seen fastened to the upper left-hand corner of the concrete wall.

From the start, Verne Clawson, as Superintendent, has had direct charge of the forces employed on the work, and the writer has been Division Engineer at Huffman.

Men Responsible for Distribution of Supplies and Materials Hold Conference

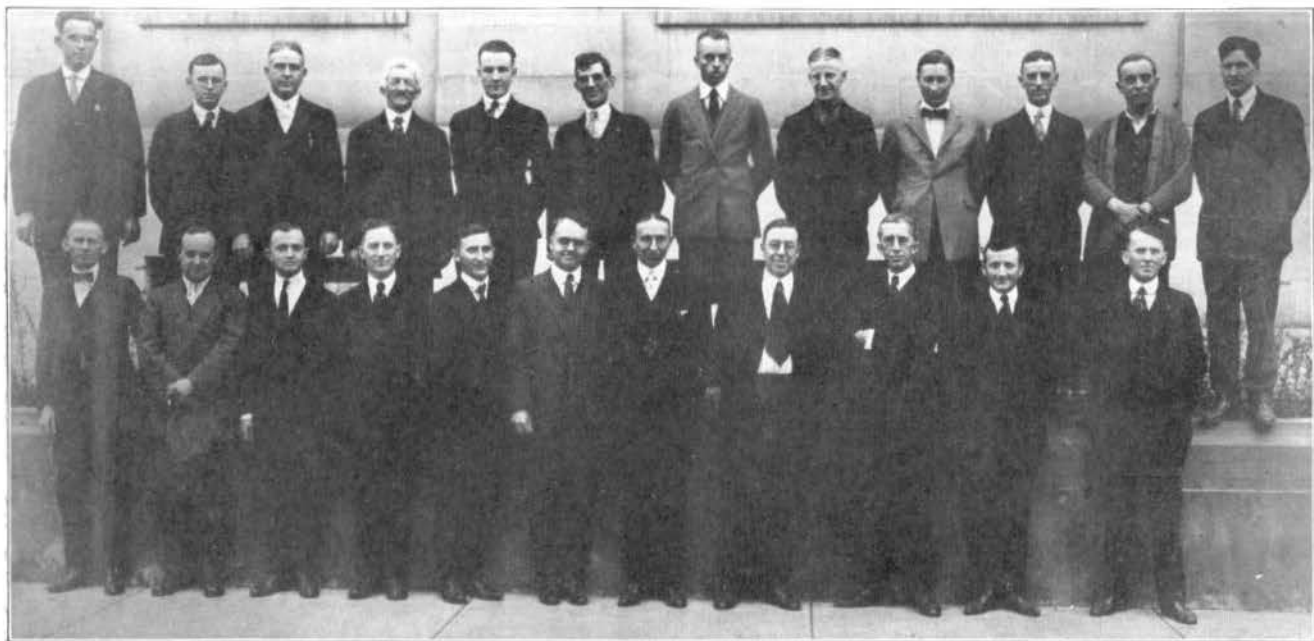


FIG. 52—THE MEN WHO ARE RESPONSIBLE FOR THE DISTRIBUTION OF SUPPLIES AND MATERIALS TO THE CONSERVANCY JOBS. OCTOBER 23, 1919.

Upper row, left to right: F. A. Myers, Warehouseman, Taylorsville; J. E. Eberly, Field Clerk, Taylorsville; H. F. Tressler, Garage Foreman; P. Bjorgum, Warehouseman, Englewood; J. W. Quinlisk, Field Clerk, Englewood; T. N. Nealon, Chief Clerk, Warehouse, Dayton; Herbert S. Dye, Field Clerk, Huffman; Bob Shriever, Warehouseman, Dayton Shop; J. E. Applegett, Warehouse Man, Lockington; J. E. Faist, Office Engineer, Hamilton; John Braun, General Warehouse Foreman, Dayton; C. R. Hooke, Clerk, Accounting Division.

Lower Row, left to right: E. J. Coover, Clerk, Accounting Division; E. J. Holliday, Warehouse Man, Garage; Jesse Horner, Clerk, Accounting Division; Samuel Reed, Clerk, Accounting Division; John T. Hall, Clerk, Dayton Shop; C. N. Phillips, Office Engineer, Headquarters Office; O. K. Welker, Chief Accountant; T. J. Manning, Auditor; H. L. Wall, Consulting Auditor; L. J. McWilliams, Field Clerk, Lockington; Jesse Swihart, Clerk, Accounting Division.

A conference was held, October 23, of the Conservancy men whose activities center in the arduous task of keeping the various construction features supplied with all those material things that are required for the successful prosecution of the work. Anything, from toothpicks up, may be called for, and may be needed on short notice. The receiving, storing, and shipping of supplies and materials, together with the stock keeping and accounting that are necessary in connection therewith, form a big chapter in Conservancy history.

The proper coordination of this phase of the work is one of the prime essentials in conducting a big

construction job. Conferences of this sort have been held in the past and have proved of benefit in getting the men acquainted, not only with each other, but with each other's duties and view points. The service which they render cannot be overestimated as to its ultimate value to the organization as a whole. Warehouse and garage men, field clerks, auditors, clerks, and accountants, meet at these conferences, and an intelligent exchange of their opinions is promoted.

The accompanying view was taken on the day of the conference and shows nearly all those in attendance.

Local Flood Protection Work at the Smaller Cities

Until a few months ago but little construction work had been started by the District at the smaller cities of the valley. The policy had been to defer such work, consisting mainly of levee construction and some channel enlargement, to a time when part of the plant and equipment used in the early construction of the dams would become available, unless in the meantime favorable opportunities should offer for the employment of construction firms possessing the requisite amount of equipment. It will be obvious that the extent of the operations to be carried on at the various localities was not sufficient to warrant the purchase of additional equipment by the District. Besides it was felt that even though started later than the big jobs there would be no difficulty in completing this work ahead of the completion of the Conservancy work as a whole.

Lately, construction work at the smaller cities has been steadily increasing, until there is now under way work at Middletown, Franklin, and Miamisburg. A dragline and train outfit is being put in shape for the work to be done at Troy. The protection work at West Carrollton is completed with the exception of a few minor items. The only points at which no operations are being carried on are Piqua and Tippecanoe City.

The first work to be commenced was that at West Carrollton in June, 1918. Because of the necessity of acquiring a portion of the right-of-way through court procedure, an interruption was made from about the middle of September, 1918, until April, 1919. The work which was done by J. I. Geiger was completed on September 2, and is the first feature in the District's work to be completed.

Arrangement for the construction of the levee at Middletown, south of the Cincinnati and Dayton Traction Company's bridge, was made with Donald Jeffrey, who commenced work in October, 1918. Mr. Jeffrey employed for this work a railroad steam shovel converted into a dragline. Except for a comparatively short distance, the levee was put in with one throw of the dragline. It was completed about

the first of August, 1919. Arrangement for the remaining earth work at Middletown was made in the spring of this year with the Cole Brothers Construction Company. During the present season the new cut-off channel was built by them and work is now under way on the levee along the river south to Fourth Street, and also at the east end of the protective works in the vicinity of the Poasttown Road. In July of this year Jeffrey, Boorhem & Company were engaged to construct the earth work on the west side of the river at Franklin and Miamisburg. At Franklin a dragline excavator commenced excavation on October 1. At Miamisburg a Monighan walking dragline and a narrow gage crane outfit are being used.

The present outlook is that the work now under way at Middletown will be completed about January 1, 1920. The work on the west side of the river at Franklin and Miamisburg will be completed early in the coming year. Plans have been made for starting construction on the east side of the river at these two localities. At all of the towns mentioned the construction operations now arranged for are confined to earth work. The concrete flood gate structures, retaining walls, street paving, etc., will be handled by a separate force which will be organized in the near future. The work to be done at Tippecanoe City will be started sometime next year so as to insure its completion by the time the Taylorsville Dam is completed, its object being to protect the low lying section of the town against overflow by backwater from the dam.

West Middletown Cut-Off Channel

The accompanying view, Fig. 53, shows the cut-off channel recently completed in the vicinity of West Middletown. The object is to straighten the course of the Miami River by cutting off an objectionable bend, the channel as now built being merely a lead for the river to follow and widen out during flood stages. The bottom width of the channel is 40 feet, the side slopes 1 to 1, and the total length 3600 feet. The excavation amounted to 70,000 cubic yards, and was handled by Cole Brothers Construction Company.

The new channel passes under the eighth span of the Third Street concrete bridge, counting from the west abutment. This span was built larger than the others, by the County, for this purpose. It is hoped that, in time, the Miami will excavate for itself a new bed following the cut-off channel, and that its present bed will silt up and be abandoned. This work was included in the plan at the suggestion of a committee of citizens of Middletown.

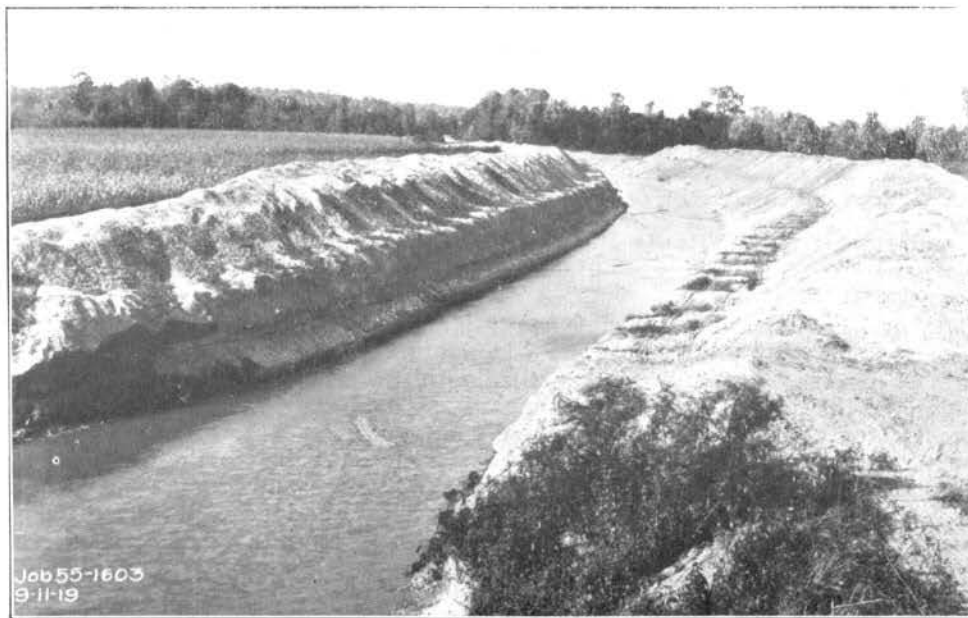


FIG. 53—THE WEST MIDDLETOWN CUT-OFF CHANNEL, SEPT. 11, 1919.

THE MIAMI CONSERVANCY BULLETIN SUPPLEMENT

"The News Letter"

To Promote the Conservancy Spirit on the Work

NOVEMBER 1919

DAYTON

C. H. Paul Back from Enjoyable Vacation Trip

Assistant Chief Engineer Charles H. Paul and Mrs. Paul returned recently from a two weeks' vacation, traveling by auto all the way to Malden, Mass., Mr. Paul's home, and back again, a total distance of 2200 miles. The trip east was by the way of Cleveland, Buffalo, Ithaca, Syracuse, North Adams and Worcester. After spending a week at Malden, the return trip was made by way of New York, Philadelphia, Baltimore, Hagerstown, Cumberland, Uniontown, Wheeling and Columbus. Mr. Paul was unstinted in his praise of the eastern highways. The excellence of their maintenance, almost complete absence of dust and detours, added greatly to the pleasure of the trip. The system of repairing pavements by closing only one side of the road at a time, thereby avoiding the necessity of detouring, was particularly appreciated. That the trip was a remarkably smooth one is attested by the fact that he experienced no tire trouble; in fact never used any tools except to tighten a nut here and there.

Conservancy Employee Decorated

H. Ellis Sibley, of the Administrative Department, has been decorated with the **Medaille Commemoratif**, for his services in France. The ceremony took place at Marietta, on October 17, the French government being represented by General Colledet, military attache to the embassy. Mr. Sibley, with characteristic modesty, has requested us to call attention through these columns to the fact that he did not receive the Croix de Guerre, all rumors to the contrary notwithstanding.

The medal which Mr. Sibley received is awarded, according to his own statement, to all Americans who served with the French Army. We take this opportunity of congratulating him very heartily.

S. K. Young Leaves Dayton Office

It is with genuine regret that we chronicle the departure of Mr. S. K. Young, our efficient Field Engineer in charge of survey operations. Mr. Young first came to the Dayton office in March, 1918, from the Upper Scioto Conservancy District, where he had charge of surveys for the Morgan Engineering Company. His stay in Dayton was short, as the work on the Scioto required his return there. In June, 1918, he was again employed by the Dayton Office, and soon thereafter took over from Mr. C. N. Phillips the duties of Field Engineer.

Mr. Young is Secretary for the Upper Scioto Conservancy District and Assistant Chief Engineer. Contracts were recently let there for channel improvement work aggregating 2,043,000 cubic yards. The vacancy left by Mr. Young's departure is being filled by Mr. C. S. Bennett.

Gift to Walter M. Smith

Chief Designing Engineer, Walter M. Smith, at the time of his departure, was presented with a handsome watch charm by the employees of the Headquarters Office Drafting Room, as an evidence of their friendship and esteem. The watch charm is patterned after the design on the Conservancy Pin, being, however, much larger and made of solid gold. It was designed by Louis DuBois. When Mr. Smith called at the office on a recent visit he evinced much pleasure in wearing it.

E. W. Lane Goes to Troy

Mr. E. W. Lane, Assistant Engineer at the Headquarters Office for several years past, will have local charge of the channel improvement and levee work at Troy, for which point he left October 30.

THE WOMAN'S CLUB

Conducted by Miss Mayme McGraw.

Miss Walcutt Meets With Accident

Tuesday noon, October 14, Miss Louise Walcutt, assistant to Mr. O'Brian of the Administrative Department, while going through one of the downtown stores, had the misfortune to slip and fall on the newly oiled floor. An X-ray, taken that night, disclosed a badly torn ligament. While the doctor stated it would be several weeks before Miss Walcutt would be able to walk, she seems to be getting along very nicely. Miss Myra Young, of the Taxation Department, is temporarily filling Miss Walcutt's place.

Ode to Mabel P.

Mabel on her piano stool
Doth sit in queenly state;
While at her touch the ivory keys
Cavort at rapid rate.
Nearby there sounds sweet melody
In liquid notes of pearl,
'Tis ———, the illustrious,
He's whistling, "Just one girl."
Mabel plays with head bent low,
And plaintive little cough,
But, oh, ye gods! there doth appear
"The smile that won't come off."

—E. S.

Miss Alexander Returns From Trip West

Miss Mary Alexander of the Stenographic Division of the Dayton Office, recently returned from a trip to Laramie, Wyoming, where she visited with friends and relatives. Going westward, the trip was made by auto, stopping at St. Louis, Kansas City, and other cities, then following the old Santa Fe trail to Pueblo and Colorado Springs; thence via Denver to Laramie. The home trip was by rail. Miss Alexander reports having seen a remnant or two of that nearly extinct species known as the Cowboy.

THE MERMAID CLUB

The spirit of athleticism has at last manifested itself among the girls of the Athletic Association.

A meeting was held September 30, for the purpose of discussing the formation of a class in swimming. The Misses Zula Eberly, Helen Theobald and Ruby Williamson were appointed a committee. As a result of their efforts the use of the Y. W. C. A. pool, between the hours of 5 and 6 o'clock on every Thursday afternoon during the coming season, has been secured. The courtesy of the Y. W. C. A. officials in this connection is much appreciated.

It is expected that a fine new crop of "jack-knives," "flying-swans," and "standing-sittings" will be developed before next summer. Watch your step, Annette!

This is but the beginning of the club. Why cannot it be made larger? Are there not women at the dams who could come in and join the party every Thursday evening? The present members would like to become acquainted with all women in any way connected with the Miami Conservancy District, and are convinced that every one would enjoy these plunges.

Those wishing to do so should communicate with Miss Eberly, at Headquarters Office.

THE MIAMI CONSERVANCY BULLETIN

ENGLEWOOD

Hints for Taylorsville Propagandists

We note with mixed emotions the standing of the "Propaganda League" as published by Taylorsville in the last Bulletin. In the first place our sympathy goes out to Taylorsville. It must be rather discouraging to have carried their payroll for all these months and been able to create so little interest in their accomplishments. The editor is surely lacking in a discriminating taste for art and science. While Taylorsville as yet has not done any concreting, nor diverted the river channel, nor carried their hydraulic fill up to imposing heights, they have organized a "Booster Organization," and it does seem as if their efforts should receive better recognition.

In a spirit of friendliness we offer the suggestion that, although he may not have a fertile field in which to work, the photographer could play up the lights and shadows in the spillway cut on different days in such a manner as to secure a number of pictures of the same subject yet of profound interest to the Bulletin readers. Then again, to impress the unappreciative public with the accomplishments of Taylorsville, the photographer might take a picture of the "Booster Organization" in a "Little Jack Horner" stunt.

Finally, we may remark that if the member of the Taylorsville force who searched laboriously through all the bulletins and tabulated the pictures and diagrams really finds the time during working hours hanging heavily on his hands, we can give him a live job at Englewood keeping track of the cars of dirt going into the dam.

Don Goes "Chicken Chasing"

Assisted by his party, Don Henry gave a hen of the wild variety a run for its life the other day, said hen having strayed far from its friends and relatives of the barnyard. Has anyone received an invitation to Henry's for dinner? No.

Miss Anna Jordan Enjoys Vacation

The office at Englewood has been decidedly out of gear for several days. We can easily account for this fact by the absence of Miss Jordan, who is taking a few days of rest and recreation. The fact that she returned in time to assist us in securing world series dope is worthy of our gratitude.

Mr. Rogers, the "Teacher"

Should anyone fall into possession of a few wood screws or a bit of varnish he will be rendering a service by turning over same to George Rogers. George has accepted the title of Manual Training Instructor at the Conservancy school and reports satisfactory progress in his new side line.

Prominent Resident of Camp Departs

With the city of Cleveland in view, Jack Owens and family left Englewood camp October 6th. The best wishes of all accompany you, Jack.

Kentuckians Visit the Camp

Mr. and Mrs. Thomas Cahill, hailing from the Blue Grass state, visited Englewood for a few days as guests of Mr. and Mrs. Albert L. Wald. An enjoyable time was spent, while views of the dam, camp and other points were of interest to the visitors.

Overheard in Division Office

Unassuming Inspector (Mike Cornish): "My head is pretty small to hit."

The question arises, why should Miss Jordan threaten to hit Mike's little head?

Dancing and Entertainment

The season of dancing and entertainment will be ushered into camp on Saturday evening, October 18. We trust that the spirit and enthusiasm displayed by the residents of the camp in the past will be in evidence again this year. We are stimulated in our belief by the fact that at a recent meeting of the association it was unanimously agreed to purchase a moving picture machine, while many good suggestions were offered for the furtherance of entertaining activities in camp. A committee appointed by Mr. McCurdy will arrange and manage social programs throughout the winter. The committee consists of the following: Mrs. Heller, Mrs. Mitchell, Mrs. Alpers, Mr. Quinlisk, Mr. Haskell, Mr. Cornish and Mr. Wald.

Wife of Superintendent Visits in Canada

Mrs. Richard Byers, accompanied by her daughter Anna, are visiting friends and relatives in Toronto, Canada.

Death of Prominent Resident

It was with surprise and sorrow that the many friends of Mr. F. M. Hunt learned of his sudden death which occurred Thursday morning, October 2. Mr. Hunt had been occupied as carpenter on the Englewood job for over a year. The jovial and convivial nature which he always displayed won for Mr. Hunt the good will and friendship of all those who knew him. The heartfelt sympathy of all is extended to his bereaved wife and relatives.

Returns from Overseas to Re-enter Conservancy Work

Mr. Thomas S. Mulheron was amongst those who took part in preliminary work on the various Conservancy jobs, in which he served as instrument man. Answering the call of the country, as did many other Conservancy men, Mr. Mulheron went overseas as a lieutenant in the army. Returning from his military duties, we are glad to welcome him to Englewood, where he is serving in the same capacity as before.

Card of Thanks

We, the undersigned, wish, through the columns of this paper, to express our sincere appreciation to the neighbors and friends for their many kindnesses shown to us in our bereavement of our dear husband and father, and for the beautiful floral offering; also to Mr. Bjorgum for his consoling words.

Mrs. Margret Hunt and Family.

Englewood School News

There were two interesting events in the past month. The first took place one Friday morning when we had a storytelling contest to interest the kindergarten children. Seven boys and girls from the upper grades took part in it. The stories were: "The Little Bull Calf," "The Gingerbread Boy," "The Golden Cobwebs," "The Dog and the Kitty Cats," "Jack and the Beanstalk," "Cinderella," and "The Pig Brother." The little children decided that Glenn Gibson, Chester Patrick and Valentine Stock were the best story tellers.

The second event happened one afternoon. We had just come in from recess when we were asked to return to the playground to play again. To our surprise we found that there was a moving picture machine there to take our pictures. The boys and girls hope soon to see themselves as others see them.

Mary Williams, Eighth Grade.

Now is the Time

Now is the time to patch that crack
That lets the cold wind in the shack,
When Boreas lights on the land
And roars around to beat the band!
Touch up the old snow shovel, too,
And scrape the whiskers from the flue,
And renovate the furnace grate
While days are yet warm—get a gait!
Dust off the old felt boots and hat,
And knit a sweater for the cat;
Root out the flannel beeveedees,
Lay in a stock of tripe and cheese
Ere winter strikes you unaware,
And fills your brow with lines of care.
In time of peace, prepare for war!—
(As Rip Van Doozle one time swore).
Can up a hod or two of beets
And yams and other garden eats;
And bake a crock of ginger cakes
And dry a string of crawdad steaks.
Get ready! for the time is near
When howling zephyrs cold and drear
Will seal you tightly in your dump!
Now is the time to get a hump!

—Elldce.

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.....	Mrs. C. C. Chambers
Hamilton.....	R. B. McWhorter
The Woman's Club, Dayton, Ohio.....	Miss Mayme McGraw
Dayton Warehouse.....	J. T. Hall

G. L. Teeple Takes Vacation

Even editors have to take vacations sometimes. And so it happens that in the absence of the regular editor of the Bulletin, who is enjoying a restful sojourn in Chicago, this month's issue was gotten out by the editor pro tem. If, therefore, you don't find your name mentioned in the usual column, or notice a departure in the customary appearance of things, it is because the editor pro tem was not familiar with the correct use of Mr. Teeple's editorial shears and paste pot.

Propaganda League Still Active

The propaganda league, referred to in our last issue of the Supplement, is still active. A delegate from Taylorville called at the editor's office recently and let it be known that moving pictures are after all the only kind that will do justice to the Taylorville job. According to this booster, there is no still life there, and it takes a fast reel to keep up with developments.

WITH THE MOVIE PHOTOGRAPHER

We accompanied Mr. Gilbert, photographer for the N. C. R., on some of his recent trips to take moving pictures of the Conservancy work. It was a novel experience, and taught us a few things we had not known before about the cussedness of inanimate things and the unreliability of most animate things, including machinery in operation.

We began by inviting Mr. Gilbert and the Hon. Picture Machine (it is worth more than a cheap human life) on board the Dorothy Jean, in order to take pictures of a dragline excavator which was busily engaged in eating up a small island.

The thing looked easy, but after an hour's strenuous work we decided it was not. The steamer did her best and gave a remarkable exhibition of naval maneuvering, but in spite of it all we either got too close up or were too far away, and meanwhile the sun would not wait but insisted on getting nearer and nearer the house tops. The dragline, in its frantic efforts to look pleasant, overloaded one scow, and all but let another get away from her. The Dorothy Jean, seized with pangs of hunger as the result of her evolutions, rashly ate a few big spoonfuls of soft coal and promptly belched forth enough black smoke to cover up the interesting part of the landscape just as the picture machine was clicking away at a good rate. Those were dark moments. But the Dorothy Jean was not the only sinner in this respect. It seemed as if the whole plant of the Conservancy District was run with soft coal instead of electricity when it came to taking moving pictures.

Wherever the party went, whether its coming had been heralded in advance or whether it just happened to bump in unannounced, always there were factors at work to cause vexatious delays. Once a large dragline that had been doing noble work, at the very instant that its picture was to be taken, quietly laid down its big bucket on a favorite spot, and settled down—perhaps having worked itself out of breath—to eye the party of fidgeting photog-

raphers with the utmost complacency. Our big megaphone inspired it into action again. Another time a dinky locomotive whose presence at the moment was greatly desired to inject life into a dull part of the landscape, experienced a sudden thirst, shunted off to a hydrant, and lingered away many precious minutes filling up its saddle bags.

We spent a brief eternity on the airy veranda of a gravel washing plant chasing cloud shadows over the landscape with our eyes. If we only could get those spots off, what a panoramic view it would be. But the clouds kept coming and even the megaphone, our last resort in emergencies, was useless. Despondently we leaned on the flimsy rail until it seemed the strain on it would exceed the specifications. But virtue, even way up there, had its own reward, and in time the clouds departed and the reel did the rest.

Engineers and superintendents made poor movie actors, so we found. We tried to catch them in their picturesque native garbs, preferably with portions of dam sticking to their jeans, but did not always succeed. One division engineer appeared in a clean shirt and white collar (we blame it on his wife), and looked like a deacon alongside of his associates. The best actors were the school children. There was nothing strained about their romping, and being themselves probably close observers of moving pictures, they were careful not to look at the camera. We discovered at least two Douglas Fairbanks and one Elsie Ferguson among them.

One of these days when the film is completed it will be shown at the different camps, and you will be given an opportunity to see yourselves as others see you.

LOCKINGTON

Mrs. Walter J. Smith and daughter Betty have returned from a visit with relatives in Dayton.

Mrs. Herman T. Meiners had as her guest for a few days during the past month her sister, Mrs. J. M. Crabtree of Dayton.

Mr. and Mrs. F. B. McWilliams of Columbus, Ohio, and Miss Betty McWilliams of Newark, Ohio, were recent visitors at the home of Mr. and Mrs. L. J. McWilliams.

Much interest was displayed here during the late World Series, and it was rumored that should an eighth game become necessary it would have been played in Lockington. Mr. Frank Watson and Mr. Billy Ginn were the most enthusiastic white hose rooters, and Kid Gleason had nothing on them for disappointment at the showing of the Sox. Before the series our Master Mechanic was of the opinion that his Lockington Dam team could have trimmed the Reds.

The many Lockington friends of Mr. H. Ellis Sibley are pleased to learn of his decoration for distinguished service by the French Government. At the time Mr. Sibley left we knew that we would hear further from him, and now we extend our most hearty congratulations.

HAMILTON

Division Engineer and Mrs. C. H. Eiffert have had as their guests Mr. and Mrs. William Eiffert, of Rock Island, Ill., parents of Mr. Eiffert. Their visit was enjoyed by all who met them, and we trust they will come to see us again.

Mr. and Mrs. A. F. Griffin have as their guest, Mrs. Cutler, of Worcester, Mass., mother of Mrs. Griffin.

Richard Young, locomotive fireman, is detained at home by the serious illness of his mother.

The bowling season has started and our team is meeting regularly every Tuesday evening. Some of the members seem to have gained skill over the holiday, Messrs. Eiffert and W. A. Roush rolling over 200 at the second meeting.

Mrs. G. W. Schrader visited relatives in Dayton, and also at Saylor Park this month. Mr. and Mrs. Schrader have had as their guests, their mother, Mrs. Colley of Dayton, and Mr. and Mrs. Frank Blessing of Dayton.

Miss Gladys Truesdell, of Chicago, is visiting her sister, Mrs. C. H. Eiffert, on North "F" Street.

THE MIAMI CONSERVANCY BULLETIN

GERMANTOWN

On October 3, a "Wiener Roast" was given by the folks in camp. A large bonfire was built for the purpose of roasting the wieners and toasting delicious marshmallows. Dancing and music furnished a part of the evening's entertainment.

Friday evening, October 12, the ladies of the camp held another dance. The music was furnished by members of the camp. The latter part of the evening, refreshments were served.

A Hallowe'en dance was given in Germantown, Saturday evening, October 25, which was largely attended by residents of Germantown camp.

HUFFMAN

Clem Shertzinger returned from his vacation on October 12. After seeing the opening game of the world's series at Cincinnati, he returned and took his family on a motor trip to Columbus and vicinity.

Mrs. Burns was surprised by a visit from her mother and two sisters who came on October 4 to remind her that it was her birthday.

Mr. B. V. Chambers made a trip to Dillonvale, Ohio, on October 3. He went enjoying single blessedness and returned with a Mrs. B. V. Chambers accompanying him. In order that there should be no misunderstanding about which cottage would be theirs, they found it well labeled with signs. The next evening the old shotguns, tin pans, and other noise producers were brought out and the bride and groom officially welcomed to Huffman Camp.

Mrs. Shertzinger was hostess to the Sunshine Circle on September 24, and the club was entertained by Mrs. Steadman on October 8.

A very enthusiastic French class has been organized to meet every Friday evening with Mrs. Madigan as instructor. Judging by the hilarious noises coming from the first meeting they are not going to be dull.

Mr. Ben Rogers has resigned his position as Field Clerk to accept a similar one with the Park-Moran Construction Company of Okmulgee, Okla. He and Mrs. Rogers left for their new home on September 30. They are both very much missed by their many Huffman friends who wish them much success in their new location.

Miss Darnell and her mother have moved into the cottage formerly occupied by the Rogers.

Mr. and Mrs. W. B. Hodge announce the arrival in their home, on October 19, of Mary Jane, a baby girl.

TAYLORSVILLE

It is with much regret that we announce the departure of Mr. and Mrs. J. E. Eberly. Mr. Eberly's long term of service with the Conservancy District came to a close October 31, when he left to take a position offered him by The Rudolph Wurlitzer Piano Company of Dayton. Mr. Eberly filled successfully the positions of stenographer, head stenographer, and head timekeeper at the Dayton Office, and for the past six months has been field clerk at Taylorsville. We wish him all manner of success.

DAYTON WAREHOUSE

Warehouse Fire Department

If you want to see some real speed in fire protection, watch the fire department at the Warehouse. Seven lines of hose cut in 38 seconds. Going some, eh?

Warehouse Bowling

Mr. Everhardt of the Warehouse has issued a challenge to any of the jobs in the District to a series of bowling games to be rolled in Dayton or any other alleys available.

Even the Rain Don't Stop Him

Ask the boys in the shop if they see "Humpy Hagerman" going after material in the yard oftener now than they did before the "No Smoking" signs were put up.

Miss Pearl Fowler has been transferred from the Headquarters Office to the Warehouse Office, where she is filling the place left vacant by Miss Osgood's departure.

CONSERVANCY BOWLING LEAGUE

Team	Standing of the League, October 15, 1919		Pct.
	Won	Lost	
Rustlers	18	0	1.000
Mekanix	11	7	.611
Purfics	8	7	.533
Railroads	4	8	.333
Tee Squares	5	13	.277
River Imps	2	13	.133

JOIN THE RED CROSS

*If You Have a Heart for Your Fellow Man You
Will Have a Dollar to Give to the Red Cross.*

IF YOU DO NOT KNOW

what the activities of the Red Cross are in these so-called peace times, visit the Montgomery County Headquarters of the Red Cross in Dayton, on Second Street, between Main and Ludlow, and spend a few hours watching the various divisions at their work.

Watch the human beings who come in there seeking relief; hear their stories, some real, some faked—and see for yourself how modern Red Cross methods deal with such cases. You will go home feeling that you have learned something you did not know before. These are not the days of old time charities. Out of the World War have grown conditions which only The Red Cross Can Handle.

*Your County, Your State, Your Country Needs This Organization,
and Will Continue to Need It for Some Time to Come.*

THE MIAMI CONSERVANCY BULLETIN

DECEMBER 1919

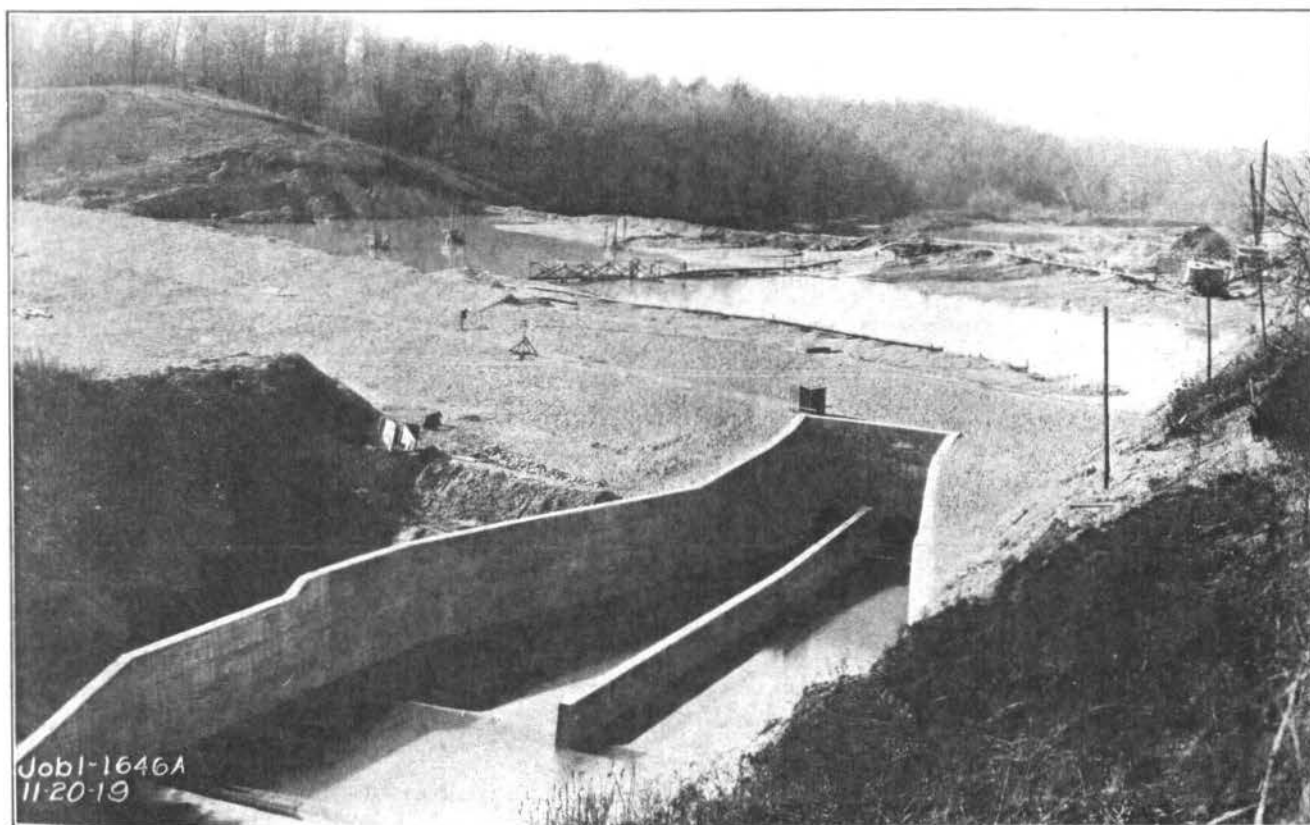


FIG. 54—OUTLET AND HYDRAULIC FILL AT THE GERMANTOWN DAM NOVEMBER 20, 1919



FIG. 55—BUILDING FIRST SECTION, ENGLEWOOD DAM, NOV. 11, 1919

This section is east of the river, the old channel of which is now occupied by the dead water in the foreground, the river itself flowing through the finished conduits, which are out of the picture, to the right. The top of the upstream slope (at the left) is about 57 feet above the base, the average elevation of the section about 50 feet. It will be carried about 10 feet higher and then left temporarily till the other sections are brought up correspondingly. The final height will be about 56 feet higher than the top as it is in the picture.

The material is of earth, excavated in the valley bottom above, mixed with water and pumped to a pool on the top of the embankment through the two lines of pipe seen climbing the slope.

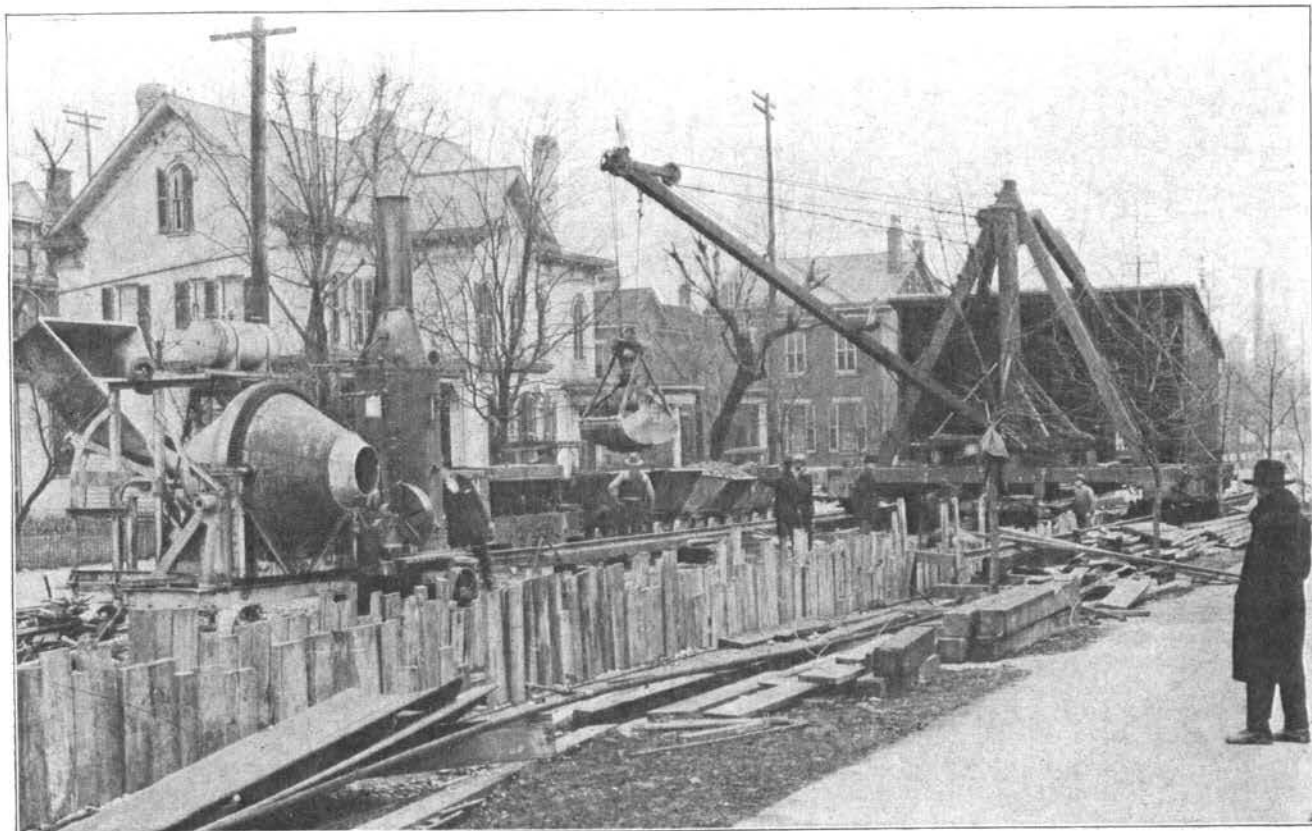


FIG. 56—SEWER EQUIPMENT ON BUCKEYE STREET, HAMILTON

A view of the equipment used in building the Hamilton storm sewers, consisting of a $\frac{1}{2}$ -yard Smith concrete mixer, portable electric derrick with $\frac{3}{4}$ -yard clamshell bucket, a 3-ton Plymouth gasoline locomotive and four $1\frac{1}{2}$ -yard side dump cars. This picture was taken on Buckeye Street near Third. Taken Nov. 20, 1919.

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 2

December 1919

Number 5

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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.

Annual Report of the Board of Directors

The Second Annual Report of the Board of Directors of the Miami Conservancy District, giving an account of activities for the period from October 1, 1918, to September 30, 1919, is about to be filed in the Court of Common Pleas of Montgomery County. It consists of 34 pages of text followed by a full statement of receipts and expenditures for the year ending July 31, 1919.

In the first ten pages is given a brief review of the principal phases of the District's affairs, such as the cost of executing the Official Plan, the labor situation, bond sales, tax collections, disposal of lands owned by the District, audits of accounts, and the more important litigations pending.

Twenty-four pages are devoted to matters pertaining to engineering and construction, a separate report of progress being given for each major division of the work.

Generally speaking the Miami Conservancy District has passed through a favorable year for its construction activities. The mild winter of 1918-1919 proved of great advantage and made it possible to advance by several months the progress on some sections of the work, over what had been anticipated. As a result a material degree of protection against floods has already been provided. The high water of March, 1919, did not injure either the uncompleted parts of the work nor the equipment used in its construction, but caused progress to be delayed for a short time.

The labor situation has been satisfactory; the men seem especially well satisfied with living conditions

at the construction camps, the general record of health and accidents has been very favorable, and the labor turnover has been much smaller than on similar work elsewhere.

The year 1919 was marked by the completion of the outlet structures at four of the dams, and by the finishing of the new railroad locations. Work on the dams themselves has progressed satisfactorily. It has also been carried on at all other localities required in the Official Plan, with the exception of Tippecanoe City, Troy and Piqua.

A New Book by Professor Mead

Every work written by Professor Daniel W. Mead of Madison, Wisconsin, consulting engineer of the District, is sure to be interesting to engineers; but his latest book, entitled "Hydrology," is of particular value to the engineering staff of the District on account of its intimate connection with the problems encountered in the evolution of the local flood protection plans.

This volume of over 600 pages is a most complete, satisfactory, and authoritative treatment discussing every engineering aspect of the origin, occurrence, and distribution of rainfall, with considerable account of the control, utilization, and ultimate disposition of the waters resulting from rainfall after they reach the earth's surface.

The general fundamental laws relating to hydrologic phenomena are stated and discussed in a manner applicable to all parts of the earth, but the detailed applications are restricted chiefly to this country. The book is a treasure mine of useful ob-

servational data collected throughout the United States, and far surpasses in this respect any similar book hitherto available.

After discussing general atmospheric conditions, winds, and storms, the measurement of rainfall is taken up, followed by a long description of the variations in rainfall throughout the United States, and of the causes and nature of these variations.

The last third of the book considers stream flow, the conditions determining the amount of run-off and its variations, and concludes with a discussion of floods. There are many references in the book to the studies made by the engineers of the Miami Conservancy District, and frequently the data obtained by the District is quoted.

Many of the subjects touched upon could not be exhaustively treated in a single volume of this kind, but to each chapter is appended a carefully selected list of references to specialized literature on the topic under discussion, forming a most valuable feature of the work. The volume contains a useful index.

Professor Mead is a leading and eminent authority in this country on the subject of this volume, and has produced a work which is a most valuable addition to the engineering literature of the subject, a work which no engineer engaged in this field can afford to be without.

S. M. Woodward.

Charles H. Locher in the American Magazine

An interesting article in the December number of the American Magazine is devoted to an appreciation of the life work of Charles H. Locher, Superintendent of Construction for the District. It has been the observation of the Bulletin Editor that much of this sort of thing contains very considerable percentages of bunk and he is therefore pleased to be able to recommend the present article to Bulletin readers as being singularly free from that ingredient. It is a sketch of Mr. Locher done largely in words from his own lips. Those who know the man can hear the intonations of his voice as they read, so true is the impression which the article conveys. The writer, "Allison Gray," probably a pen name, clearly knows her business. Mr. Locher is a modest man and an interview with him concerning the work of his life is not easy to secure. He did his best to squirm from under, but "Allison Gray" pinned him firmly and he was obliged to deliver the goods. What he gave, the writer had the skill and the discernment to give as he gave it, although no doubt with some rearrangement, such as the necessities of an article of the kind required. The result is an uncommonly truthful picture. If anybody, friend or enemy, wants to know what kind of man is directing the construction work of the Miami Conservancy District, he can easily find out. Read that article.

Farm Circular No. 4 Issued

Farm Circular No. 4, of the series issued by the Land Division of the District, is now off the press. Its purpose is to furnish prospective purchasers a clear guide to the use of the leaflets describing the individual farms, so that they will know what the probable conditions will be during floods on any farm in any retarding basin, especially as to the

elevations of the buildings and whether it will be necessary to move these to comply with the rules for safety established by the District.

These leaflets are being issued in numbered series as needed, one to each farm as it comes up for sale. Each leaflet gives the location, nature of soil, etc., and also the elevations of the buildings and of the bottom and uplands. Farm Circular No. 4 gives the elevations which would have been reached by every notable flood between 1893 and 1919 in each retarding basin, supposing the dams in existence; also the spillway levels. Used with the leaflets it is thus a complete guide to flood conditions for every farm in the Conservancy District. The rules of the District require the buildings to be moved to higher ground if they are more than 10 feet below spillway level for the basin in which they lie. A removed building is not allowed to be rebuilt more than 5 feet below spillway level. (Some exceptions are made to these rules where the lay of the land is especially favorable for safety to the residents during floods.)

Copies of the new circular can be obtained free by addressing the Miami Conservancy District, Farm Division, Dayton, Ohio.

Coal and Copper

Apropos of the coal famine, friends of the Conservancy may be glad to know that sufficient coal for the needs of the District through the coming winter was bought last May at the low figure of \$1.84 per ton f. o. b. mines. It was secured in West Virginia, the quantity being 27,000 tons. The price of the same coal, before the present flurry, was \$3.50 per ton for this grade of coal. Saving \$44,800.00.

Another item of interest is the purchase of copper for overhead and trolley wire construction for the Ohio Electric Railway. This material, amounting to over 100,000 pounds, has not yet been put into the line. It was bought, however, last April, when the price was at or near the bottom of the notch. The advance since then has been about 58 per cent, representing a saving on this item of over \$10,000.

These figures are given, not as exceptional, but to show that the Purchasing Division under the leadership of Fowler S. Smith, is also "onto its job" and holding up its end.

Influenza and the Conservancy Medical Service

The coming of the winter, and the sporadic recurrence of the epidemic in various quarters, has called attention once more to the influenza. Dr. W. M. Smalley, the Conservancy physician, reports that there have been so far this season among the workers of the District about a dozen cases of the disease. These have all been light, and easily taken care of. He considers that while reasonable precautions are naturally advisable, there is no need for alarm. Theories of the disease have been pretty much exploded and there is yet no known specific. The disease is contagious and probably microbic, but the microbe has never been isolated, nor a "serum" or "culture" giving immunity discovered. The best preventives are the simplest—sunlight, fresh air and plenty of them. Don't be afraid of having a window open. Sleep always with a window open. Don't be afraid of fading rugs or cur-

(Continued on page 79.)

Building the Hamilton Storm Sewers

Three Concrete Sewers, 4' to 5' 8" in Size, and Totaling 4160' in Length, Have Been Built.

By R. B. McWhorter, Assistant Division Engineer

Three storm sewers have been built as a part of the local flood protection work at Hamilton. The largest of these is located on Buckeye Street, and extends from the tail-race, between Fourth and Fifth Streets, to the river; another is located on Wood Street and extends from Second Street to the river, and the third one is located on Front Street, running southerly from the old Crawford's Run channel to South Avenue, thence westerly to the river. The map of Hamilton, on page 27 of the September, 1919, issue of the Bulletin, shows the location of these sewers.

The Buckeye Street Sewer

There is an area in the northeast part of the city from which the storm sewers drain into the tail-race, which until recently, flowed northerly to Old River. This tail-race was a part of the Hamilton and Ross-

ville hydraulic and was abandoned for power use with the other parts inside the corporation limits. Its outlet was closed by the Old River improvement, and the sewers that empty into it are now served by the Buckeye Street intercepting sewer, which connects with the tail-race. The maximum flood stage to be expected at Buckeye Street is elevation 589.5 feet, or about 3.5 feet lower than at the tail-race outlet, a noteworthy advantage of the new location.

This sewer is made of reinforced concrete, horse-shoe shaped, inside dimensions 5'-0" x 5'-8", and is 1868 feet long. Figure 60 shows its cross-section and design of forms in detail. It connects with the tail-race 300 feet east of Fourth Street and runs westerly, 9 feet north of the south curb, to the river. The elevation of the flowline at the connection with the tail-race is 577.0 feet. There is a change in grade at Third Street, 740 feet from the tail-race. Above this point the grade is 0.45 percent, and below it 0.40 percent. The sewer has an inside sectional area of 24.5 square feet, and is capable of discharging about 200 cubic feet per second. There is a gate manhole about 70 feet back from the outlet, in which a flood-gate will be operated during extreme flood stages. A standard manhole was provided at each street intersection, through which there can be no overflow, even with the flood-gate out of commission, as the street surface is from 6 inches to 6 feet above the maximum flood level. The gate will protect the ground surface from flooding should the river level approach the top of levee, which, at Buckeye Street, is 4 feet above the estimated maximum flood level.

Excavation. The excavation was begun at the lower end of the trench, the plant used consisting of an electrically operated traveling derrick, fitted with a $\frac{3}{4}$ -yard clamshell bucket, and mounted on a 28-foot gage track, straddling the ditch; one 24-inch gage Plymouth gasoline locomotive, four $1\frac{1}{2}$ -yard rocker dump cars, and 420 feet of track laid with 30-pound rail. The track was placed alongside the ditch at a convenient distance for the derrick to load the cars. The amount of material by which the excavation exceeded the backfill was wasted on the river bank south of the outlet to be later removed by the large river excavating machine. The depth of cut ranged from 14 to 24 feet.

A stratum of hard, tough, blue clay, varying in thickness from four to seven feet, and lying from eight to ten feet below the surface, was found, extending from the outlet to a point some 450 feet up the trench. This material was difficult to remove and impeded the progress, increasing the expense considerably during the first month or so. Dynamite was used, but not very effectively. The clay proved to be too soft to blast and too hard to be handled satisfactorily by the clamshell. West of Front Street the material other than the clay consisted of cinders and loam. From Front Street to Fourth Street, three or four feet of surface loam was underlaid by clean gravel and sand, suitable for use in concrete.

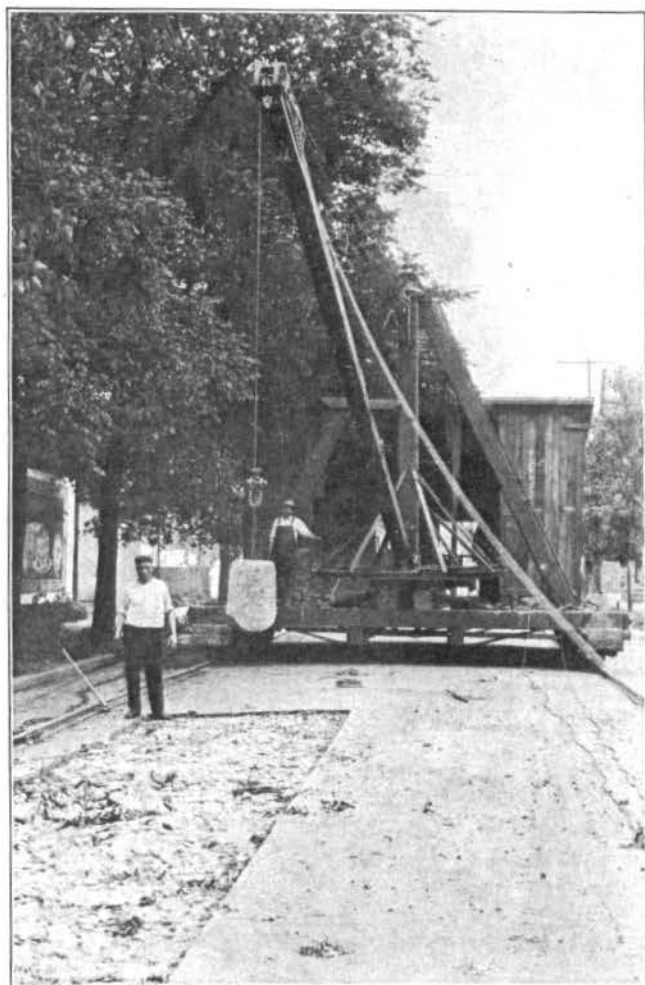


FIG. 57—BREAKING CONCRETE PAVEMENT, HAMILTON

The 6-inch concrete pavement base on Wood Street was broken by dropping a 1-ton hammer on it, worked by the excavating derrick, thus averting the laborious process of breaking it with a sledge. At Buckeye Street the concrete base, owing to its inferior quality, was readily removed by the clam-shell bucket. Taken June 2, 1919.

Because of the nature of the soil and the depth of the trench continuous sheathing of the sides was necessary. Fig. 62 shows the method of shoring the trench.

A street railway line runs up Third Street to Black Street, under which the sewer trench was passed, thereby necessitating an interruption of the service north of Third Street. As the patronage on that part of the line is small, except during the early morning and late afternoon hours, the service was suspended during the day for the few days the derrick was working over the track. Provision was made to pass the cars up to 8:00 a. m. and after 4:00 p. m.

The double track main line of the Baltimore & Ohio Railroad crosses Buckeye Street at Fourth Street, and the sewer was carried under these tracks by means of a tunnel. The tunnel was 48 feet long, of cap and leg construction, sheathed overhead and on the sides. The sections shown in Fig. 58 give an idea of the manner in which the tunnel was built. To guard against possible settlement of the tracks four 8" x 16" stringers, 30 feet long, were placed by the railroad company symmetrically under each rail, each resting on four 16-inch square mudsills, one placed on either side of the trench and one at either end of the stringers. After completing the sewer through the tunnel the remaining space was packed full of loam sand, care being taken to leave no voids. The temporary timbers under the tracks were then removed, and the original condition restored.

Concrete. A ½-yard Smith portable tilting mixer and wood chutes were used for mixing and placing the concrete. The "trench run" material supplied both the fine and coarse aggregates, as frequent screening tests made throughout the work indicated that no screening was necessary. These tests, through ¼-inch screens, showed the ratio of gravel to sand, with only one exception, to range from 2½:1 to 2:1. Sufficient cement, as determined from the tests was used to maintain a ratio of 1:2 between cement and sand, and enough water was used to make a mix that would move down the chutes with slight assistance from a hoe or shovel. Both water and aggregates were heated during freezing weather, and the fresh work was covered with tarpaulins under which salamanders were placed. However, the winter of 1918-19 was very mild, and heating was necessary in only a few instances. A layer of

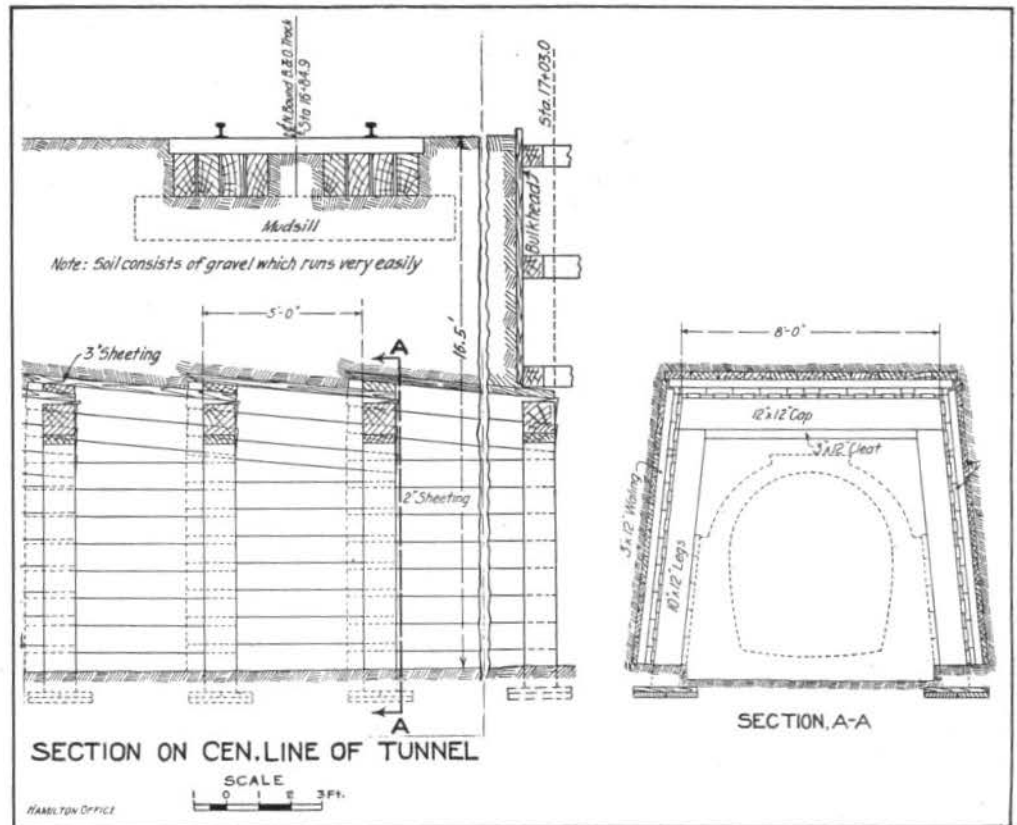


FIG. 58—TUNNELING UNDER THE B. & O. R. R., HAMILTON

tar paper prevented the concrete from coming in contact with the sheathing.

Fig. 60 shows in detail the forms used, and the methods employed to hold them in place. It also shows the sequence of the concreting operations. Forms were left in place till the second day after concrete was placed, usually from 40 to 48 hours.



FIG. 59—WOOD ST. SEWER TRENCH, HAMILTON

View of the Wood Street trench, west of Monument Avenue. The fine loamy sand on this portion of the sewer required but little shoring. However, this condition did not prevail on most of the trench. The water main seen against the bank was successfully jacked over from the middle of the trench without interrupting the water service. It was necessary to recalk only a few of the joints. Taken June 2, 1919.

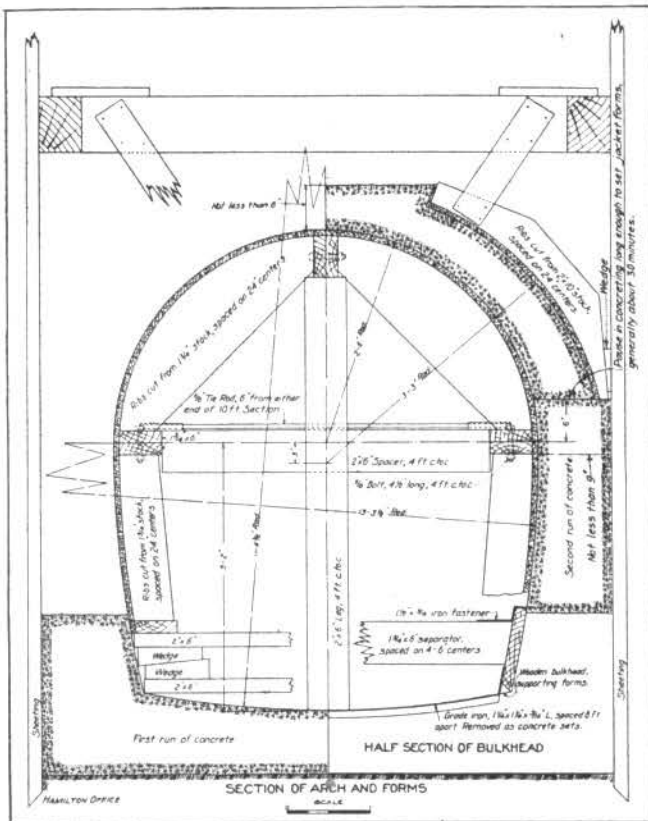


FIG. 60—SECTION BUCKEYE STREET SEWER

Backfilling. The backfilling was done by shifting the dinkey track so that the cars could be dumped into the trench. A stream of water was played upon the fill constantly and lumpy material was not allowed to remain unpuddled. The backfilling was kept close up with the concrete, and the sheeting was pulled soon after the trench was filled. A heavy timber "horse" and a block and tackle rig were used for this purpose, the power being furnished by either the gasoline locomotive or a 5-ton motor truck. Voids left by the sheeting were flushed with water. Elevations taken in sanitary sewers near the trench and parallel to it showed no settlement. However, it was necessary to remove parts of the pavement adjacent to the sheeting, because of the poor condition of both the concrete base and the wearing surface.

The street was repaved about three months after the backfilling was completed. A 10-ton road roller was used to compact the sub-grade, upon which a 6-inch base of 1:2½:6 concrete was laid. The asphalt was placed by the Andrews Asphalt Paving Company of Hamilton.

The sewer was begun in August, 1918, and completed in April, 1919. The quantities were as follows: Earth excavation 11,453 cubic yards; rock excavation, consisting of old foundations and concrete base, 303 cubic yards; concrete 1133 cubic yards; reinforcing steel 79,600 pounds.

Wood Street Sewer

In the central part of the city there is an area of about 132 acres, which until recently was served by a storm sewer on Wood Street discharging into the river north of the Columbia bridge. This sewer

has a manhole at each street intersection, and as the surface of Wood Street, west of Second Street, is below the maximum flood stage to be expected (elevation 586 feet), it was necessary to place a flood-gate at its outlet. A reinforced concrete circular storm sewer, 4 feet in diameter and 1588 feet long, has been built on Wood Street, from Second Street to the river, parallel to the old sewer, to drain by gravity during extremely high river stages the 106 acres of the aforementioned area lying above elevation 586 feet. The desired condition was obtained by building a tight sewer and connecting it with the old sewer at the existing manhole at Second Street, leaving a dead end on the old sewer at which a standard manhole was built. The elevation of the flowline at the connection is 580 feet (the street surface here being elevation 590 feet) and the new sewer is built on a grade of 0.6 percent, having a capacity of a little over 100 cubic feet per second. On the river side of the levee the old sewer was connected with the new one, a gate manhole being built in the old sewer at the levee. Thus for all ordinary stages of the river the 26 acres still served by the old sewer are drained through the outlet of the new sewer. There are no manholes or other openings in the new sewer except a standard manhole at the center line of the levee, the top of which, at elevation 589, is flush with the top of the levee. West of the levee the sewer is of horseshoe shape, on a grade of 9.7 per cent. As a precaution against underwashing the outlet structure and the horse-

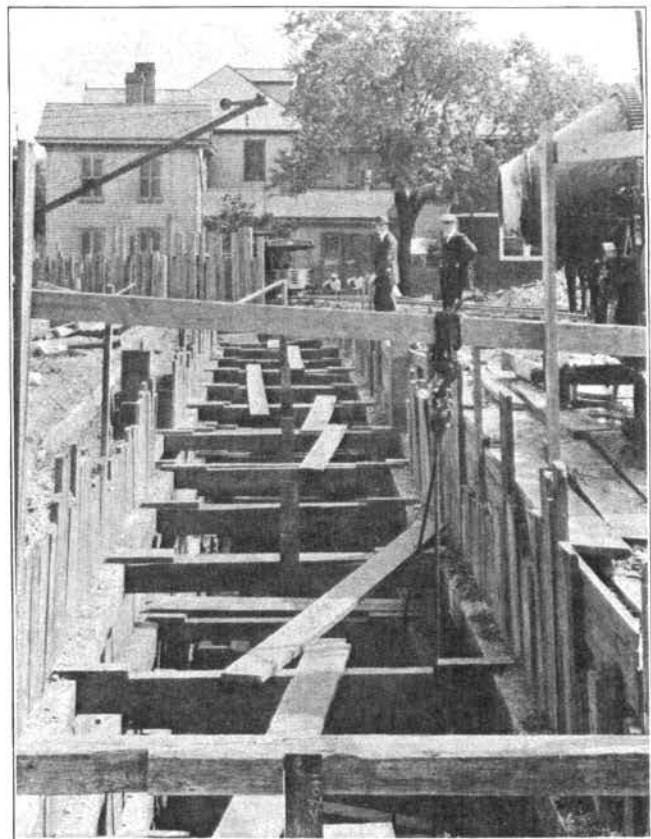


FIG. 61—TRENCH TIMBERING, HAMILTON

Buckeye Street sewer trench showing method of timbering. The depth of cut here was 23 feet, only one foot less than the maximum attained on this work. The trench is 8 ft. 10 in. wide at the top. This picture was made near the lower end of the sewer. Taken Sept. 9, 1919.

shoe portion of the sewer were built on timber piles. Fig. 63 shows the sewer from the outlet to the levee and also shows the connection at Second Street. The piles under the outlet structure range from 23 to 28 feet in length, and the balance from 15 to 20 feet.

The excavation, concreting and backfilling operations were practically the same as at Buckeye Street, the same plant being used. The depth of cut was 18 feet at the outlet, and ranged from 7 to 10½ feet on Wood Street. The deepest excavation was about 6 feet below the river level at that time, necessitating pumping, a 4-inch centrifugal pump driven by a 25 horsepower electric motor being used. Wood Street is paved with asphalt on a concrete base east of Monument Avenue, and to facilitate its removal the concrete was broken by dropping a 1-ton hammer on it by the derrick. The asphalt was cut by an improvised rolling disc, placed on a

pin between the timbers, and wedged under the derrick.

The street has not, as yet, been repaved. This will be done in conformity with the original specifications.

The job was begun April 9, 1919, and completed July 31, 1919, the quantities being as follows: Earth excavation 4600 cubic yards; rock excavation 186 cubic yards; concrete 665 cubic yards; reinforcing steel 21,700 pounds; timber piles 900 lineal feet.

Front Street Sewer

There is an area lying between Wood Street and South Avenue that has been served by a storm sewer that runs southerly on Front Street to a manhole at the old Crawford's Run crossing, thence westerly in an open channel to the river. A sewer connecting the manhole with the low ground east of Front Street serves the old Crawford's Run drainage area. The outlet was closed by the recently constructed levee, and a plain concrete circular sewer, four feet in diameter and 704 feet long, has been built to drain the areas mentioned, which total about 112 acres. This sewer connects with the manhole referred to, and runs southerly along Front Street to South Avenue, thence westerly to the river. The maximum flood stage to be expected at its outlet is elevation 585 feet. The elevation of the flowline at the upper end is 567.44 feet, and the grade is 0.55 percent, the maximum capacity being about 100 cubic feet per second. This location was selected with the idea of draining still another area, farther south, in the event of a storm sewer being built on South Avenue. The cross-section of this sewer is the same as that of the Wood Street sewer. There is a gate manhole at the intersection with the levee, back of which no openings were placed.

Construction methods were the same as at the other sewers, but the trench was not completely backfilled because this portion of Front Street is within the limits of the spoil bank to be filled by the excavation from the river channel. The average cut was about twelve feet, and the material removed consisted mainly of rubbish from the city dump. This part of Front Street has never been paved. Excavation began August 13, 1919, and the sewer was completed October 18, 1919. The quantities consisted of 2750 cubic yards of earth excavation, 310 cubic yards of concrete, 1700 pounds of steel, and 680 lineal feet of timber piles.

C. H. Eiffert, Division Engineer, is in charge of the local flood protection work at Hamilton, and the writer, as Assistant Division Engineer, has had direct charge of the sewer work. F. C. Williams served as superintendent from the beginning of the work to March 1, 1919, when he resigned and was succeeded by W. A. Roush.

Hydraulic Fill at Germantown Dam (Fig. 54)

The Germantown dam is the first to reach the stage where it blocks the valley from hill to hill, effecting thus what is called "closure," and giving some measure of flood protection. The top is now about 44 feet above the old bed of Twin Creek. The stream, which formerly ran along the foot of the farther valley slope, now passes through the concrete conduits provided, issuing through the openings seen in the foreground. The bridge carries the dredge pipe line across the hydraulic fill pool.

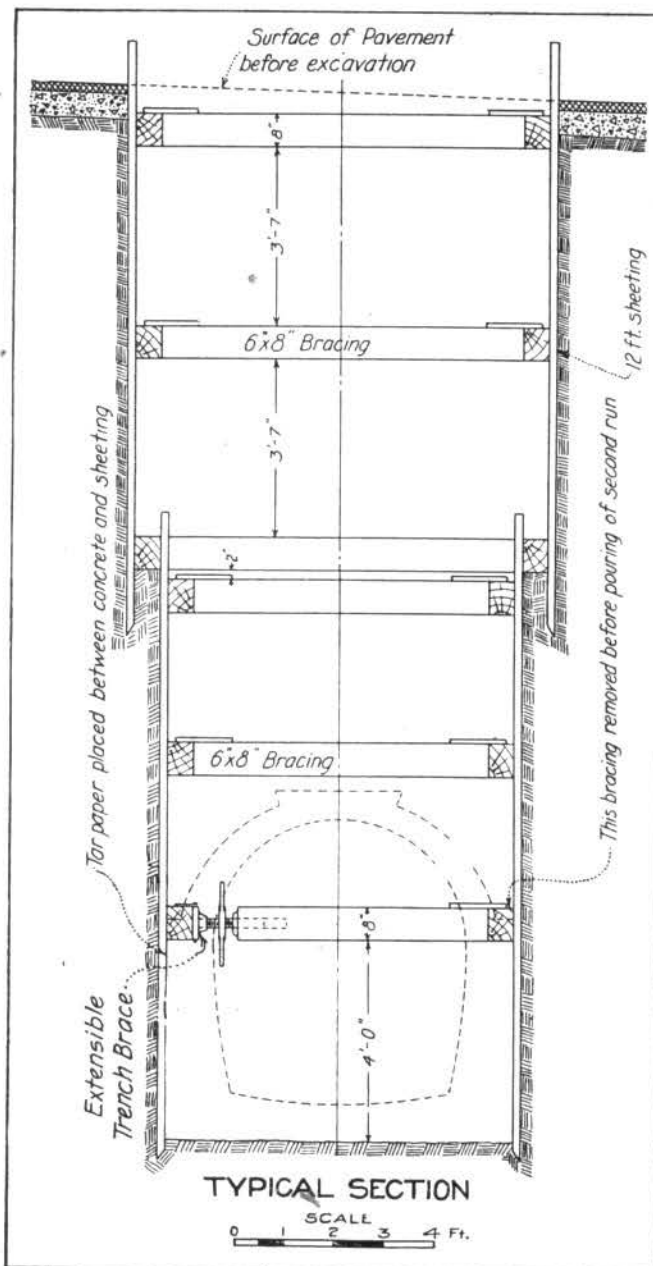


FIG. 62—BUCKEYE STREET TRENCH

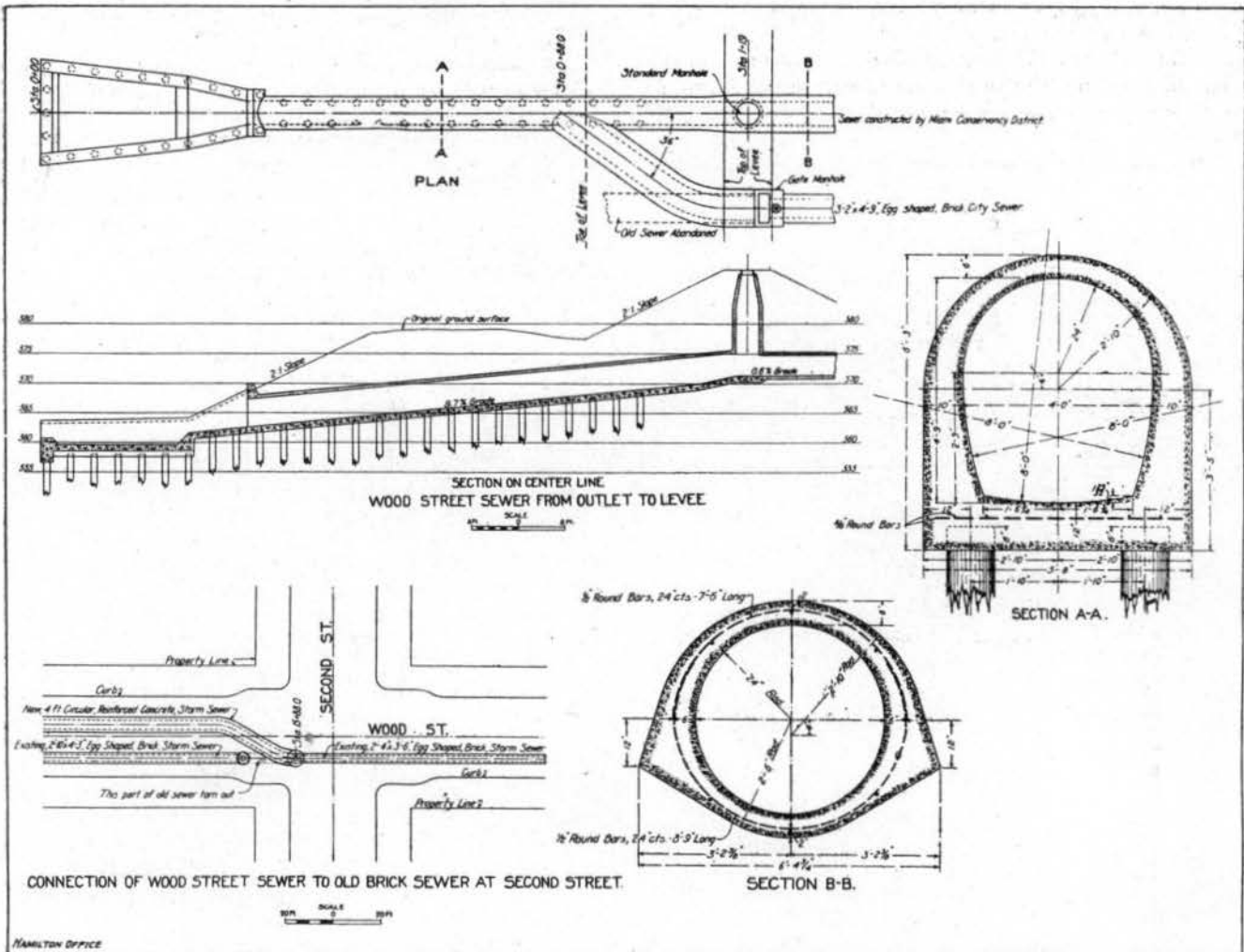


FIG. 63—PLANS AND SECTIONS, WOOD STREET SEWER, HAMILTON

November Progress on the Work

GERMANTOWN

The rate of placing the hydraulic fill was greatly increased during October over the previous months. The total amount of material placed for the month was 91,500 cubic yards, bringing the total placed in the dam at the end of October to 268,000 cubic yards. This is approximately 32 per cent of the total hydraulic embankment to be placed. The increased rate is due to the installation of larger shoes than had heretofore been used on the 36-inch runners, and to a decrease in delays from the dragline. The number of cars delivered to the pumping plant from the dragline during the month was 7,025, an increase of 1,038 cars over the previous month.

The work of protecting the upstream slope of the dam by paving it with the oversize rock from the pumping plant was started during the month. The rock is placed in a 4-yard dump-car at the pumping plant by a derrick and hauled by a Plymouth locomotive to the dam.

The Marion dragline, after being down for repairs, is again at work building the slopes of the dam. At present it is working on the upstream slope.

Work on the spillway is progressing satisfactorily. Teams are used to excavate the material when they are not in use on the dam.

Arthur L. Pauls, Division Engineer.

November 17, 1919.

ENGLEWOOD

The hydraulic fill has progressed favorably, 98,500 cubic yards being pumped during the month, carrying the general elevation of the embankment over the portion under

construction up to Elevation 830, or 50 feet above the base. The fill to date aggregates 835,600 cubic yards, about 24 per cent of the entire embankment.

The cross dam east of the Stillwater River, placed by the roller method, is being pushed to completion before cold weather sets in. This portion of the embankment has been carried up about 54 feet, with but 6 feet remaining to be done.

A small cross dam has been built across a knoll on the damsite 1,700 feet east of the river. The purpose of this is to confine the hydraulicking operations to a zone within practical pumping distance of the present hog box and thereby eliminate the necessity for another booster pump.

A second sump installation, favorably located for pumping to the easterly portion of the dam, is being made. In this manner the earth material will be deposited by the trains within easy pumping distance of its final destination.

H. S. R. McCurdy, Division Engineer.

November 15, 1919.

LOCKINGTON

On November 13 the large Lidgerwood Class K dragline finished its work on the western part of the dam where it has built to full height 3400 feet of the embankment. The material was excavated from a borrow pit extending along the north side of the dam. The dragline is now moving eastward to the railroad siding, where it will be dismantled for transfer to the work at Dayton.

Improved progress has been made during the past month on the hydraulic fill. The total amount now in place is 160,000 cubic yards. Practically all of this is west

of the outlet works where the fill has reached an elevation of 907 feet, which is 31 feet above the original creek bottom. A manganese steel dredge pump unit has been put into service to take the place of one of the cast iron units. It will be far superior to the latter in wearing quality.

The Class B Lidgerwood dragline has just completed the excavation of the cut-off trench on the higher ground at the east end of the dam. It is now digging a part of the trench west of the pike before it shifts to assist in dismantling the larger dragline.

Fences are now being built along Roads 9 and 10.

The slopes of the dam are being finished and covered with rock.

Barton M. Jones, Division Engineer.

November 18, 1919.

TAYLORSVILLE

The progress of the Lidgerwood dragline on the outlet works excavation last month was slightly below the average for the three months previous, but still above the schedule set for this work. It is now working up the incline from the deep pool to the lower end of the conduits.

The sluicing was shut down on November 1st, until such time as the B. & O. R. R. can be moved to the new location and the present roadway vacated.

Concreting was started at the lower end of the outlet works on October 17th, but since almost the entire output of our gravel pit the last few days was taken for ballast on the new B. & O. only about a thousand yards of concrete has been placed to date. Recently a Model 70 Marion steam shovel has been fitted up with a 70-foot dragline boom and this machine is now digging gravel for the concrete plant.

About 75 per cent of the gravel ballast for the B. & O. relocation has been delivered.

The approaches to the concrete bridge over the B. & O. relocation have been graveled by contract by Charles Crampton, and as a part of this contract a farm road has been graded and graveled from Road No. 12 at the bridge to the old road near the present B. & O. tracks just north of the dam.

O. N. Floyd, Division Engineer.

November 18, 1919.

HUFFMAN

The placing of material in the dam embankment by hydraulic fill has been proceeding continuously during the past month. 60,830 cubic yards of material were pumped into the dam during September. The first lift has been completed on the downstream side and the first two lifts on the upstream side. The small dragline is building the outside levees up to the lower berm.

The distributing equipment used to place the concrete in the outlet works has been dismantled, and other cleaning up work is practically complete.

The culverts on the relocated line of the Valley Pike have been completed and the grading is nearing completion.

C. C. Chambers, Division Engineer.

November 19, 1919.

DAYTON

Channel excavation to date amounts to 635,000 cubic yards. A total of 450,500 cubic yards has been placed in levees and spoil banks, including 60,000 cubic yards of levee embankment on Contract No. 41. In accomplishing this work a total of 1,110,700 cubic yards has been handled.

The two large draglines have continued channel excavation and spoil bank fill, D-16 excavating below Dayton View bridge and D-15 placing the material in the spoil bank below Herman Avenue. The proposed cut along the right bank between Dayton View bridge and Salem Avenue is now being made. D-16 has also placed a stock pile within reach of the gravel plant derrick.

The D-19, Class 9½ caterpillar dragline has placed all of the required levee and spoil bank fill on the right bank above Herman Avenue and is now removing the 12-inch cast iron water pipe which was left in the bed of the river above Herman Avenue when the main was replaced last season.

Placing concrete revetment is progressing on the left bank of the river below Island Park dam. Work was delayed for several days because of the high water.

The concrete wall at the Dayton Canoe Club house has been completed.

Forms are in place for a part of the Bank Street crest wall on the right bank between Third and Fifth Streets.

Concrete is now being placed in the South Robert Boulevard retaining wall.

A second derrick has been installed at the gravel washing plant. It will be used for storing aggregate as the output of the plant exceeds the demand.

Price Brothers have completed manufacture of the 182,000 concrete blocks required in Dayton for flexible revetment. The last blocks were cast November 8.

C. A. Bock, Division Engineer.

November 17, 1919.

HAMILTON

The total yardage handled by the two draglines to November 1, 1919, was 937,600 cubic yards. The total pay dirt, including McGillicuddy's contract, was 484,300 cubic yards. This excludes all dirt moved twice, and dirt moved in auxiliary work like the deep water channel.

The electric dragline D-16-18 has completed the last cut on the east side of the river south of the Columbia Bridge and is at present excavating for a new submerged outlet for the east side sanitary sewer system.

The steam dragline has been excavating the Ford tail-race west of the B. & O. R. R. It has also handled the pile driver for the piling driven as a temporary support for the 24-inch water main crossing Old River. This water main will be lowered below the bed of the new channel after the excavation is completed.

The work of driving the steel sheet piling under the B. & O. bridge over Old River has been completed. The excavation under the south arch has been completed and concreting begun. Excavation under the north arch is nearing completion. The excavation is for the foundations of the concrete tail-race of the Ford Tractor plant, which will divide, a branch passing under each arch.

An 8-inch centrifugal motor-driven pump has been installed west of Third Street to unwater the tail-race excavation.

On the concrete wall work south of the Soldiers' Monument the sheet piling has been driven to grade and the excavation practically completed.

The portable gravel screening plant has arrived and the derrick to be used in handling the gravel has been moved to its new location.

C. H. Eiffert, Division Engineer.

November 20, 1919.

TROY

The business district of the city of Troy is situated on high ground on the right bank of the Miami River. A strip of low land lies between this part of town and the hills to the west which form the highland along the valley. During the 1913 flood, a large part of the discharge of the river passed through this low section. While comparatively little harm was done along the river channel proper, great damage resulted from the flooding in this lower lying land on the opposite side of the city.

The principal features of the Troy improvement are: (1) a levee at the upper end of the city, across this strip of low land, to cut off the flood water from this section of the city, (2) the enlargement of the main channel through the center of town, to take care of the increased flow which will be forced through this channel because of the levee above, (3) the creation of a valuable residence district near the center of the city, by filling in river bottom land with the spoil from the channel excavation, (4) a cut-off channel across a U-shaped bend in the river, and (5) a levee parallel to this channel, to protect the lower end of town.

Work was started by the contractor for the Troy improvement, Frank McGillicuddy & Co., on November 3. The cut-off channel and levee paralleling it will be built first. The earth is excavated from the channel and placed in the levee by a Bucyrus Class 14 caterpillar dragline, with a 65-foot boom. It is expected to complete this part of the improvement by spring. The cut-off channel will lower the level of the water in the river above, and thus facilitate the enlargement of the present channel. The

bottom width of the cut-off is 40 feet, but it is expected that the river will enlarge this until it becomes the main channel, and the present one around the bend will gradually silt up.

E. W. Lane, Assistant Engineer.

November 19, 1919.

LOWER RIVER WORK

Middletown—Cole Brothers have completed the levee fill to a point about 500 feet below Sixth Street and have built a road over the levee at the end of Sixth Street. They were delayed two or three days by high water, which rose a total of seven feet on November 1. The fill for the north levee is practically completed from the point of beginning above Poastown Road to within a short distance of Adams Street.

Franklin—Jeffrey, Boorhem & Co. are working on the second throw of material from the river bed in front of the water works plant and the Pulp and Paper Co.'s plant. They will soon commence moving this material the third time, which will place it in its final location in the levee and Oxford Road. The road at this point will be raised to extend over the levee. The high water which occurred during the week ending November 1 caused a delay of several days to this work and made it necessary to move the dragline machine onto higher ground.

Miamisburg—Jeffrey, Boorhem & Co. have placed approximately 12,000 cubic yards of material in the levee adjacent to the B. & O. R. R. above Germantown Pike, working with their train outfit. They will soon be ready to extend their tracks south of the Germantown Pike. A delay of about a week was caused by rain and high water during the latter part of October and first of November.

F. G. Blackwell, Division Engineer.

November 17, 1919.

RAILROAD RELOCATION

Baltimore & Ohio—Roberts Brothers have completed the first lift of the ballasting and about half of the second lift, the track having already been entirely completed. The ballasting has been much delayed by bad weather and scarcity of labor.

The raising of the track south of Needmore Road, which is being done by the B. & O. forces, is about completed.

H. C. Kahl, with Miller Brothers as sub-contractors, is making good progress on the building of the right-of-way fence.

Big Four and Erie—The grading on these two railways is now completed with the exception of widening the embankment near Enon.

Track laying is under way, about 15 miles of it having been completed. About 80 per cent of the ties have been received, and all of the other track material.

The overhead bridge at Huffman, to carry the highway across the railway tracks to the top of the dam, is rapidly nearing completion. The structure is of concrete.

Work has been started on the interlocking tower at Tate's Point by the forces of the District. The tower will be built of brick and concrete. A portion of the signal equipment has been delivered.

The Big Four Railway signal gang has started work on the interlocking system at Fairfield.

All the signal equipment has arrived.

The fence gang has completed about 15 miles of right-of-way fence.

Ohio Electric—The grading is completed and tracklaying will begin as soon as the machine has finished that work on the Big Four & Erie.

Albert Larsen, Division Engineer.

November 21, 1919.

RIVER AND WEATHER CONDITIONS

The streams throughout the Miami Valley were comparatively low during the first three weeks of the month of October. Rainfall averaging about 3 inches over the valley during the last week of the month caused a slow rise in the rivers of from 3 to 7 feet. No damage resulted from this to the Conservancy work or to the equipment.

The rainfall was considerably above normal for October, varying from 4.09 to 7.53 inches at the District's stations. At the Dayton Weather Bureau Station the total precipitation during the month was 7.08 inches or 4.68 inches more than normal, which changes the accumulated deficiency in the mean annual rainfall to an excess of 1.92 inches since January 1.

Observations taken by the local office of the U. S. Weather Bureau show that at Dayton, the mean temperature for the month was 60.8° F., or 6.7° higher than normal; there were 7 clear days, 7 partly cloudy, 17 cloudy days, and 16 days on which the precipitation exceeded .01 of an inch; the average wind velocity was 9.3 miles per hour, the prevailing direction being from the southwest; and the maximum wind velocity was 37 miles per hour from the northwest on the 10th.

Ivan E. Houk, District Forecaster.

November 24, 1919.

Railway Grading With Stiffleg Derrick Draglines

65,000 Cubic Yards Moved for 26.7 Cents Per Yard.

The use of excavators with interchangeable steam shovel and dragline equipment is common. The transformation of an ordinary stiff-leg derrick into a dragline for use in railway grading has elements of novelty, and its application in the work of the Miami Conservancy District may be of interest and value.

The application was to the grading of the Ohio Electric Railway across the flats of the Mad River valley north of Osborn, a distance of about a mile and a half. The top soil is loam, one to three feet deep, with gravel below. Water occurs three to four feet below the surface. The fill varied from five to nineteen feet. The use of a plow with wheel scrapers or of an elevating grader with dump wagons would have required a right-of-way three to four hundred feet wide, on account of the shallow cut necessary. The use of a dragline, permitting underwater excavation, reduced this width to two hundred feet. The total excavation was 65,000 cubic yards. It is in such jobs of comparatively small size, making investment in large equipment unprofitable, that the adaptation has its value.

The District had two stiff-leg derricks available which had been in use at Ohborn, both as derricks and as clam shells with 1-yard buckets. It was proposed to take these two derricks, equip them with 1½-yard dragline buckets, and work them as a team side by side, one to a borrow pit, on each side of the embankment to be built. (See Fig. 65.)

The two derricks were much alike and the description of No. 1 will be sufficient for both. The machine was mounted on a 30'x30' base of 12"x12" timbers, moving on 8" rollers. The mast was of white oak 14"x16" by 24'. The boom was of yellow pine, 12"x14"x62', equipped with hog rods. The bull wheel was 12' in diameter. The hoist engines were double, 9"x10", equipped with 3 drums 16"x30". Ropes as follows: 5/8" boom-fall, 5/8" load cable, 1/2" hoist cable. Swing engines were double, 4½"x5", with drum 26"x12". The boiler was 48"x8'6", vertical, carrying 100 lbs. pressure. This machine was bought by the District in fair second-hand condition for \$4300. No. 2 was slightly smaller and cost \$4000.

Either of these machines could have been transformed into a dragline by substituting a dragline



FIG. 64—DERRICK DRAGLINES LOADING CONCRETE GRAVEL, MAY 5, 1919

A stiffleg derrick converted into a dragline excavator. It is excavating gravel from the Ohio Electric R. R. borrow pit into the hopper, whence it drops into dump wagons, to be taken to the mixer at Smith Ditch concrete trestle. The steel boom was made from one of the stifflegs taken from a converted derrick on the Conservancy work at Lockington. Taken May 5, 1919.

bucket for the clam shell, running the load cable from the breast sheave to the bucket through a mortise cut in the boom, the latter being strengthened on each side opposite the mortise by a 4"x12" oak timber 10 or 12 feet long, bolted through. The District, however, had on hand the stiff-legs from a steel derrick which had been re-equipped, and it was thought better to rebuild these stiff-legs into booms for the dragline derricks, with the hope that it would enable the use of a larger bucket (of 1½-yard size), thus expediting the work. This was accordingly done. These booms were 20"x20" at the center section, 62 feet long, built of four angle irons 3"x3"x ¾", with lattices 5/16"x2½" spaced 30 inches, and with end plates at the top 4"x6"x½", carrying 2-16" sheaves above and 3 of the same size below. These booms proved entirely satisfactory, although for reasons to be stated, the buckets had to be reduced from 1½ to 1 cubic yard in size.

The two derricks, thus equipped, are shown at work in Fig. 65. One of them, temporarily in use to load gravel for concrete bridge work, is shown in Fig. 64. The derricks ran on timber ways built up about 18" from the ground. This arrangement fitted well with the work of clearing out stumps, several acres of which had to be handled. The trees were sawed off close enough to the ground to permit the draglines to run over them, thus bringing them into the borrow pit, whence they were pulled by the dragline buckets acting as "tooth extractors."

It was the extracting of these stumps which threw the greatest strain on the transformed mechanism and led to the chief troubles in the way of breakages. All the cables had to be made larger, the final sizes adopted being ¾" for drag and swing cables and ⅝" for boom fall and hoist cables. Experience indicates that for drag cable 1" should be used on these size machines. The necessity of

adopting ample sizes for cables is emphasized by the fact that the total cable bill on the 65,000-yard job was \$1405.13.

Other chief difficulties encountered were due to wear of the sheaves, and breakage of the goose necks connecting the stiff-legs to the top of the mast. The heavy strain of dragline work also led to rather excessive wear on the pins of the breast sheaves and bottom sheaves. The breast sheaves were 14" diameter with 2" pins. 16" diameter with 3" pins are recommended. The bottom sheaves were 16" with 2½" pins. 24" diameter with 3" pins are recommended. Here again the bill for sheaves on the job—

\$628.15—tells the story of the necessity of attention to these details. The goose necks were 2"x10" plates bolted to the under sides of the stiff-leg timbers. They were reinforced by 1"x10" plates bolted through on the top side of the timber, the bolts being 1¼"x18" and six in number. With this change no trouble has been since experienced.

The greatest single delays were due to stoppages necessary to reflow the boilers on both derricks, and to repair a badly worn drum pinion. These delays, due to other causes than those characteristic of the dragline job, are not strictly chargeable to this work.

As to costs. The force of men required by the draglines proper required 1 foreman, 2 dragline runners, 2 firemen, 1 pumpman, and 8 laborers—14 in all. In addition, 2 to 3 men were kept on the embankment dressing the crown and slopes. The working day was 10 hours, of which a two-hour loss, due to stoppages for repairs, oiling, moving ahead, etc., was considered normal. The job took about four months. The figures follow:

Original cost of derricks: No. 1 \$4300—No. 2 \$4000. Operating expenses as follows:

Shop Repairs.....	\$ 2407.33
Labor	13331.14
Materials (cable, coal, etc.).....	3062.80
Field Acctg.	220.96
Hauling draglines Osborn to Dayton..	216.96
Dayton Garage	8.42

Total\$19247.61

The total material moved was 65,000 cubic yards, giving an operating cost per cubic yard of 29.6 cents. Deducting time lost for retubing boilers and cost of repair of same, these items not being fairly chargeable to the job, reduces the cost to 26.7 cents. This represents a contractor's cost, with materials, repairs and labor obtained in the open market, and no

overhead except for field accounting. As an interesting comparison, it may be noted that the contractor's bid for the job before the District undertook it by force account, was 35 cents.

As has been noted, it was a great advantage for the use of these draglines here that much of the material could be taken from under water, thus lowering right-of-way cost. An additional advantage of this was that all of the material was put in the bank soaking wet, making an unusually solid structure. The banks were staked for 5% shrinkage only, on this account. The finished structure shows not more than $2\frac{1}{2}$ to 3 per cent.

Summing up, it may be said that after paying the

entire cost of making the changes required, the Conservancy District has two machines in first-class rebuilt condition, equipped to be used either as derricks, clam shells, or draglines, at a total cost of \$8300, having at the same time built 65,000 cubic yards of embankment at a price per yard 5.4 cents below the contractor's bid. The figures may be left to speak for themselves.

The idea of the transformation came from Wm. McIntosh, Master Mechanic for the District, but the successful carrying out of the scheme was due in no small degree also to the efficient co-operation of Leslie Wiley, Superintendent, and John Rosite, Foreman on the work.



FIG. 65—TEAM OF DERRICK DRAGLINES BUILDING OHIO ELECTRIC RAILWAY EMBANKMENT

The embankment, $1\frac{1}{2}$ miles long, extending across the flats of the Mad River Valley, and totalling 65,000 cubic yards, was built by these machines at a cost of 26.7 cents per yard, including cost of converting the booms and making the experimental transformations. The derricks "crawfished" down the pike on wood rollers running on a timber crib built high enough to permit running over the stumps (sawed low), which were then snagged out of the pit by the drag bucket. The depreciation in these drags was negative, as they finished the job in much better shape than when they began. Cables, sheaves and goose necks proved to be the weak spots in the original mechanism, as applied to such work as this. Mad River (beyond the trees in the distance) was crossed on the timber falsework for the new concrete bridge. The crossing took two days. Most of the material for the railway embankment was taken from under water, making an exceptionally solid bank. Shrinkage about $2\frac{1}{2}$ per cent.

Flood Protection Work at Middletown

The flood of 1913 brought to Middletown a volume of water equivalent to a flood about three-fifths of a mile wide and ten feet deep. The river channel could carry only a little over three-eighths of it. There were no levees and the water consequently spread over the city unchecked. Fortunately, the valley at this point is very wide, about two miles in breadth, and the depth of water in the streets was proportionately shallow—five to eight feet deep, so that comparatively little damage was done as compared with some of the other cities.

About half the area of the city was flooded. (Flooded area—750 acres). The normal slope of the river here is about 3.3 feet per mile and the entire drop of the water surface through the city proper is about 10 feet.

Almost all of the city lies on the east slope of the valley, and this fact, together with the wide valley and the shallow flood depth makes the problem of flood control a comparatively simple one. A single earth levee, following roughly the foot of the eastern valley slope, is the principal feature. With the wide

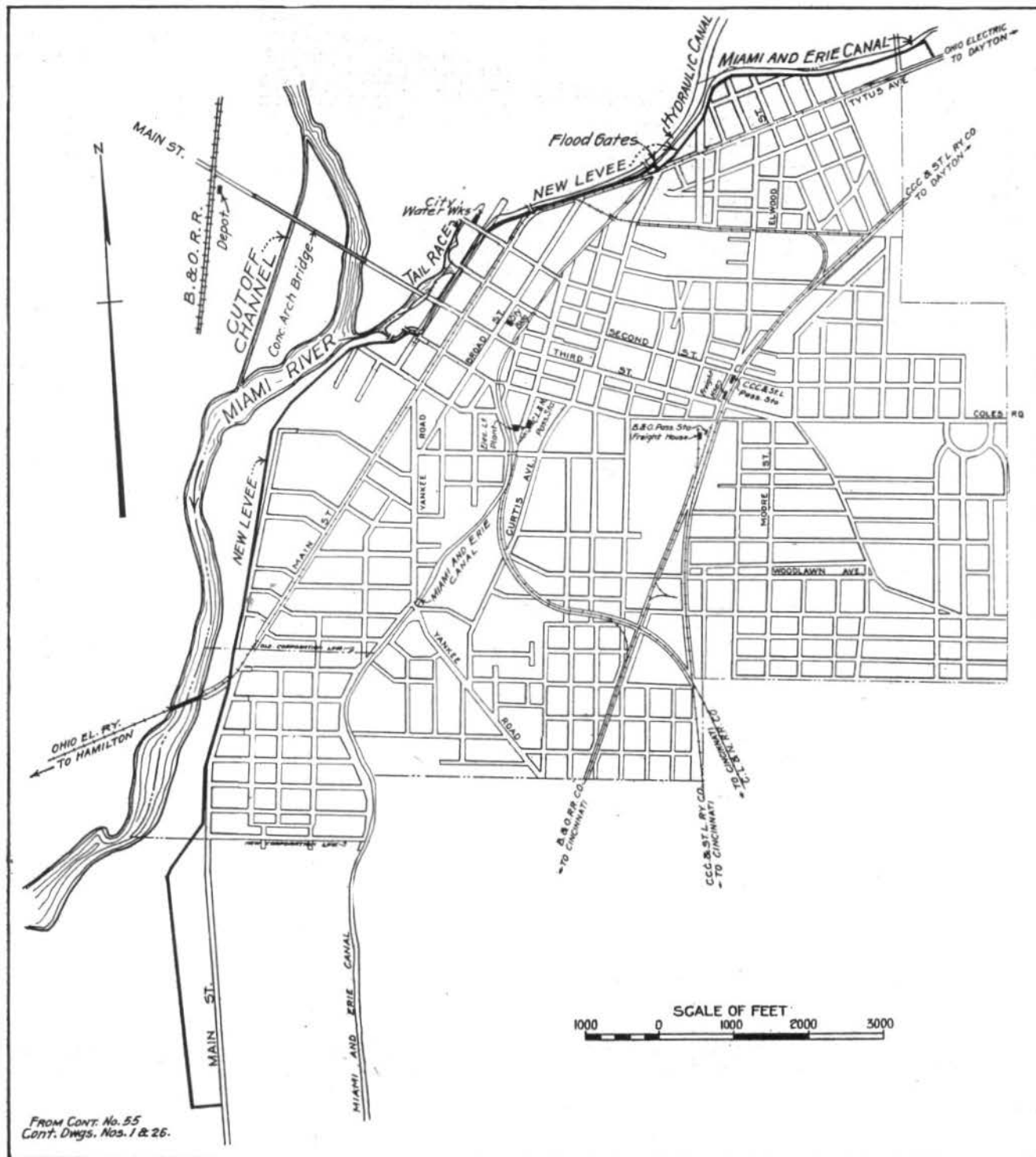


FIG. 66—MAP SHOWING RIVER IMPROVEMENT, MIDDLETOWN

flood flow no concrete lining of the river slope of this levee is considered necessary. Wash will be prevented by dressing the levee with top soil and sowing the surface to grass seed.

The only complicating factor is due to the two canals which, drawing their water from the river about two miles above the city, flow through it. (See Map, Fig. 66). One of these is the old Miami & Erie traffic canal, now no longer used except for water supply. The other, the hydraulic canal, is used for power purposes by several industries.

The levee is in two portions. One, beginning at the northeast limit of the city, just east of the Poast-town road, follows the canals to First Street. The other follows the river, beginning at Fourth Street. Between First and Fourth Streets the river bank is as sufficient elevation to make a levee unnecessary. The upper portion of the north section of the levee forms the south bank of the Miami and Erie Canal to the head of Hydraulic Street, where it crosses this canal to form the south bank of the hydraulic canal, which here borders the north edge of Hydraulic

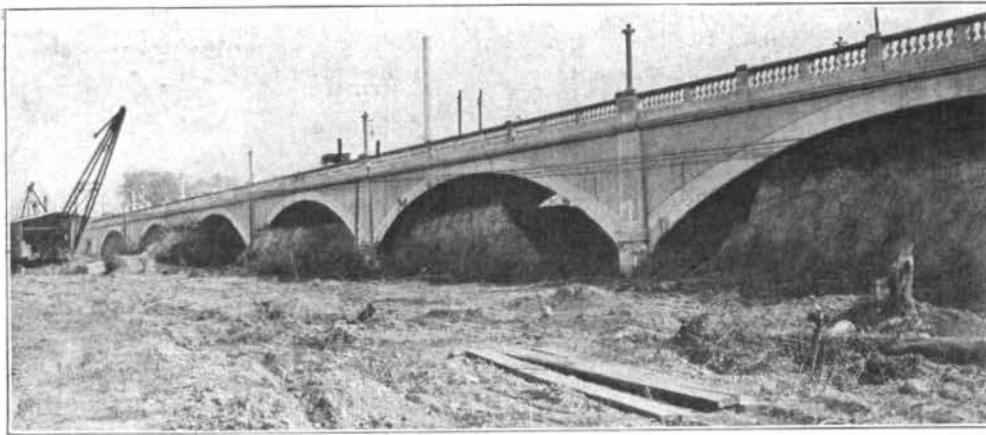


FIG. 67—EXCAVATION AT THIRD STREET BRIDGE, MIDDLETOWN, SEPTEMBER 10, 1919.

The original ground surface is indicated by the unexcavated earth under the arches. The work was done by the dragline excavator seen in the distance, the valley bottom being cut down as shown in order to obtain increased flood flow. The earth under the arches being inconvenient to get at, was left for the river itself to excavate. See last paragraph of article.

Street to the end of the north levee. At the levee crossing the Miami and Erie Canal enters the city proper, and gates will be installed here to be shut during flood seasons.

Hydraulic Street, between which and the hydraulic canal the new levee forms the boundary, is narrow in width. It is being improved by widening it to 55 feet. The consequent encroachment upon the canal is being recompensed by cutting away the north bank, maintaining thus a water way in the canal of at least 42 feet. The levee here, less than two feet high, is of concrete, enabling it to be placed entirely outside the street limit.

The only portion of the work to offer difficulty has been the widening of Hydraulic Street, just referred to. The natural way to do this was to dig material from the north bank and deposit it next to the south bank, thus preserving the canal width and widening the street at one operation. This method was adopted, the excavation being done by a small (1½-yard) dragline excavator. The difficulty lay in the swift current in the canal water, which was sufficient to carry away surface soil dug from the north bank as fast as it was deposited. Fortunately, the substratum here is gravel, which being much heavier, would on deposition remain in place. Unfortunately, however, after several hundred feet of street length had been thus widened, the gravel sub-soil ran out, and the lighter loam and clay running away on the current as fast as it was dropped by the drag-

line bucket, the street widening by this method was brought to an end. The remainder of the canal excavation was used to form the north bank. The unfinished fill for street width will probably be brought by dump wagon from a nearby gravel pit to be opened north of the canal.

The first part of the work at Middletown to be finished was the south end of the south levee. This will shut off the flood water which heretofore has come across the Cincinnati Pike from the river in times of high water. The embank-

ment was thrown up by a railway steam shovel which had been converted into a dragline excavator. This machine did some very effective work. The largest day's excavation amounted to 1200 cubic yards, advancing the levee 120 lineal feet.

Probably the most striking part of the work has been the excavation of a new channel cutting off the big bend in the river which passes under the Third Street bridge. This cut-off shifts the channel a maximum of about 1000 feet to the west. (See Map, Fig. 66). It is about 3600 feet long, about 10 feet in average depth, 40 feet in excavated bottom width, and carries at ordinary stages about 5 feet depth of water. The sides of this channel, being mostly river bottom loam, are being eaten away rapidly with every rise of the water in the river. This was foreseen and was the reason for the narrow width of the channel as dug. It was expected that the dragline would simply pilot the excavation, leaving the river to follow and dig the main part of the cut-off for itself. The widening is expected to continue till the new channel will take most of an ordinary flood and all of the ordinary flow, thus stopping most of the erosion now taking place next the city on the east bank of the present bend. This erosion has been in the past not inconsiderable. Skeletons out of an old graveyard are said to have been tumbled into the river by floods many years ago. The remains of this old graveyard have entirely disappeared.

Influenza and Conservancy Medical Service (continued.)

tains. Keep the south curtains up. Sunlight is one of the best "microbe killers" known and a faded rug is cheaper than say a faded baby.

In this connection it may be well to call attention to the unusually good health record of the Conservancy camps during the past year. This has been largely due to two things. The first of these is the very exceptional care taken in the beginning to make the camps sanitary. Each camp has a sewage purification plant. Each is also supplied with pure water from a driven well, pumped to every house in the camp.

The second reason referred to has been the careful and regular inspection of sanitary conditions at the camps. The water supply at all the camps is examined three times during the year by the chemists of the Ohio Department of Public Health at Columbus, samples being regularly forwarded for the purpose. The samples have in all cases shown a good test. The sewerage system has also been approved by the State Inspector and is periodically re-examined once in two months. The inspections have shown the system to be working well. There have been no complaints, either of plumbing or the outside system.

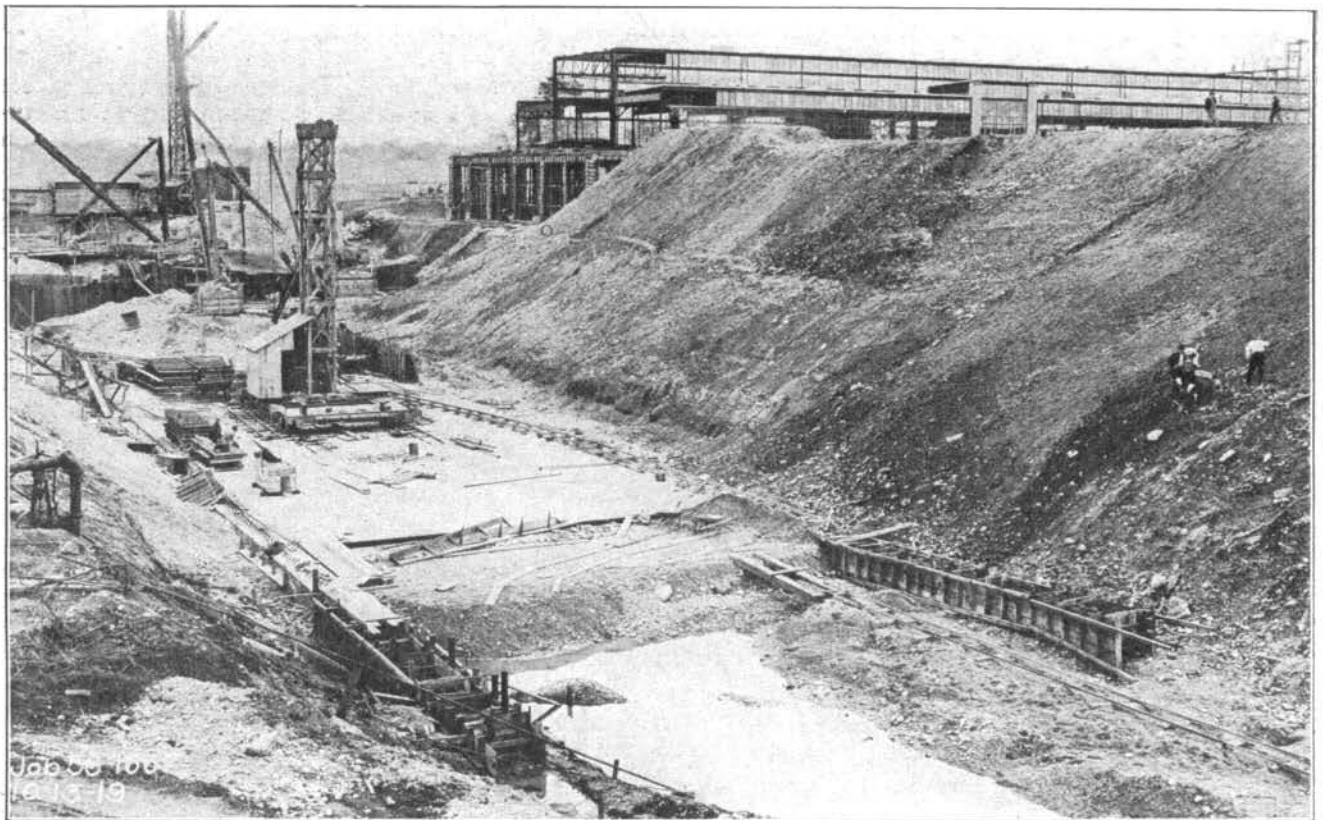


FIG. 68—AT WORK ON TAILRACE, FORDSON TRACTOR PLANT, HAMILTON.

This plant, seen in the distance at the right, occupies a "strategic point" of attack for a flood striking Hamilton, the bank at the right being the new north protection levee opposite the mouth of the Old River channel (out of the picture at the left). The building of so important a structure at such a place by a man of Henry Ford's acumen indicates a confidence in the flood protection plans worth noting.



FIG. 69—HEAVIEST CUT ON BIG FOUR AND ERIE R. R. RELOCATION.

Maximum depth, 119.8 feet. Length, 4500 feet. Bottom width, 72 feet, to accommodate four tracks, only two to be laid at present. Total earth excavated, 630,000 cubic yards, of which over 500,000 cubic yards was rock.

THE MIAMI CONSERVANCY BULLETIN

JANUARY 1920

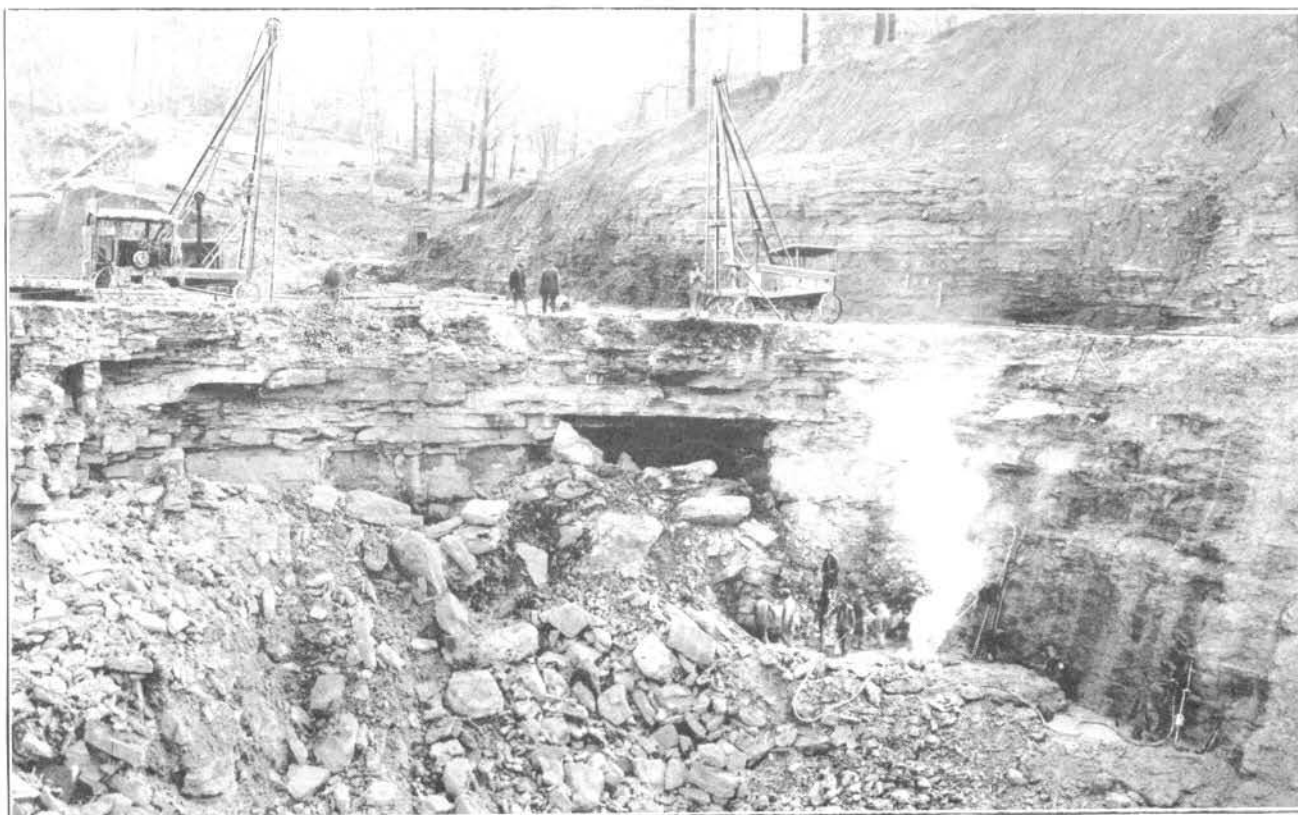
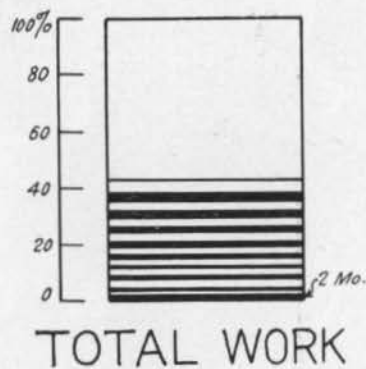
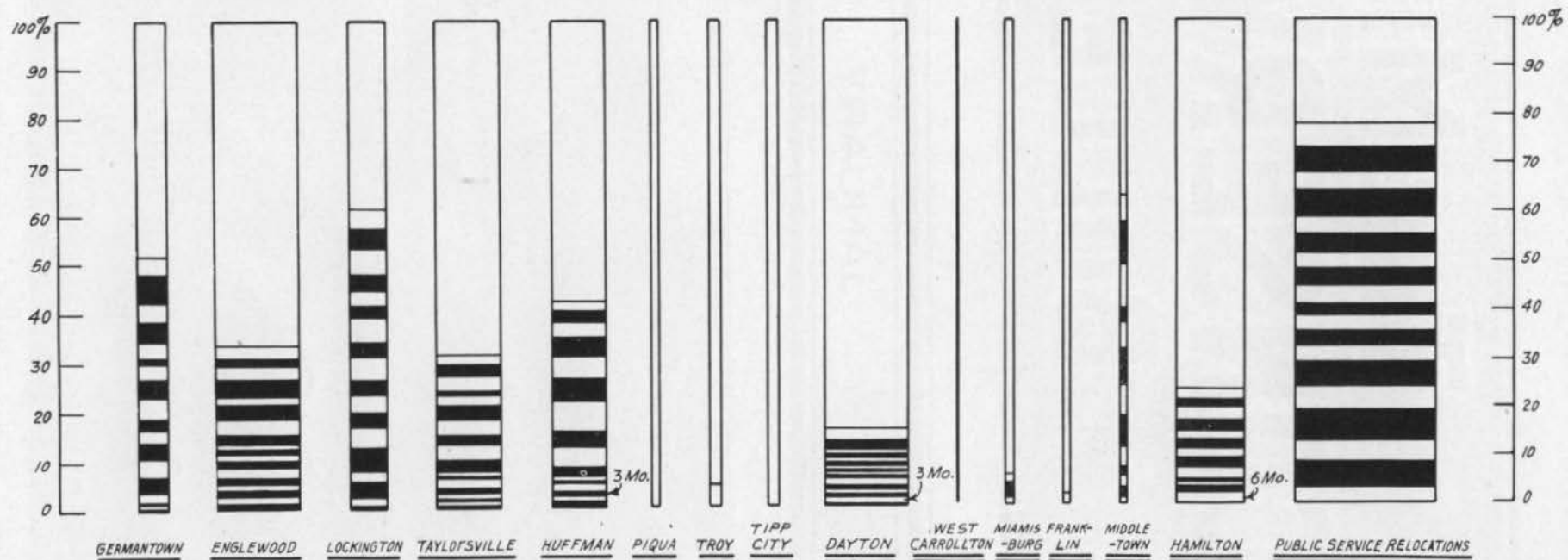


FIG. 70—DRILLING FOR ROCK EXCAVATION, TAYLORSVILLE DAM, MAY 13, 1919.



Miami Conservancy District PROGRESS DIAGRAM

Vertical Scale:- Percentage of Work Done
Horizontal Scale:- Relative Volumes of Work



WORK BY FEATURES

Note:- Each horizontal band, black or white, represents work of one month, unless otherwise noted

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THE MIAMI CONSERVANCY BULLETIN

PUBLISHED BY THE MIAMI CONSERVANCY DISTRICT

DAYTON, OHIO

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"Therefore when we build, let us think we build forever. Let it not be for present delight, nor for present use alone. Let it be such work as our descendants will thank us for, and let us think as we lay stone on stone, that a time is to come when

those stones will be held sacred because our hands have touched them and that men will say as they look upon the labor, and wrought substance of them, 'See this our fathers did for us.'"

—Ruskin.

Progress on the Conservancy Project

The diagram on the opposite page is designed to exhibit to the eye the exact status of the construction work on the project, up to October 1, 1919, the date to which it was shown in the last report of the Board of Directors to the Conservancy Court. The vertical block or rectangle over the words "Total Work" represents the entire work required to be done on the whole project. The portion of it striped in alternate black and white bands represents the fraction which had been completed on October first. The scale at the left of the rectangle is divided and marked so that the completed fraction can be estimated as a percentage of the whole, the bottom being marked "0," and the top "100%." Thus the top of the upper band, a white one, standing a little above the 40% mark, indicates that on October 1, 1919, the entire project was a little over 40% completed. (About 42%, to be more exact). Each horizontal band, whether black or white, represents the work of one month, unless otherwise noted on the chart. Thus the lower band on the "Total Work" rectangle is marked as representing two months' work.

The rectangles in the row below represent in a similar way the various "features" or divisions of the work. At the left are the five dams; then the nine divisions of the Miami River channel improvement; last, at the right, bunched in one broad rectangle, the public service relocations—the railways, roads, telephone and telegraph lines, etc., which had to be shifted to get them out of the water's way when floods fill the retarding basins. The bulk of this last, of course, is concerned with the four railways—the Big Four, Erie, Baltimore & Ohio, and Ohio Electric, totaling more than fifty miles of track.

The horizontal widths of the rectangles in the lower row differ in a way to show the comparative amounts of total work to be done on the different divisions. Thus the Englewood rectangle is a little over twice as wide as the Lockington rectangle, indicating a little over twice the amount of work on the Englewood dam when both are completed.

Exhibiting in this way the differences in total work in the various divisions, enables the reader to understand several things; as, for instance, why Germantown and Lockington are nearest completion of the five dams—they are the smallest and require least work. It explains how it was possible to

Table Showing Principal Quantities of Work Done

Flood Control Works Proper		
	To Oct. 1, 1918	To Oct. 1, 1919
Earth removed from cut-off trenches and outlet works.....	274,680 cu. yds.	682,312 cu. yds.
Loose rock, hard pan, and solid rock removed from cut-off trenches and outlet works..	64,535 " "	357,412 " "
Earth placed in dams.....	87,900 " "	1,504,012 " "
Earth placed in levees.....	55,800 " "	374,209 " "
Earth removed from river channels.....	47,190 " "	1,096,700 " "
Earth moved in soil stripping and in dressing slopes with earth.....	100,127 " "	158,437 " "
Earth moved in permanent road building.....	7,840 " "	41,437 " "
Earth moved in sewer construction.....	2,360 " "	18,720 " "
Concrete placed, exclusive of that in public service relocations.....	11,680 " "	104,945 " "
Clearing and grubbing.....	21 acres	80 acres
Steel placed	0 pounds	535,607 pounds
Public Service Relocations		
	To Oct. 1, 1918	To Oct. 1, 1919
Earth excavation	193,500 cu. yds.	1,560,770 cu. yds.
Loose and solid rock excavation.....	270,500 " "	726,120 " "
Concrete placed in structures.....	8,500 " "	30,620 " "
Gravel placed on relocated roads.....	0 " "	21,900 " "
Steel re-enforcing placed.....	0 pounds	638,000 pounds
Track laid	0 miles	13.5 miles
Track ballast placed.....	0 cu. yds.	6,000 cu. yds.

finish the river improvement at West Carrollton so early—there was so little to do there, comparatively.

The public service (mostly railway) relocations are much the nearest done of any of the larger divisions of the work. The reason for this is clear. They had to be pushed first to get them out of the way of dam construction. And the dams are ahead of the river improvement, because the latter, as a means of flood protection, is rather less vital than the dams to the safety of the valley.

The table at the top of this page gives the items making up the completed 42% of the total work, as indicated on the chart. The right-hand column, like

the chart, carries the estimate to October 1, 1919. The left-hand column carries it to October 1, 1918. The difference between the two, for any item, represents one year's progress. The figures should give renewed assurance to all the friends of the project that the work, considering especially the unusually difficult circumstances produced by the war, under which it was begun, is proceeding at a rate which should finish it within the estimated time.

The table below is also from the last report of the Board of Directors to the Conservancy Court, and exhibits the financial condition of the project up to July 31, 1919.

Condensed Summary of the Net Cash Receipts and Disbursements, August 12, 1915, to July 31, 1919.

	Aug. 12, 1915 to July 31, 1918	Aug. 1, 1918 to July 31, 1919	Totals Aug. 12, 1915 to July 31, 1919
Net Cash Receipts			
Sale of Bonds (Net).....	\$14,400,000.00	\$5,194,900.00	\$19,594,900.00
Taxes Collected.....		1,275,028.01	1,275,028.01
Assessments Paid in Advance.....	759,268.94	4,821.71	764,090.65
Interest Earned.....	175,939.41	135,187.48	311,126.89
Sale of Real Estate.....		113,713.45	113,713.45
Real Estate Operation Receipts.....	40,221.89	223,122.38	263,344.27
Engineering Department Receipts.....	644.74	146,440.49	147,085.23
Miscellaneous Receipts.....	3,340.34	4,569.86	7,910.20
Accounts and Notes Receivable.....	2,221.54	146,022.75	148,244.29
Total Net Cash Receipts.....	\$15,381,636.86	\$7,243,806.13	\$22,625,442.99
Net Cash Disbursements			
Interest on Bonds.....	\$ 413,325.00	\$ 961,675.00	\$ 1,375,000.00
Interest on Loans.....	40,241.00		40,241.00
Office Building.....	16,934.05	157.82	17,091.87
Osborn Business Claims.....	73,015.00	50,157.50	123,172.50
Miscellaneous Items.....	2,377.17	6,350.29	8,727.46
Administrative Department.....	97,087.90	72,946.62	170,034.52
Legal Department.....	208,789.74	94,617.40	303,407.14
Taxation Department.....	175,293.18	30,028.72	205,321.90
Real Estate Investments.....	6,460,765.14	824,781.85	7,285,546.99
Real Estate Operations.....	38,217.42	129,408.79	167,626.21
Crop Operations, Etc.....	27,311.50	15,321.81	42,633.31
General Expense.....	24,282.07	80,955.47	105,237.54
Engineering and Construction.....	3,418,471.84	6,629,346.57	10,047,818.41
Total Net Cash Disbursements.....	\$10,996,111.01	\$8,895,747.84	\$19,891,858.85
Balance on Hand, July 31, 1919.....			\$ 2,733,584.14

Geology of the Miami Valley as Affecting Conservancy Work

Careful Study Made of Rock Occurrence and of Glacial Drift as Dam Embankment Material.

The rock occurrence in the Conservancy District affected the work of construction in two different ways. In one, the Conservancy engineers sought the rock to secure solid foundation for the concrete outlet structures which will carry the stream flow under the completed dams. In the other they would avoid the rock if they could, this case being the relocation of the railway lines necessary to take the old tracks out of the way of the dam structures. With five dams to be built and four railways to be relocated, the necessities for finding or avoiding rock required rather thorough preliminary study of the geology of rock occurrence throughout the Miami Valley. In relation to the proper materials of which the dams were to be built, a study of the glacial drift which fills the valley was of no less importance.

All the streams of the region wind through broad, flat valleys enclosed between slopes rising upwards of a hundred feet above the valley bottom. Between the valleys the country is gently rolling. The entire region is covered with soil varying from a foot or two to hundreds of feet in thickness, practically all of which was brought down and deposited by the enormous ice sheets which slid down out of Canada in a former geological time. These glaciers plowed off the hill tops, and deposited the material farther south, filling valleys in places hundreds of feet deep. The rock on higher ground, where the soil is thin, still bears in many places the rude autography of the glacier, in the shape of parallel scratches graded by

granite boulders or pebbles held firmly in the clutch of the dry ice as it slid over the surface. The pre-glacial valleys, while sometimes coincident with the valleys of today, were much deeper, dug out by streams during the lapse of possibly millions of years, only to be partially filled by the glaciers, leaving the much shallower but broader valleys of today, in which the present river courses are now in process of being carved.

The entire country, valley and upland, is underlain with limestone belonging to two geological periods, the lower being the Ordovician, the upper the Silurian. The Ordovician in the Miami Valley all belongs to the so-called Cincinnati formation, occurring in rather thin layers interstratified with sheets of shale. The Silurian limestones are much more solid, with the strata usually considerably thicker, and are frequently of use either for building stone (as the Brassfield, Dayton, and Springfield) for cement, (Brassfield) or for burning into lime (Cedarville). The Cincinnati formation is not used for either of these purposes.

The pre-glacial streams of the Miami Valley cut their way successively through all these layers of limestone, from the topmost, the Monroe, down through the Cedarville, Springfield, Orgood, Dayton, and Brassfield (the Silurian group) then through the Richmond, Maysville and Eden, (the Ordovician group, the latter all comprised in the Cincinnati formation.)

The melting of the glaciers evidently resulted in

streams considerably larger than those of the present day. The material left by the ice in the deep pre-glacial valleys was worked over by the water and left in beds of gravel, sand or clay. In the middle of the valleys this material may be hundreds of feet deep, while on the sides the underlying rock approaches much nearer the surface crust and in places is even exposed. That is, valleys which were deep canyons, 300 or 400 feet deep, have been filled up until now they are 50 to 100 feet deep, with a broad, flat bottom. Over this surface there has been deposited by later overflow a layer from one to 10 or more feet in thickness, of clay or modified till; that is, earth and rock ground up by the glacial action.

It was the great

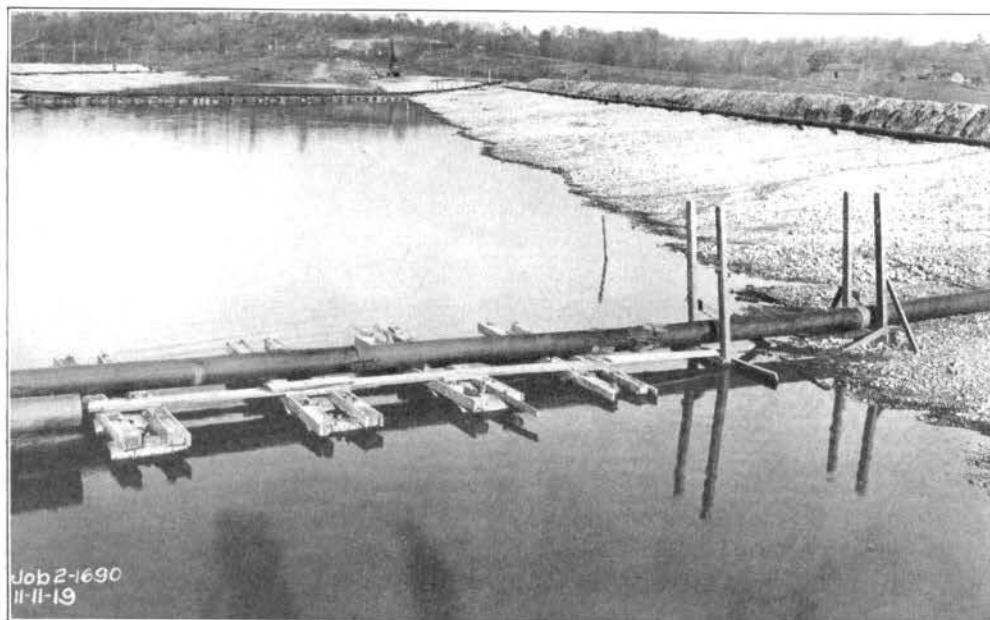


FIG. 72—SHORE LINE, HYDRAULIC FILL POOL, ENGLEWOOD DAM.

The material, mixed earth and water, is pumped through the two pipe lines seen, (coming from the "hog box," out of the picture at the left), and is discharged at the edge of the long bank at the right. The gravel and coarse sand are deposited on the sloping beach. The fine material is carried on into the pool, and settles to the bottom. This settling is very slow, on account of the fineness of the suspended material. A 6-inch cannon ball, dropped over the edge of a boat on the center line of the pool, will sink first through water, then through very thin mud, then through a thicker and thicker mud, till about 17 feet below the surface (in the pool as seen), it will come to rest. Taken Nov. 11, 1919. (See also Taylorsville Progress Report, p. 86.)

depth of the glacial drift in the valleys of the District which determined the materials of which the Conservancy dams are being built. If the earth cover had been shallow, permitting masonry foundations to be sunk to bed rock across the valley at reasonable expense, perhaps concrete might have been chosen as the building material. But with bed rock hundreds of feet below the present valley bottoms this was out of the question. Therefore the earth dam, the only alternative safe type, was adopted.

The combination of superficial layers of clay material in the glacial till, with subsurface deposits of sand and gravel more or less sorted by water, make the valley material nearly ideal for the construction of earth dams by the hydraulic fill method. The glacial till furnishes the impervious material for the dam core. The sands and gravels beneath furnish stable materials necessary for the outer slopes. By varying the amounts of material taken from the surface and the subsurface depths, the ratio of core thickness to the thickness of the dam slopes can be altered, so that the necessary combination of imperviousness with stability can be obtained in the dam structure. (See pages 188 and 189, Bulletin

for July, 1919, for description of hydraulic fill method.)

There remained the problem of obtaining suitable foundations for the concrete conduits which must carry the stream flow underneath the structure of the dam. These structures are subject to severe conditions. In times of maximum flood they must carry thousands of tons of water per second at high speeds, at Englewood 60 feet or more per second, with possible tendency to vibration, the maximum head at Englewood being over a hundred feet. The foundations must, therefore, be of assured stability. Also, the conduits must be located at an elevation such as to carry the stream flow through the base of the dam at its present ordinary level. The proper outlet location for a Conservancy dam, therefore, would be at a point just far enough up the old pre-glacial valley slope to reach solid foundations in the rock at the necessary level without unnecessary expense for either rock or earth excavation. The principal features at the various dams, both of the location and of the methods of taking out the rock, appear in the article on rock excavation. (See page 89.)

November Progress on the Work

GERMANTOWN

The hydraulic fill has progressed favorably, 55,400 cubic yards being pumped during November. This brings the total amount of material placed at the end of November to 323,500 cubic yards, which is approximately 40 per cent of the total hydraulic embankment to be placed. The embankment has been carried to elevation 765, or approximately 45 feet above the old creek bed.

Paving the upstream slope of the dam with the oversize rock from the pumping plant has made favorable progress during the past month.

Progress on the spillway has been satisfactory, the total quantity excavated, to the end of November, being 12,000 cubic yards.

Arthur L. Pauls, Division Engineer.

December 15, 1919.

ENGLEWOOD

During the month of November 103,160 cubic yards of material were pumped into the dam, bringing the total embankment to 943,000 cubic yards. On December 15, the estimates show that the one-million mark was reached. As the placing of embankment did not begin in earnest until April, this progress is probably a world's record for the construction of earth dams. To date the embankment is slightly more than 29 per cent completed.

The two cross dams, for the purpose of confining at the ends the hydraulic fill, have been completed.

Work on Sump No. 2 is progressing favorably. The excavation is completed and concreting for the pump foundations, pump house, etc., has begun.

H. S. R. McCurdy, Division Engineer.

December 15, 1919.

LOCKINGTON

During the recent cold weather pumping of the hydraulic fill was carried on twenty-four hours a day to keep the water pipes and ditches from freezing. On December 10, the sudden drop in temperature made it impossible to proceed, and since then only two shifts have been pumped. The greatest difficulty that was experienced was from freezing of the open ditch leading sluice water from the Miami and Erie Canal to the borrow pit. To date there have been placed in the dam 195,000 cubic yards of hydraulic fill, over 80 per cent of which was placed since September 1. Surfacing the slopes of the dam with rock is being continued as a part of the winter program.

The large Lidgerwood (class D) dragline placed in the west 3400 feet of the dam 100,000 cubic yards, making a total of 392,000 cubic yards placed in the dam embankment.

The Lidgerwood Class K dragline has completed its work at Lockington, having moved a total of 500,000 cubic yards of earth. The steam dragline aided in dismantling the larger machine and loading it onto cars for shipment to Dayton. The steam machine will be put into thorough repair this winter to be ready for its work on the dam next spring, consisting principally of excavating the deep portion of the cut-off trench east of the outlet structure.

Barton M. Jones, Division Engineer.

December 20, 1919.

TAYLORSVILLE

The Lidgerwood Dragline was shut down for seven shifts on account of a break in the center casting, but in spite of this delay, the progress for the month was but slightly below the schedule set for this work. The excavation for that part of the outlet and inlet channels which is to be lined with concrete will be completed about Mar. 1.

The placing of concrete in the outlet works has progressed very satisfactorily at such times as gravel could be had. For some time the B. & O. R. R. Relocation has had first claim on the output of our gravel pit, and gravel for the concrete plant could only be furnished at such times as there happened to be a delay in the railroad work. The delivery of gravel for ballast to the B. & O. Relocation is practically completed, so that there is not likely to be any more delay on this account.

Some tests recently made with a 6-inch cast iron ball in the hydraulic fill core may be of interest. The ball was dropped into the pool at station 18 on the center line of the dam. At the end of one minute it had sunk to a depth of 6.5 feet below the water surface, which at that time, was about 0.3 feet above surface of mud. At the end of twenty-five hours it had reached a depth of 6.87 feet. In 50 hours, 7.05 feet, one week 7.05, and at the end of four weeks 7.18 feet.

O. N. Floyd, Division Engineer.

December 16, 1919.

HUFFMAN

The hydraulic fill has been progressing during the past month. The work, however, has been hindered somewhat on account of unfavorable weather conditions. 47,300 cubic yards of material were pumped during the month of November.

The steam dragline has built the outside levees up to the first berm, on both sides of the dam between the diversion channel and the Erie Railroad. A cross dam ten feet high has been built along the south side of the pres-

ent location of the Erie track so that the embankment may proceed without waiting until the track has been moved to its new location.

The delivery of the ballast gravel for the relocated road bed of the Big Four and Erie Railroads was begun on December 8th. This gravel is being excavated with the electric dragline in the borrow pit above the dam, loaded into cars and delivered to a point on the relocated line, where it is taken by the Walsh Construction Company, who have the contract for placing the ballast in place.

The main excavation and fill for the relocation of the Valley Pike have been completed and Contractor McCann has removed his steam shovel to other work. The excavation of the side ditches and the placing of the rolled gravel surface probably cannot be completed until more favorable weather in the spring.

C. C. Chambers, Division Engineer.

December 19, 1919.

DAYTON

Channel excavation to date amounts to 666,300 cubic yards. The total pay quantity placed in levees and spoil banks is 467,500 cubic yards, including 60,000 cubic yards of levee embankment on Contract No. 41. In accomplishing this work a total of 1,171,900 cubic yards has been handled, not including excess depth channels. During the night of December 8, the temporary dam at Sunset Avenue washed out. This occurred about two weeks before it was intended to remove the structure and will necessitate taking all the 30,000 cubic yards of excavation remaining above the dam to Sunrise Avenue spoil bank, instead of hauling a portion of it to the Stillwater Avenue Spoil bank.

The large dragline D16-15 is grading the downstream end of the spoil bank below Herman Avenue on the west side of the river. D16-16, the other large dragline, is moving off its scow and will continue excavating above Third Street, working on a roller mounting. The Class 9½

caterpillar dragline is grading the top of the spoil bank between Herman Avenue and Webster Street.

The Lidgerwood Class K dragline, D16-8, has been shipped from Lockington and some parts have arrived in Dayton. It will be erected near the gravel washing plant at Sunrise Avenue.

Work on the concrete revetment has been suspended because of cold weather. About 550 cubic yards of concrete have been placed in the South Robert Boulevard Wall. Apparatus for heating the gravel plant is being installed in order to permit operation during the cold weather.

C. A. Bock, Division Engineer.

December 16, 1919.

HAMILTON

The total yardage handled to December 1 was 975,000 cubic yards. The pay quantity was 516,900 cubic yards.

The electric dragline has taken out the temporary railroad embankment south of the Columbia bridge, built for construction purposes, which remained from the last cut, and is at present moving around the east end of the bridge to get into position for the second cut north of the bridge.

The steam dragline has been at work on the Old River channel west of the B. & O. R. R.

Excavation has been completed for the two branches of the tail race under the B. & O. R. R. bridge, and concreting has been completed under the south arch. The concrete floor has been poured under the north arch.

On the retaining wall work on the east bank just south of the Soldiers' Monument the excavation and pile driving have been completed. The forms for the footing have been built and the reinforcing steel is in place ready for the concrete.

The portable gravel screening plant has been placed in operation.

The brick paving has been removed from that part of



FIG. 73—BUILDING TAILRACE UNDER B. & O. R. R. BRIDGE, HAMILTON, NOV. 17, 1919.

This is a view of the Ford power house tailrace, taken from the top of the tractor plant. (See Fig. 68, in Bulletin for December, 1919). The tail water from wheels aggregating 3500 horsepower will flow between the two low concrete walls, seen finished in the foreground at the right. At the B. & O. R. R. bridge the race divides, a branch carrying half the water under each of the two middle arches. The tower enables fresh concrete to be poured from one point for both walls of both branches. The extra expense for this tailrace is borne by the Ford Company. The bank of earth in the left foreground is the north protection levee of Hamilton.

North Third Street which will be raised for the levee crossing.

C. H. Eiffert, Division Engineer.

December 20, 1919.

TROY

Work was continued by the dragline on the cutoff channel. Approximately 35,000 yards were excavated from the channel, of which about 3,000 yards were placed in the levee. On account of unfavorable weather, it was decided by McGillicuddy & Co. to shut down for the winter. Excavation was therefore discontinued on December 19, and after the two stormwater outlets through the levee are completed, no further work will be done on the Troy improvement until spring.

E. W. Lane, Assistant Engineer.

December 20, 1919.

LOWER RIVER WORK

Miamisburg. The levee adjacent to the B. & O. R. R. above Germantown Pike has reached approximately the full width at the base. The spur track from the B. & O. R. R. to the J. C. Groendyke Twine Factory has been raised a maximum of 10 feet at the point where it will cross the proposed levee. Rain and high water caused considerable delay during the past month.

Franklin. The levee from the C. & N. R. R. to the point where it crosses Oxford Road, about 200 feet long, has been completed and sod from the water works lawn placed on the side slopes. From this point north about 300 feet of the levee is finished with the exception of top dressing. The raising of Oxford Road to extend over the levee is nearly finished. The work has been practically at a standstill since December 2, owing to a breakdown of the dragline excavator.

Middletown. The levee south of the Verity Golf grounds

has been completed to a point about opposite Seventh Street. Three hundred feet north of this point, rock was found near the ground surface in the borrow pit. This necessitates widening the pit considerably in order to get sufficient material to build the levee. This again necessitates moving a large quantity of the material twice. Since the high water of November 30 the pit material has been so wet that it is very difficult to handle the second time. Cole Brothers have moved the machine therefore to a point north of Eleventh Street, where there is sufficient material above the rock to build the levee with one throw of the machine. It is hoped that when the river returns to normal stage the water in the upper borrow pit will drain sufficiently to allow work to continue unhindered.

F. G. Blackwell, Assistant Engineer.

December 16, 1919.

RAILWAY RELOCATION

Big Four and Erie. All grading on these two railways is now completed. The Walsh Construction Company are clearing the right-of-way and tearing up the construction tracks. About twenty miles of track has been laid and a portion of the Fairfield yard track completed. The Walsh Construction Company started the ballasting, but were forced to stop on account of cold weather. Progress has been delayed on this account and by scarcity of labor.

The concrete highway bridge at Huffman is about 80 per cent completed. This is being constructed by the District's own forces.

The Big Four Railway signal gang at Fairfield has completed the foundation for the interlocking tower and is now working on the pipe carriers.

The foundation for the Tate's Point interlocking tower is completed. The brick for the structure is delivered, as well as all signal material. Funderberg Brothers have



FIG. 74—LOOKING ACROSS THE OUTLET WORKS EXCAVATION, TAYLORSVILLE DAM, JULY 9, 1919.

Shows dragline machine (seen in part at left) near the finish of its record performance, excavating rock from the bottom of the cut, 63 feet below the rock shelf on which the machine and dump car train are standing. The maximum cut, bottom of pit to top of earth bank, is 100 feet, of which 77 feet is in rock. The machine thus reached material 37 feet above the rock shelf, as well as 63 feet below it, an excellent illustration of the great flexibility of this type of excavator. A similar machine at Huffman excavated the entire width of the cut there (174 feet bottom width) from the trench center line, showing also the remarkable reach of these machines. It was this unusual flexibility of the dragline which led to its adoption for the outlet works excavations at the Conservancy dams.

completed about 25 miles of right-of-way fence to date.

Ohio Electric Railway. All the steel rails have arrived and some of the ties have been unloaded at Fairfield. Work will not be resumed on this line until tracklaying is completed on the Big Four and Erie Railways.

Baltimore & Ohio. The work on this line has been suspended on account of cold weather. The ballasting is about 85 per cent completed. The raising of the track south of Needmore Road, which the railroad is doing with its own forces, is nearly completed.

The fencing on this line has recently been completed by H. W. Miller, sub-contractor for H. C. Kahl.

Albert Larsen, Division Engineer.

December 20, 1919.

RIVER AND WEATHER CONDITIONS

The river and weather conditions during the month of November were not greatly different from normal. During the first week the rivers were a little higher than usual, for this time of the year, due to the rainfall of October 25 to 31. A small rise also occurred during the last

week due to the rainfall of November 25 to 29.

The total rainfall during the month at the District's stations varied from 2.84 inches at Fort Loramie to 4.95 inches at the Englewood Dam. The maximum 24-hour rainfall occurred on November 29, varying from 0.60 inches at Pleasant Hill to 1.46 inches at Ingomar. At the Dayton Weather Bureau Station the total for the month amounted to 3.23 inches, or .34 inches greater than normal, bringing the accumulated excess since January 1 up to 2.26 inches.

Observations taken by the local office of the U. S. Weather Bureau at Dayton showed that at Dayton the mean temperature for the month was 41.9 degrees, or 0.4 of a degree less than normal; that there were 11 clear days, 8 partly cloudy days, 11 cloudy days, and 16 days on which the precipitation amounted to or exceeded 0.01 of an inch; that the average wind velocity was 11.6 miles per hour, the prevailing direction being from the southwest; and that the maximum wind velocity for five minutes was 56 miles per hour from the southwest on the 29th.

Ivan E. Houk, District Forecaster.

January 5, 1919.

Rock Excavation at the Conservancy Dams

Depth and Width of the Excavations, and Depth Below Low Water Level, Led to Adoption of Dragline Excavators for the Work.

As stated in the preceding article, the rock excavation at the dams was for the purpose of securing stable foundations for the concrete conduit and outlet structures. At all the dams except Lockington the rock was of the Cincinnati formation. This consists of alternating layers of limestone and shale, the limestone occurring usually in layers varying from a fraction of an inch to five or six inches in thickness. At Taylorsville a few strata were encountered which blasted out in rather massive blocks, three to five feet in thickness, but these blocks proved to be made up of several layers of limestone, of more than normal thickness, running up to 13 inches, cemented firmly together by $\frac{1}{8}$ inch to $\frac{1}{4}$ inch layers of shale. At Englewood the layers of limestone and shale are distinct, the limestone coming out in hard slabs. At Taylorsville the two kinds of rock are blended or mixed. At Germantown the proportion of limestone to shale is small. The Cincinnati occurs exposed to the surface, or covered with a blanket, usually of glacial till, varying from a foot or two to 20 feet thick. Within six to ten feet of the ground surface, the Cincinnati rock is weathered and the shale layers rotted by the action of air, water and frost to such an extent that it is removable without blasting. Below this depth, drilling and blasting with dynamite were necessary.

The method of excavation adopted was prescribed by the conditions encountered. These conditions varied considerably at the different dams, but certain features were common. The cuts were all of considerable length, running up to a maximum of 1850 feet; and of considerable depth, the maximum at Taylorsville being 100 feet, 77 of which was in rock. All had a width for the conduits proper much narrower than for the corresponding entrance and exit channels. And finally, the cuts were all carried a considerable depth below mean low water level, the maximum being 38 feet and the minimum about 22 feet.

Practically, under these conditions, the choice as to means lay between steam shovels and dragline excavators. In general, the steam shovel can load,

swing, and dump considerably quicker than the dragline. Also steam shovels of a powerful type have been developed particularly adapted to heavy rock excavation. Nevertheless, and in spite of the advantages mentioned, dragline excavators were chosen for the work.

There were several reasons for this. The first was that with such excavations as have been described, a steamshovel would be obliged to make a "thorough cut," taking the material out in several lifts, and working from end to end of the excavation in removing each lift. Thus, before concreting could begin, a large proportion of the excavation would have to be completed.

This is not true of the dragline excavator. The latter machine has a great advantage over the steam shovel in the depth, height, and breadth of its reach. Excepting at Taylorsville, a case to be considered later, a dragline machine could work down the center line of any of the conduit excavations, and at one journey clean up the job, removing all the material as it went. It could begin at one end and as soon as it had cleaned up the first forty or fifty feet of its task, the concreting could begin immediately behind it, and follow it up without any delay. With the necessity of beginning the work of concreting at the earliest possible moment, this was a very great advantage.

Another was the less danger to dragline equipment in case of flood during the work of construction. A steam shovel is compelled to get under the material which it excavates; to do this it must go to the bottom of the cut, since it can reach with its dipper but a few feet below the level of the track on which it stands.* Required thus to go far below mean low water level, a steam shovel caught at the bottom in case of a flood which should overtop its protecting earth cofferdam, might be "drowned out" like a gopher in its hole.

* It is true, special shovels are designed which will work a considerable distance below track level, and in fact steam shovels of such a special design were considered for the work, but their other limitations prevented their adoption.

A dragline excavator, on the other hand, does not need to get down into the hole it excavates. It can reach down with its bucket. (At Taylorsville it reached 63 feet below the rock shelf on which it stood, a record performance of the kind in rock excavation). Thus, both the dragline machine and the locomotives and dump car trains which take away the excavated rock, can stand at a comparatively high elevation, reasonably safe from flood. §

A connected difficulty would arise from the fact that a steam shovel cannot dump its dipper at a level very far above the steam shovel track. This would mean that the cars to be loaded must go down with the steam shovel into the excavation, to depths which would make it difficult to get the loaded trains out. This was perhaps the preponderating count in favor of the dragline excavator for the work in view.

A further advantage of the dragline is that it requires less labor to run the equipment. This is because, on account of its much wider reach, it requires less track shifting. It would save, as compared with a steam shovel, the expense of a track gang of six or seven men at each dam. What was of more importance, during the emergency labor shortage of war time, when the work began, it would release these men for war work.

Finally, the dragline had the advantage that it could adapt itself easily to the varying breadth of the excavation, drawing in for the narrow width of the conduit proper, and reaching out when at work in the wider inlet and outlet.

Consideration of all these points left no doubt as to which was the proper equipment to use.

Englewood and Germantown

The general conditions at these two dams were much the same. The excavation in each case was a long, deep trench, 30 to 32 feet in the bottom width, and widening to over 100 feet at the ends. The work was done at one trip of the dragline in each case, beginning at the outlet end. The top 7 to 10 feet, including much loose rock, was first removed. Drills were then set up back of the dragline and holes sunk to an average depth on the center line of 18 feet at Germantown and 28 feet at Englewood. After blasting with 40 per cent dynamite the loosened material was picked up with the dragline bucket, dumped into 12-yard air-dump cars and taken by 40-ton locomotives to a spoil bank where the material was wasted. The total rock thus removed at Germantown was 40,000 cubic yards, the work there beginning about August 1, 1918, and ending in March, 1919. At Englewood the work began May 10, 1918, and ended November 9 of the same year, the total rock removed being 57,712 cubic yards. Not all of the material at Englewood was wasted, a considerable quantity being placed next the down stream toe of the dam to serve as a protection against eddies below the outlet during floods, which might tend to wash away the earth of the dam structure. At Germantown 30,400 pounds

§ It is an interesting circumstance that contractors who were consulted at an early date in the formulation of the construction program, declared that at such depths as would be encountered at the Conservancy dams, a dragline bucket would not pick up the material, but would bump and tumble over the heap of blasted rock without digging in.

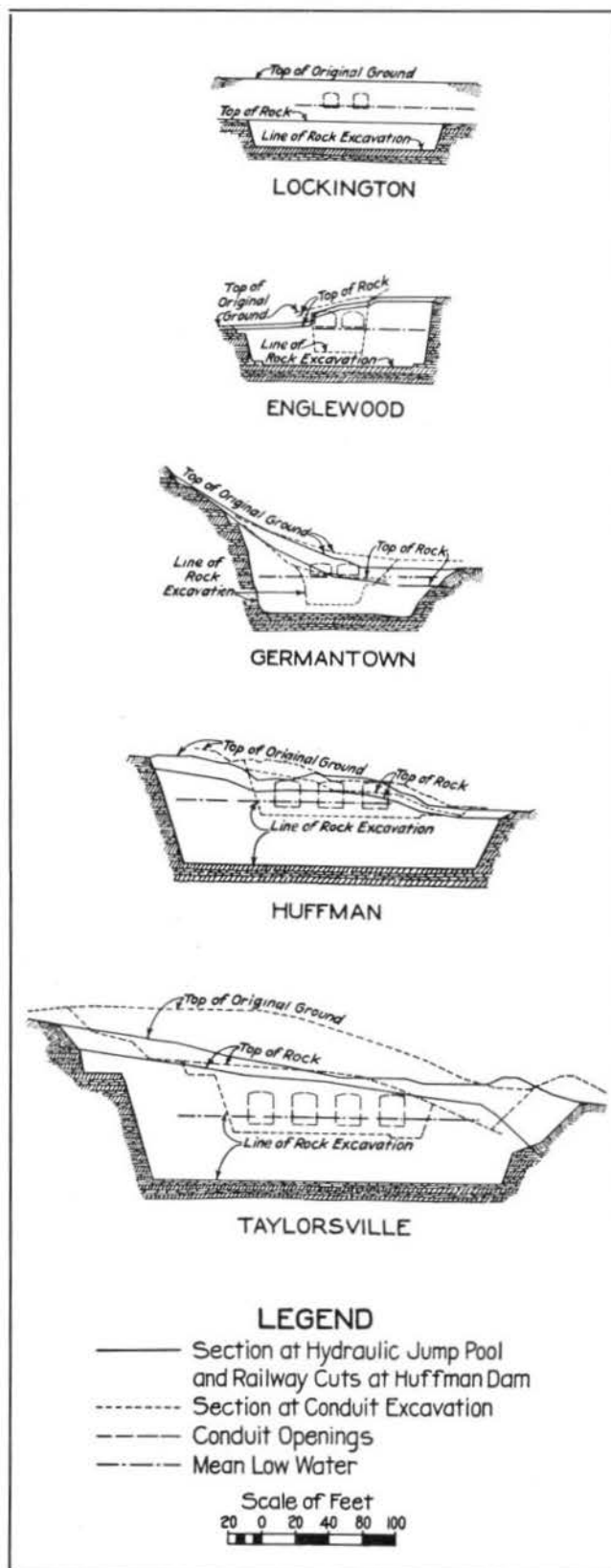


FIG. 75—SECTIONS OF OUTLET EXCAVATIONS.

Shows this work at all the dams, drawn to the same scale. The dotted sections are taken at the conduits proper; the full line sections are taken at the conduit outlets (at the hydraulic jump pool). The openings (in dashed lines) are the conduit openings as they will be when finished. All sections are shown looking downstream. At Lockington practically no excavation, (except a small amount for the pool), was necessary.

of dynamite was used, practically three-fourths of a pound per cubic yard excavated. At Englewood the amount used was one-half pound per cubic yard. The drills were tripod drills using steam. To trim the sides and bottom and cut out the corners small compressed air "Jap" drills were employed. At Germantown this trimming was kept within reach of the dragline bucket, which was thus able to remove the loosened material. At Englewood the trimmings were thrown by hand into skips or dump boxes which were lifted out of the excavation by a locomotive crane. The final dressing of the side walls and bottom was done with picks, and very carefully, in order to make sure that all loose rock should be removed and a solid surface presented for the concrete of the conduit.

Huffman

The conditions here were somewhat different from those at Englewood and Germantown. The flood flow provided for at the dam is so great as to require three conduit openings instead of two, necessitating a much greater width of structure. Also the topography and other conditions required that the excavation be carried to a much greater depth. The maximum width at the outlet was 174 feet, and the maximum depth, from the loading track to the bottom of the excavation, was 64 feet. The maximum depth of the rock cut was 60 feet.

The method followed was in general similar to that at Englewood and Germantown. The dragline excavator ran down the approximate center line of the conduits, from which it was able to reach all the material, even to the maximum width of 174

feet. The depth of the cut, however, was such that the machine (a class 24 Electric Bucyrus Dragline with 100-foot boom and 4½-yard bucket) could more efficiently take the material out by making two trips. The material was drilled and blasted in three layers, each about 20 feet thick, this thickness being exceeded in the deepest places in the lower lift in order to reach the bottom. The dragline cleaned away the upper layer on its first trip and all the remaining material on the second. In the deepest place the blasted material was picked up by the dragline bucket at a depth of 64 feet below the loading track, and 58 feet below the level of the ground upon which the machine stood. This at the time was a record performance for deep excavation by such a machine in rock material. (It was exceeded a little later by the machine at Taylorsville). The Huffman dragline excavated a total of 25,000 cubic yards from one position in the course of this work, which is believed to be also a record dragline performance.

Most of the holes were sunk by a well drill and a wagon drill. The well drill averaged 45 feet of hole per day at a cost (not including overhead), of \$0.27 per foot. The wagon drill did a maximum of 240 feet in one day. The trimming of sides and bottom, as at Englewood and Germantown, was done with "Jap" drills. All the work of drilling and blasting was kept well out of the way of the excavation, the dragline suffering no delays at any time from this cause. The total amount of dynamite used at Huffman was 70,000 pounds. The total amount of rock excavation was 39,500 cubic yards, giving a figure of 0.52 pounds per cubic yard.

Lockington

The conditions of rock occurrence at Lockington were quite different from those at any other dam. The rock is not of the Cincinnati formation, but of the Silurian, a later period, comprising rocks of the Springfield, Dayton and Osgood series. The layers are all of hard limestone, from 4 inches to 18 inches thick and practically level, the dip, which is to the north, being imperceptible except to measurement. The material is also much firmer than that of the Cincinnati formation, permitting its use as plum stones in the concrete or as rip-rap on the slope of the outlet channel below the dam.

The outlet location was selected a few hundred feet east of Loran Creek, where bed



FIG. 76—CONCRETE REVETMENT, MIAMI RIVER AT DAYTON, DEC. 29, 1919.

The revetment on the slope of the levee, (2:1 slope,) is of 6-inch reinforced concrete slabs built in alternate blocks as seen. At the foot of this slope is a low sunken concrete wall or footing capping a row of piles driven 8 feet in the ground, 3 feet apart. From this wall the "flexible revetment" extends, (lying on the very flat slope of the river bed as seen), about 30 feet toward the center of the channel. It is made of concrete blocks, 1 foot by 2 feet in size, woven into a "mattress" by galvanized steel cables, anchored in the sunken wall mentioned, and in a heavy concrete "footing" at the other (left) edge, and passing through holes cast through the blocks. (See Bulletin for August, 1919, page 13).

rock occurs at a favorable elevation for the foundation. This location was unusually favorable also in that there had been very little weathering of the upper rock layers (the depth being about 20 feet below the surface), the rock surface being so solid over much of the area that the concrete could be deposited directly upon it. In no case did more than a foot or a foot and a half of loose rock have to be removed to reach solid foundation. The bottom of the hydraulic jump pool was about 16 feet below the bottom of the conduit proper, requiring an excavation of 4,560 cubic yards of material. This constituted practically all of the rock at Lockington requiring to be removed.

On account of the unusually favorable winter of 1918-19, the concreting was enabled to follow closely upon the rock excavation at all times, and occasionally to overtake it. For this reason, with the materials at Lockington, heavy blasting was not permissible. It was found most satisfactory to drill shallow holes with "Jap" air drills and load with light charges. This light shooting broke the rock into sizes suitable for concrete "plums" and for the rip-rap referred to. It required more dynamite than would have been required if deeper holes had been sunk, but the excess cost was offset in several ways. The light shooting gave a neat rock line with practically no overbreakage. This in turn enabled the excavation for the two weir foundations, adjacent to the hydraulic jump pool, to be reduced in cross section, the solid unbroken rock base and wall taking the place of concrete. There was no damage to the plant, to the finished work or to the foundation itself done by blasting during the entire work of construction. Forty per cent dynamite was used, with an average of $\frac{3}{4}$ pound to the cubic yard of rock removed.

The blasted rock was not removed by dragline excavator as at the other dams, but by one and three-quarter yard bottom dump buckets loaded by hand and lifted by two guy derricks with 105-foot booms and 120-foot masts, which were used in connection with the concrete work. Much of the material was dumped directly into the concrete forms in the form of plum stones; the remainder was loaded into 5-yard dump cars, and hauled away to be built into rip-rap on the east side of the outlet chan-



FIG. 77—LIDGERWOOD DRAGLINE LIFTING WAGON DRILL, TAYLORSVILLE DAM.

This machine has a 100-foot boom and a $3\frac{1}{2}$ -yard bucket and is driven by electric motors, as are most of the other draglines used by the District. The wagon drills, also electrically driven, are moved to and fro as needed in the manner shown. U-bolts, fastened at each corner of the drill frame, are gripped by hooks carried by a 4-cable bridle, the upper ring of which is attached to the dragline bucket. The dragline is carried on trucks traveling on tracks running crosswise of the excavation, the latter being too wide to permit all the material to be reached from any one position. The machine thus zig-zags back and forth up the excavation, taking out a slice at a time. Taken Dec. 18, 1919.

nel, or to be used for other miscellaneous purposes.

Taylorsville

The excavation for the outlet works at the Taylorsville dam is much wider, much longer, and also considerably deeper than any other on the Conservancy work, except in the railway cut at Huffman (See plan Fig. 78). The maximum depth is 100 feet, of which 77 feet is in rock. The maximum width is 380 feet. The length on the center line is 1850 feet, on the east edge 2900 feet. The total excavation is estimated at 773,000 cubic yards, of which 523,000 is earth, and the remaining 250,000 rock. It is evident from these dimensions and quantities alone that the Taylorsville excavation problem must present somewhat different aspects from those at the other dams. (See Fig. 78.)

Especially, the disposition of the 523,000 cubic yards of earth overburden must be considered. This material must be made use of in the dam embankment, and this means that it must be removed ahead of the rock which underlies it, since the rock, for reasons to be given later, is not permitted to be used in the dam except as an addition and safeguard. The hydraulic fill method of construction having been settled upon as giving the maximum economy with assured solidity and stability, most of the overburden was washed down by the powerful jet from a hydraulic "giant" or monitor.

The dimensions and quantities given in the first paragraph also indicate that at Taylorsville the ex-

cavation, exclusive of the hydraulicking, might be done, not by dragline alone, but by a combination of dragline with steam shovel, the latter carrying the excavation down to elevation 775 or 770 (14' to 19' below the working shelf in Fig. 74), and the dragline following and completing the operation. This would have speeded up the work of the dragline on its part of the job by reducing the height of bucket hoist, and would have turned over a very considerable yardage of excavation to the quicker swinging steam shovel. It was decided, however, that the difficulties involved in the method, principally in harmoniously coordinating the double excavation and track equipment necessary, made the work at Taylorsville, like that at the other dams, a dragline job.

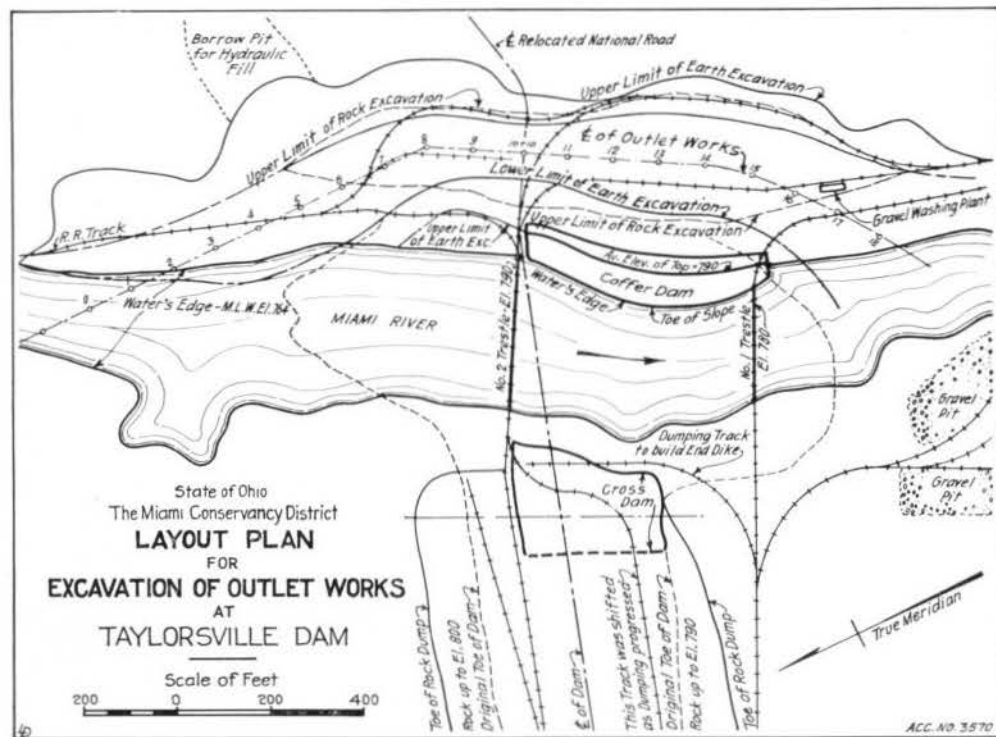


FIG. 78—LAYOUT FOR TAYLORSVILLE OUTLET EXCAVATION.

A small fraction of the material has been excavated by steam shovel and dragline, loaded into 12-yard dump cars, and carried across the river by locomotives, where it has

been used to build the cross dam extending across the damsite just west of the river, and enclosing the hydraulic fill pool on the east. This took 30,000 cubic yards. The remaining portion, as already indicated, was jetted, sluiced, and pumped by the method of hydraulic fill into the main structure of the dam between the river and the old B. & O. Railway tracks. About 230,000 cubic yards have been thus disposed of and the process is to be continued. This material for hydraulic fill has been obtained mostly from the river bank north of the north trestle (See plan Fig. 78). About the upper 10 feet of this material as it lies in the bank is composed of glacial till or boulder clay, and is excavated without difficulty. Beneath this,



FIG. 79—STEAM SHOVEL AT HAMILTON, SEPT. 11, 1919.

A powerful Marion machine, of a type adapted to rock excavation. Note the compact, massive build of the boom and dipper. The dipper and dipper handle swing on the shaft of the biggest wheel (seen about the middle of the boom) as a center, and the dipper handle, as seen, is pushed out to its full stretch. The short reach, either down, up or sidewise, as compared with a dragline machine of equal power equipment (Fig. 77) is evident. This means that only a comparatively narrow trench can be taken out at one cut, and also that the dump car trains to be loaded must run rather close alongside the shovel. To take out a wide excavation, much side shifting, both of shovel and train tracks, is thus necessary to reach all the material. See pp. 89-90.

however, and extending down to the Cincinnati rock, is a layer running to 20 feet or more in thickness, of extremely tough clay or hard pan, which was as hard on a steam shovel or a dragline as rock would be. It was found best in the end to blast it, and this was true whether it was to be removed by dragline, steam shovel or hydraulic monitor. The holes for this purpose were best drilled from above by well drills, spaced about two-thirds the height of the excavation to be shot, and loaded with black powder at the rate of about a pound per cubic yard, the holes having first been "sprung" or enlarged at the bottom by dynamite. The general arrangements for the excavation of this overburden by hydraulic fill have been described in the issues of the Bulletin for November, 1918, and March, 1919.

The earth excavation began in August, 1918, with the work of a Marion 36 steam shovel cutting a shelf for the big dragline to work on. Excavation of the overburden by hydraulic began in September, 1918, and has been continued with various necessary interruptions down to November, 1919, when it stopped until the Baltimore & Ohio tracks could be removed to their new location out of the way of the growing dam embankment. Rock excavation began in February, 1919, and has been steadily continued ever since. The total amount of the latter removed to December 1, was 141,130 cubic yards, leaving about 110,000 cubic yards still to be done.

The general arrangements for taking out the rock are in the main similar to those at the other dams. The chief tool relied upon for the digging is the dragline excavator, a Lidgerwood machine with 100-foot boom and 3½-yard bucket, loading into 12-yard dump-cars handled by 40-ton locomotives. The dragline works on a rock shelf at elevation 789. The loading tracks are laid on the same shelf and run to the north trestle on a level grade. The south trestle is ten feet lower than the north one, (see plan Fig. 78) and the general elevation of the valley floor on which the dam is built is 770. The rock being deposited, as explained later, as a buttress to the low outer slopes of the dam embankment, this arrangement permits the loaded trains to move on level or downward grades. About 6,000 yards of rock lying above the working shelf elevation, as well as a considerable yardage of the earth overburden, was removed by steam shovel. The rest is being taken out by the dragline. All the material is carried across the river on the trestles, almost all of the dam embankment being west of the stream, and the outlet works excavation being on the present east bank.

It has been stated before that in taking out this rock at Taylorsville a record for deep excavation with a dragline is believed to have been made. The machine stands on a rock shelf at elevation 789. The bottom of the hydraulic jump pool, the lowest point in the excavation, is at 726. The lowest material was thus removed at a depth of 63 feet below the supporting rock shelf.

The rock was drilled and blasted in two lifts. The upper lift was carried down 26 feet, taking it to the bottom of a heavy seam of the Cincinnati limestone. Where the holes were carried deeper this thick seam would break out in blocks 3 to 5 feet thick, which would require to be "block-holed;" that is, drilled and blasted again, to break them into pieces small enough to be handled by the dragline

bucket. With the main charge exploded at the base of this seam block-holing was not necessary. The second lift was carried down to the bottom of the excavation, a maximum distance of 37 feet below the first.

The drills used were three cyclone drills and three air drills of smaller size. The cyclone drills were driven by 7½ H. P. alternating current three phase motors, operating at 440 volts and drilling a four-inch hole. Fifty feet of hole per day was considered a good day's work. The holes were spaced 10 feet each way and up to June were charged with 40 per cent dynamite. Following that, "gelignite" was used, a 72½ per cent gelatin dynamite, which had been sold to Italy for use in the war and on the conclusion of the armistice was advantageously taken off the Italian government's hands by the Conservancy District for its own use. An amount of this explosive ranging from 75 to 100 pounds was used in each hole. The holes were not "sprung;" that is, a small charge of dynamite was not exploded at the bottom of the hole to enlarge it for a bigger charge. Ordinarily this process is an advantage, but in the Cincinnati it cannot be used, the reason being that the springing charge "funnels out" the top of the hole, the strata being thin and weak, and the broken rock drops down the funnel into the hole, blocking it and making it necessary to re-drill.

The large holes were not carried nearer than two feet from the bottom of the excavation nor nearer than five to ten feet from its sides. These remaining portions were drilled by jap and jack hammer drills and shot with small charges of from one to two pounds of dynamite. These holes were drilled three feet apart, and next the sidewalls four to six feet deep, the holes on this latter case being drilled at the very edge of the excavation. The caps were exploded by electricity tapped from the 440 volt motor line. On the day of the editor's visit 235 of these holes were fired at once in this manner by a single stroke of the electric switch.

The quantity of dynamite used per cubic yard of rock blasted has been 0.72 pounds of the 40 per cent explosive and 0.5 pounds for the gelignite.

It would have been desirable if the rock material could have been used in the dam structure, but fears have been entertained for the stability of the Cincinnati formation, the particular rock encountered, in such a situation. The rock is limestone, for the most part in thin layers and interstratified with much shale, which on exposure to air, frost, and water, sloughs and decomposes in such a way as to create considerable distrust regarding its ability to stand without sliding when placed in the dam embankment. For this reason it is not placed in the dam structure proper, but is deposited as a blanket and buttress adjoining the dam to the north and to the south. Thus used, it becomes a strengthening extension of the very flat outer slopes of the dam embankment.

It is believed to be worth while to call attention once more to the remarkable flexibility of the dragline as an excavating machine, as exhibited on this work. The total depth of the Taylorsville excavation at its maximum is just 100 feet. The Lidgerwood machine, with its 100-foot boom and 3½-yard bucket, standing on its work shelf, as described, excavated over this entire range, reaching up and

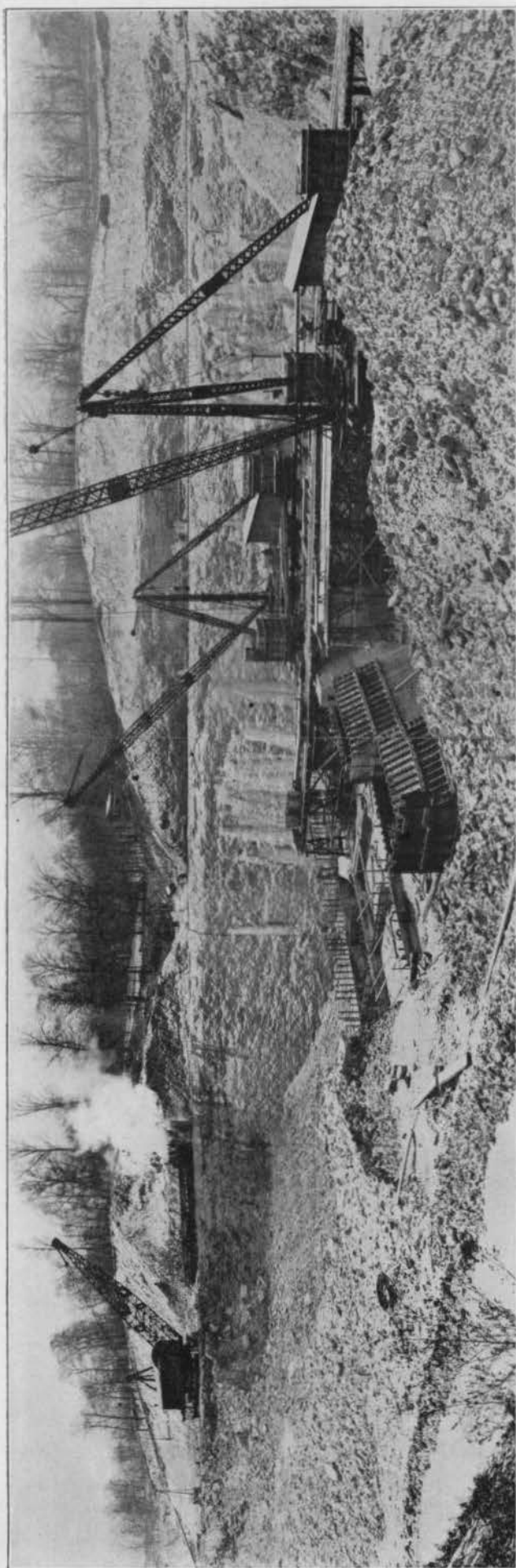


FIG. 80—FOLLOWING UP THE ROCK EXCAVATION WITH CONCRETE WORK, TAYLORSVILLE DAM, DEC. 18, 1919.

"browsing" 37 feet above its base, and then reaching down 63 feet into the pit, to pick up the material which was there. It could no doubt also have taken out the excavation to a 175-foot base width by running down the center line and reaching out on each side, since the Bucyrus machine at Huffman, with a 100-foot boom, did such a feat on an excavation of that width. The extreme breadth of the Taylorsville excavation, however, did not permit this. The machine was obliged to "seesaw" back and forth crosswise of the excavation while it worked down the length of it, and take the rock out a slice at a time.

Equipment for Sale

On this page will be posted from time to time a list of the equipment for which the Conservancy District has no more work in prospect. All of this equipment will be completely overhauled in our own shops, and any one interested in any item may rest assured that it will leave our hands in first-class working condition.

The following items are now on sale:

6 Sullivan FL-3—3 $\frac{1}{4}$ " Cylinder Tripod Drills.

8 Ingersoll E-44—3 $\frac{1}{4}$ " Cylinder Tripod Drills.

Above are all complete with tripods and weights, steel in various lengths, connections, and a full line of repair parts.

7 Sullivan DP-33 Rotator Jack Hammer Drills

with steel hose connections and all necessary repair parts to keep them in service.

All inquiries relative to the above should be addressed to the Miami Conservancy District, Dayton, Ohio, marked for attention of Fowler S. Smith, Purchasing and Sales Agent.

Excavation and Concreting at Taylorsville

The picture of the Taylorsville work on this page is intended to bring out, among other things, one of the chief reasons for the choice of dragline equipment to excavate for the outlet works at the Conservancy dams. It shows the dragline working up the trench on its job of excavation, and further down, at the right, the work on the concrete proceeding simultaneously. The nearest wall seen is the lower weir wall for the hydraulic jump pool, at the downstream end of the outlet works. The further wall is that of the upper weir, the pool floor being between. The dragline completed this part of the excavation first, to full depth and width. Then the concreting began, while the dragline excavated on ahead. A steam shovel would have been obliged to take out almost the entire outlet works excavation, from end to end, before concreting could begin at all. (See pages 89 and 90). This greatly expedited the concrete work, a matter of much importance.

At Taylorsville the great width and depth of the excavation (the maximum cut in the picture being 100 feet), made it necessary to excavate the upper part first, down to the level of the rock shelf on which the dragline and train stand. (Elevation 789). Then the lower part was attacked, beginning at the right-hand end in the picture, and working to the left (upstream.)



FIG. 81—LOCKINGTON DAM EMBANKMENT, DEC. 8, 1919.

The view is westward from the top of the west wall of the outlet works (the left hand wall, Fig. 82 below). In the foreground is the hydraulic fill pool, with its enclosing levees on the north and south. The trestle carries the dredge pipe line across the pool to the south levee. In the distance, in the middle of the picture, is the east end of the narrow western half of the dam embankment, recently completed. This portion, averaging only 15 to 20 feet high, can be seen sweeping to the northwest where it ends behind the trees at the right. It was built by a dragline excavator, the material being scooped up out of a "borrow pit" at the side. It is 3400 feet long, (the entire length of the dam being about 7000 feet), and contains 101,000 cubic yards of earth. Material totalling 195,000 cubic yards has been deposited in the embankment from the pool by hydraulic fill. Total earth in the finished structure will be 1,000,000 cubic yards. The embankment seen in the distance is up to full height (elevation 954 above sea level). Hydraulic fill embankment seen is up to an average elevation 42 feet below this. The concrete walls and foundations for the outlet works (see Fig. 82 below) are completed. The dam as a whole is 64% complete. Closure of the dam is expected to be made next season, sufficient to give Piqua and Troy, immediately below, protection against a flood equal to that of 1913. By the end of the season, it is hoped, the concrete spillway will be finished and the embankment carried to full height, giving the full protection planned. Total earth in the embankment to date is 392,000 cubic yards.

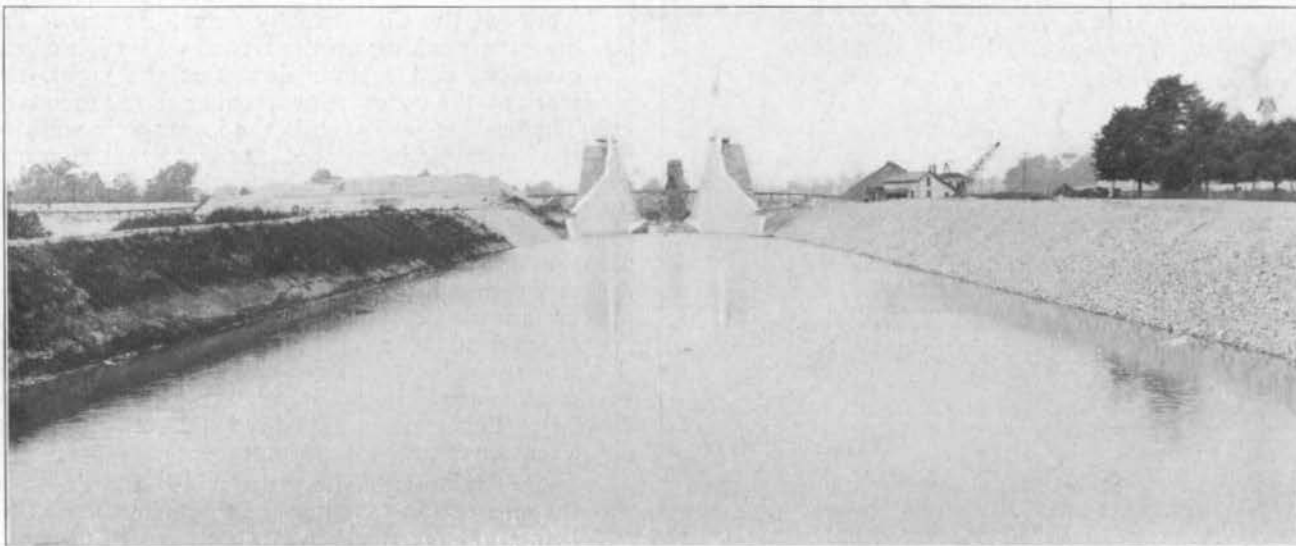


FIG. 82—OUTLET CHANNEL AND WALLS OF OUTLET WORKS, LOCKINGTON DAM, AUG. 11, 1919.

The view is looking north. The hydraulic fill pool shown in Fig. 81 is just to the left of the left wall of the outlet structure, on top of the unfinished dam embankment, (which appears in Fig. 82). A concrete cross dam will block the space between the outlet walls. It will be pierced at the base by the two conduits, carrying Loramie Creek through the dam. At the top, between the walls, it will carry the spillway.

THE MIAMI CONSERVANCY BULLETIN SUPPLEMENT "The News Letter"

To Promote the Conservancy Spirit on the Work

JANUARY 1920

GERMANTOWN

There were many sumptuous dinners served in camp Thanksgiving Day. Among the out-of-camp guests were Mr. and Mrs. Verne Clawson and daughter, Dorothy, of Huffman Dam, who were entertained by Mr. and Mrs. A. L. Pauls. Mrs. Gillespie of Piqua visited her daughter, Mrs. Minton, and Miss Hazel Moore of Dayton was the guest of Mrs. H. A. Wehrly. Mrs. Shively entertained Mrs. Wherl and little son of Pittsburgh, Pa.

Mrs. A. L. Pauls gave a six o'clock dinner to several of her friends on Thursday, December 4, in celebration of her husband's birthday.

The dance and card parties held every week have met with great success, each lady being hostess as her turn arrives. The lunches have been quite an inducement, not to mention the good times we are sure to have.

Ravenna, Ohio, Greets Her Long Lost Wanderer

After fourteen years of globe trotting, Mr. Robert E. Reynolds will go back to spend Christmas in his old home with his dear ones and incidentally with his old sweethearts, especially, as we understand, with one of them. We are hoping to give Bob a grand reception on his return, as we do not expect him to come back alone. This is so far only a pleasing surmise. It's wait and see.

Our telephone operator, Miss Sadie MacDonald, leaves Saturday, December 20, on her vacation. We know of one who will surely miss her very, very much.

Miss Julia Maria Darnell, our school teacher, will spend her first Sunday in camp on December 21, thanks to the young man who is making life interesting for her.

Mr. Will Fuller will spend Christmas with his folks in dear old Georgia.

Germantown requests more information about Miss Carroll's furniture.

Stub Graham, our popular club house boy, who is accused of stealing two pumpkins and two ducks, draws the line on two girls, finding one enough to occupy all his spare time. We wish him much luck with her.

Germantown wishes to extend thanks to Paymaster Dodds for his kindness in making it possible to receive the last bunch of pay checks so that they would be available for the Christmas holiday. With the deep holes made by the H. C. L. in our financial roll, those pay checks came in handy.

The Same to You, Germantown

Germantown wishes the Headquarters Office, also all other employees of the District, a very Merry Christmas and a bright, happy and prosperous New Year.

ENGLEWOOD

Chandler Begins Hoarding

It is alleged that Paul Chandler has opened a savings account in the Englewood bank. We hear that Paul intends to buy "a coupla good mules" in the spring.

They Had "Just the Sweetest Little Meeting"

The Social Committee and Mike Cornish were all present at a special meeting called the other evening. Several boxes of candy had to be sampled, tested, tasted, passed upon and approved by each member of the Committee before they were finally selected for the Christmas entertainment.

Santa Claus a Little Ahead of Schedule

Anticipation is running high amongst the children at Riverside. They already have visions of the candy, nuts and "good eats," not to mention the presents, which will be distributed amongst them by the most generous Santa Claus that ever brought good cheer and happiness to Englewood Camp. He is scheduled to arrive at Community Hall Monday evening, December 22 immediately after the entertainment. A program by the school children, under the direction of Mrs. Everdell, will be staged at eight o'clock.

Hoboism

A noteworthy coincidence it is that as the weather grows colder and as radiators freeze tighter, Mr. Horne should be seen walking down to the office these mornings.

Mrs. T. L. Mitchell visited in Middletown, Ohio, to attend the wedding of her niece in that city.

The Height of Strategy

For full particulars on ways and methods of getting to Englewood via D. C. & P. without carfare, see Mrs. Alpers. At present we are in no position to state how long she walked around town looking for a friend indeed.

Here's a Hot One

The stove in Mike Cornish's shack in the woods is up to some mean tricks again. The fire burned furiously throughout the night, but alas, next morning Mike found his tea kettle full of ice, "sitting right on the stove."

LOCKINGTON

On November 29, a miniature hurricane took away the porch roofs from two Togan-Stiles cottages. A hastily organized first aid crew made temporary repairs to protect the house furnishings from the downpour of rain that followed.

During the month Mr. R. E. Schlotterbeck and family moved from Lockington to the camp and Mr. J. J. Loehr moved his family from Dayton.

Mr. and Mrs. H. T. Meiners are spending the holidays in Louisville, Ky.

Mr. D. S. Haldane and Mr. Axel Person have moved their families to Dayton as Mr. Haldane and Mr. Person have been transferred to the Dayton channel job.

Mr. and Mrs. L. J. McWilliams are visiting home folks in Newark, Ohio, during the holiday season.

On December 4, Mrs. Ball, Mrs. Person and Mrs. White entertained the ladies of the camp, and on December 18, Mrs. Meiners, Mrs. Gudgeon and Mrs. Shea were hostesses at a Christmas party.

Mrs. C. H. Shea and children are visiting in Dayton.

TAYLORSVILLE

At Home

It might be well to explain to any person contemplating an evening call on any one of a certain group of eight Taylorsville families, that although the house may look dark and deserted from the street, nevertheless if the visitor will approach and knock on the door (providing he can find the door with the porch light turned off), he will be welcomed by the householder with a candle in his hand. In the living room he will find the rest of the family crowded around the feeble glimmer of an 8-watt lamp, trying to find Taylorsville propaganda in the Bulletin. Before the caller departs he will undoubtedly be offered the entire household electrical equipment, including fan, grill, washing machine, iron and heater at greatly reduced rates. And the reason for all this is that these eight families have had electric meters wished upon them by the District.

Better Give B. H. P. a Rabbit's Foot

After cleaning up all the rabbits around Taylorsville Dam, C. Farmer crossed the line into Indiana over the Holidays and bagged eight on Christmas Day alone.

Ben H. Petty also spent the Holidays in Indiana, but doesn't like to talk about the number of rabbits he bagged.

Another One

L. N. Southern and Bob Rogers, in a seven-passenger Hudson, had a narrow escape on the night of January 6, when they met up with another machine on an icy road. L. N. threw on his brakes. This started the Hudson into a "shimmy" and "hesitation" simultaneously, turning it at right angles to the road and heading it through the guard rail and down a 15-foot embankment. At the first sign of "breakers ahead," Bob decided to jump overboard and suffered some damaged ribs. L. N. stuck to his wheel as all good skippers should, and came through unscratched. Outside of a smashed wheel, windshield, etc., the Hudson is still seaworthy.

Bob says what started the "shimmy" was wood alcohol in the radiator. All right—but whose radiator?

Election

The semi-annual election of officers for the Community Association was held in Community Hall on the night of December 19. A total of twenty-four names had been nominated at a previous meeting and from this list the following five commissioners were elected: Masel Floyd, Chairman, Social Service; C. Farmer, Community Safety; H. W. Tizzard, Education; F. A. Meyer, Finance and Records; F. E. Floyd, Community Service. These officers took charge of the association work January 1st. A free picture show followed the election.

Armenian Relief

Our Sunday School sent a Christmas offering of \$18.00 to the "Near East Relief Committee" to help alleviate the suffering among the destitute people of Armenia and Syria. An additional contribution of \$5.00 per month will be forwarded to this committee, which will pay for the feeding of one child.

Disastrous Fire

A very disastrous fire occurred in camp on the morning of December 1, when the home of J. F. Schmidt, dragline runner, was completely gutted and the entire family seriously burned. The fire was started by an explosion of kerosene which Mr. Schmidt was using to start a fire in the kitchen stove. Mr. Schmidt rushed from the house immediately and was assisted in extinguishing the flames on his clothing by neighbors, who quickly appeared. Others entered the house and rescued Mrs. Schmidt and the 9-year-old son, Clarence, who had come down stairs through the flames in their night clothes. All three were taken into the home of W. D. Rogers and given every attention possible until the three doctors arrived. After receiving first aid they were removed to Miami Valley Hospital in ambulances. The parents were so seriously burned that they died during the week. They were sent to Wisconsin for burial. The boy was burned only about the face, hands and feet, and although suffering considerably, he improved very rapidly.

The people of Taylorsville offered every assistance in the emergency. Flowers were sent to the funeral and a complete outfit of clothing was bought for Clarence. The Schmidts had a large circle of friends in camp and their passing away under such distressing circumstances came as a severe shock to all who knew them.

Movies

The picture shows every Wednesday night are attracting good crowds and the Triangle films now being shown are proving very satisfactory. Besides the 5-reel feature and 2-reel comedy, we are running the "Herald Weekly" as an added attraction.

Christmas Program

A Christmas program was rendered by the school in Community Hall on Tuesday evening preceding the holiday. The hall and stage were appropriately decorated for the occasion. A Christmas play was given in which Santa Claus junior took part. A large crowd of adults enjoyed the Christmas spirit with the youngsters.

HAMILTON

Master Mechanic C. H. Lalonde motored to Sidney and spent the holidays with relatives.

H. P. Rowlands, a dragline operator on the Old River work, was painfully burned by a carbide explosion recently.

Frank Peters, formerly foreman on the sewer work, who was operated on for appendicitis at Mercy Hospital last month, has been removed to his home and his condition is rapidly improving.

Foreman William Garrett reports a pleasant and otherwise satisfactory hunting trip in the vicinity of Oxford during the holidays.

Division Engineer and Mrs. C. H. Eiffert were the dinner guests of Mr. and Mrs. A. F. Griffin on Christmas eve.

Miss Lois Faist, daughter of Office Engineer J. E. Faist, is spending the holidays at home, after a somewhat strenuous term at Miami University.

Locomotive Engineman O. B. Brenner has been recalled to his former position with the Baltimore & Ohio Railroad.

Supt. W. T. Rains was quite as busy on the job during the holidays as at any other time.

We are pleased to learn that F. H. McCafferty, who formerly operated one of the locomotives, is about able to be out again, after a long illness caused by blood poisoning.

Supt. W. A. Roush and Electrician Stanley E. Roush spent the holidays at the home of their mother in Middletown.

Mr. and Mrs. G. W. Schrader and Jane spent Christmas with relatives in Dayton.

We were all pleased to receive Christmas cards from our friends, Mr. and Mrs. Frank C. Williams, now residing in Brooklyn. Mr. Williams is engaged in the construction of large sewers in that city.

HUFFMAN

Mr. E. S. DuBois is enjoying a visit from his mother, who came on December 17, and will remain through the holiday season.

The Huffman camp extends a cordial welcome to another bride and groom, Mr. and Mrs. James Cullen, who moved to Huffman from Dayton on December 20. Mr. Cullen had been employed in the Headquarters Office for some time.

The Huffman Sunday School is preparing the Christmas cantata, "Santa's Reception," which will be given in the Community Hall the evening of December 23.

Miss Darnell entertained all the children in camp with a Christmas party at the school room, the afternoon of December 19. Miss Darnell's popularity that day was only exceeded by that of Santa Claus himself.

The Sunshine Circle met at the home of Mrs. C. C. Chambers on the evening of December 17th, with Mrs. B. V. Chambers assisting as hostess. The big event of the evening was the exchange of Christmas gifts. Each member gave a present, which was placed in a large Christmas pie, with a string attached to each gift, the end hanging outside the pie. The pie was covered, and then everybody pulled a string.

DAYTON

"Abe Linkhorn"

The people of the Conservancy are sure to be interested in a recent announcement by the Atlantic Monthly, which concerns our Chief Engineer. It seems that Mr. Morgan, spending a chance holiday beyond the reach of railways, in the Ozark mountains, came upon a family of people whose parents had lived as brothers and sisters to Abraham Lincoln—"Abe Linkhorn"—as they called him. This branch of the Hanks family had much to say regarding the boyhood of "Abe Linkhorn" in the pioneer cabin in Illinois. Mr. Morgan naturally was much interested and made a record of what he was told, which is to be shortly published in the Atlantic Monthly. We are sure that all the members of the Conservancy family will look forward to this story with unusual anticipation.

THE MIAMI CONSERVANCY BULLETIN

Board of Editors

Germantown	Miss Julia Darnell
Englewood	Albert L. Wald, J. W. Quinlisk
Lockington	C. H. Shea
Taylorville	Miss Coral Benedict, W. D. Rogers
Huffman	Mrs. C. C. Chambers
Hamilton	R. B. McWhorter
The Woman's Club, Dayton, Ohio.....	Miss Mayme McGraw
Dayton Warehouse.....	J. T. Hall

"Water Power at the Dams"

Once more the ignis fatuus, of "Water Power at the Conservancy Dams" fumes up out of the editorial brain, this time in the office of our esteemed contemporary, The Dayton Daily News. The engineers of the District have laid the ghost of this delusion as they thought, again and again, but still it lifts up its head. They have explained over and over that you can't have water power and insurance against flood at one and the same time. Whatever you get in water power, you lose in safety. The dams have not been designed and do not provide for water power. They must never be used for water power. This has been said again and again. It has been literally chiseled in stone, to be built into the structure of every dam. Yet the ghost still walks and we suppose it will walk till time shall be no more. Therefore, we repeat, as we expect to repeat in future, that it IS a ghost. Don't take it for solid substance. It hasn't any. It is marsh gas and heated air.

Editorial Prattle

The Bulletin is open to congratulations on its recent removal to a new office in the east end of the Headquarters building, where the sun comes pouring in through two big double windows running across an entire side of the room. That just suits us; we are no lovers of gloom. Besides the sun, this window lets in a large landscape, wherein the waters of the Miami and Mad Rivers meet and run smoothly on their way past the office down to the Main Street bridge. We can look up and see the Dorothy Jean puffing up and down the river with a scow, or the D-9½ dragline swinging a bucket of stuff over the levee north of Webster Street bridge. Being still a child, these pictures please us.

P. S.—We forgot to say that the view indoors beats the landscape.

Prizes for Conservancy School Children

Once more we call the attention of all the pupils in all the Conservancy schools to the fact that the Editor of the Bulletin has offered prizes for the best school contribution to the Bulletin during the present school year. Announcement has been sent through the kindness of Mr. Hauck to the teachers at the several camps giving particulars. We wish especially to emphasize that the smallest child has just as good a chance as the biggest, because age will be fully taken into consideration. It will not be possible to publish all the contributions, but they will all be taken into account, and the quantity sent in by any contestant will be counted as well as the quality of the work done.

Clarence Schmidt Well Remembered

All Conservancy people felt an unusual interest and sympathy in the case of little Clarence Schmidt, the boy who lost his parents in the sad accident at Taylorville some time ago. Clarence left Dayton on Friday, December 12, to make his home with his mother's brother, Mr. Max Schroeder, in Neillsville, Wisconsin. Special pains were taken to let Clarence know that his Conservancy friends did not forget him at Christmas time. A special fund was raised in the Headquarters Office and another at Taylorville. Paymaster Dodds undertook the job of Santa Claus for headquarters, and a generous supply of building blocks, books, toys, nuts, candy, etc., was the result. Clarence means when he grows up to be a dragline runner like his father, and the chief toy sent him, therefore, was an automatic sand crane, which loaded and unloaded like a man-size machine. Taylorville, as noted

WOMAN'S CLUB

Miss Mary Brunner was called home on account of the death of her niece, Miss Dorothy Antrim, of Hamilton, Ohio. We extend our sympathy in their bereavement.

The Editor wishes to thank all those who so generously contributed toward the Christmas fund for little Clarence Schmidt, who was seriously burned in the recent explosion at Taylorville Dam. Especial thanks are due Miss Cullen for her assistance in helping collect the money, and Mr. Dodds, for his kindness in buying the gifts. The gifts were sent by parcel post and were received the day before Christmas.

We extend our sympathy to Mr. Nealon of the warehouse and to Miss Mary Nealon of the Purchasing Department in their recent bereavement.

Miss Mary Cullen has returned to her desk after several days' illness.

Confidential Communication

"I promised Matilda not to mention this to anyone, because she got it in strictest confidence from some one who was pledged to absolute secrecy, so before I tell you you must give me your word of honor you won't even breathe a hint of it."

Do You Know the Leonids?

During the month of November we were watching the sky for shooting stars from the region of Leo. These stars are sometimes called Leonids. Meeting an old fellow, Peter Pickup, from the East End, thinking he remembered the great shower of stars, I asked him if he knew anything of the Leonids.

"Know them? Why I should say I do. I know them all. They used to live at Washington Courthouse. The old man used to own a shanty boat. I've been fishin' with him many a time. His brother Jim kept a tavern in Wilmington, his daughter Mary—the cross-eyed one, married Buck Thompson. After a few weeks she broke up house-keeping by bouncing a skillet off his head. The other daughter, Celia, ran away with a traveling showman. The old man's dead now, and his widow runs a roomin' house in Dayton, and Julius runs a wheelbarrow or dray or something down at Woodsdale. Do I know the Leonids? Well I say I do."

elsewhere, specially undertook to furnish Clarence with a brand new outfit of clothes, as well, of course, as other things.

The entire district sends the boy its kindest and heartiest wishes for the coming year.

What About the Conservancy Club?

Every now and then somebody pounds on the coffin of the Conservancy Club and listens for signs of life within. Some claim they hear faint cries and demand that the Bulletin editor pry the lid off, and apply the pulmotor. We answer tranquilly that we will be glad to try when it appears that we will not be left alone (as at the last seance) to work the handle. We remember it well. The committees gently evaporated. The editor remained. We were captain, cook and crew, worked fifteen hours a day, landed five dollars in the hole and paid the same cheerfully out of our own pocket. When do we think of the Conservancy Club? Seldom. What do we think of it? Well, we love it yet, but we are still too weak from the effect of the last session to undertake to carry the whole thing on our lonesome. What do you think?

Honor to "Eldee"

We wonder how many of our readers saw the half page of tribute paid to our Conservancy poet in a late issue of the Dayton Sunday News. Personally, we have long been proud of having Eldee on the Bulletin staff, and we were very glad to see him get such a notice. There is only one trouble with Eldee—he is too modest. He needs a "press agent." Some day he will be "discovered," and when it happens, Eldee's rhymes will travel a long way out of Dayton. Because he has developed what is rare—an original gift, and in a vein that is always in demand—humor. When you cast your eye over Eldee's corner of our little sheet, therefore, take a second "slant" at it, as having a deal more virtue in it than lots of editorial "bunk" that cuts a far wider swath.

THE MIAMI CONSERVANCY BULLETIN

Life is mostly froth and bubble,
Two things stand like stone—
Kindness in another's trouble,
Courage in your own.

Shop, Warehouse, Garage

We are glad to see Ed Payne back on the job after his lengthy vacation.

Disappeared—Bill Shriver's mustache. Bill says the baby amused himself by pulling it and on account of the continuous pain, he had it removed. We doubt that.

Death is a certainty,

Life is a doubt,

Sid is dead,

But still walking about.

We now understand that Mr. Gerber was sent to the shop to instruct Mr. Hagerman how to use the big air hammer.

We are glad to hear that Mr. Black of the garage is recovering from a severe attack of pneumonia. He is expected back on the job within the next few days.

We are glad to see Daddy Thompson back on the job after seven weeks of sickness.

We are advised that Dave Rike of the warehouse is seriously considering matrimony. Dave must have picked a winner, as it takes a lot of nerve to take on a wife during the high cost of living period.

The mystery of the electrical division: Ask Frank Harvey to give you the history of his baby.

Is the Peace Treaty going to be ratified before the next presidential election. Ask Peggy Ames; he knows.

Who's "Q"?

Are the Colonial dances over? Ask Mary Margaret Helmig. It is reported to the Bulletin on authority right next to Mary Margaret herself that a certain young gentleman from Englewood whose name begins with "Q" has a monopoly there.

A Bas, the French Heel!

A certain member of the Headquarters Engineers staff—whose name we dare not mention—has calculated, to quote his words, that "a 16-story sky scraper gives less pressure per square inch on the foundations than a French heel does under the burden of 200 pounds of foolish woman." We believe it. We have long desired to take a slam at the French heel. Some day when we get sufficient courage we are going to do it. We have often wondered how our good, common sense American women could stand for or stand on such a contraption as the French heel—bad cess to it!

"Miami Conserving Dentist"

Supposed to be Stockman. At any rate that's the way a letter was addressed which came to him a few days ago.

Frank J. Sprague Visits Dayton

Mr. Frank J. Sprague, Superintendent of the Conservancy Railway work in the Mad River valley, until recently, has been paying Dayton a visit with his family during the holiday season. It looks good to see him again.

E. W. Lane Publishes Engineering Paper

E. W. Lane, who has been for some time assistant engineer on the Miami River channel improvement at Troy, is again at work in the Headquarters Office, the work at Troy having come to an end on account of the cold weather. Mr. Lane has recently published a paper in the proceedings of the American Society of Civil Engineers for October, November and December, 1919, on "The Flow of Water Through Contractions in an Open Channel." We expect to give it further notice later.

Mr. Cornish Goes to Chicago

Mr. Myron Cornish, we are sorry to announce, started recently for Chicago to take a position with the Sanitary District there, on the same project which recently took from us Mr. Walter M. Smith. Mr. Cornish will, in fact, we understand, be under Mr. Smith on that work. It is a big job, a good job, and a boost for Mr. Cornish. We are glad of all that, but very sorry to see him go.

Poor Vacant Lot

By Eldee

With pain I view my vacant lot,
That one time verdant, laughing spot,
Resplendent in its nodding rows
Of growing corn and thieving crows,
And spangled beets and pesky spuds,
O'er which I spoiled two suits of duds,
To make them get a move on, shoot,—
And broke a one plunk hoe to boot!

Frost bit tomatoes lie here and there;
The wigwags that I built with care
For my pole beans to shin up—climb,
Are so far gone they scarce will rhyme,
The dead vines clinging to them still
Like grief to broken Kaiser Bill.
And over all, the cold winds roam—
It makes me homesick in my dome.

My vacant lot is on the bum!
When I think how I made things hum
On Saturday P. M.'s and nights,
How I went after bugs and blights,
And carried water to those plants
And hoed until I sprained my pants—
My heart grows dim, my eyebrows fill;
To see it now makes me feel ill!

Enter Miss Patricia Burkin

The Editor acknowledges with much pleasure the receipt of a card announcing the birth of Miss Patricia Burkin, on November 19, 1919, to Mr. and Mrs. John Flemming Burkin, Greenwich, New York. Mr. Burkin occupied a desk immediately in front of the Editor when the latter was wrestling with the first Bulletin, and he has never forgotten the kindly help which he received from Mr. Burkin, at that time. He hopes some day to be able to pay his personal respects to the new-born heiress. In the meantime he does the best he can in cold type.

New Boy

An eight and one-half pound boy was born to Mr. and Mrs. A. W. Pease on December 5, 1919. He is called James Frank. Mr. Pease seems to be particularly pleased because it is a boy. The Bulletin extends congratulations.

Brother Pease of the Paymaster's Department, accompanied by his trusty guard, Billy Gugel, in the course of a trip to Hammond and Germantown on January 2, drove four automobiles and had three "shot under him." It was some battle. They started out from headquarters in a Buick, which blew up a few miles outside of Hamilton. They telephoned to the Hamilton office for help. The second steed was a Ford Sedan, which lasted fifteen minutes. They were rescued this time by a Hudson Super-Six, which in turn went down within a block of the Hamilton office. With the help of Graham Smith's Buick they finally got home.

Good Eats at Taylorsville

We can't help throwing a bouquet to Chef Gray and his assistants at Taylorsville in return for the very appetizing dinner which we ate there not long ago. And it was precisely the same stuff and cooking that the Taylorsville workers all ate.

CONSERVANCY BOWLING LEAGUE

Final Standing of Teams at End of First Round of 1919-1920 Bowling Season January 1, 1919

Team	Won	Lost	Pct.
Rustlers	43	2	.956
Mekanix	24	21	.533
Railroads	23	22	.511
Purfits	19	26	.422
T Squares	15	30	.333
River Imps	11	34	.244

This completes the first half of the bowling season, and January 17 all teams start again with a clean slate.

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FIG. 83—BORROW PIT AT ENGLEWOOD DAM, NOVEMBER 11, 1919

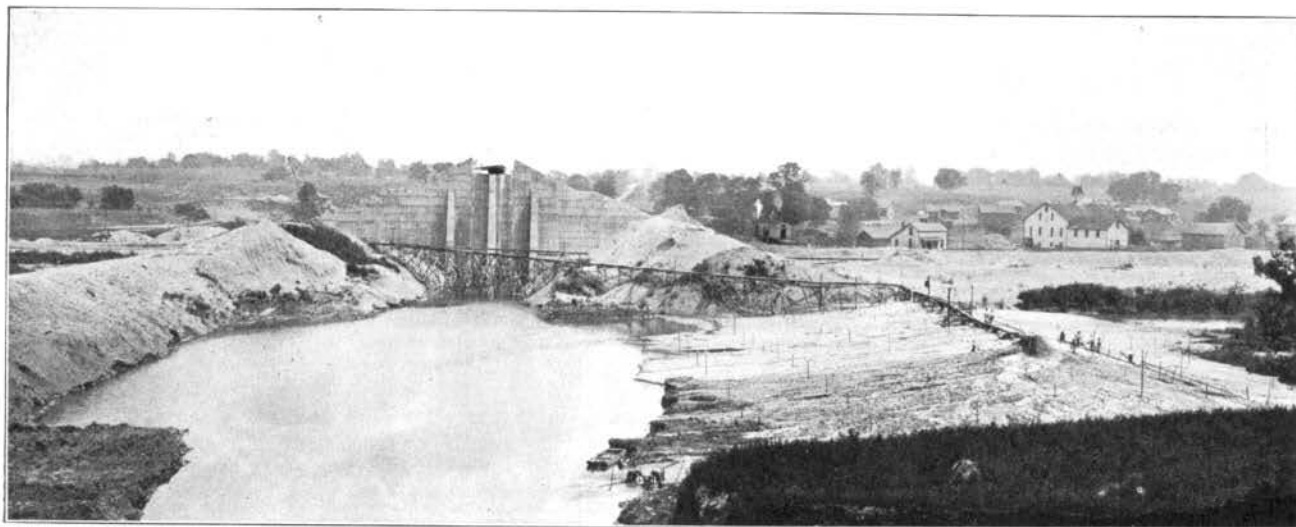


FIG 84—THE CORE POOL AND SOUTH BEACH, LOCKINGTON DAM, AUGUST 11, 1919

At this stage, the hydraulic fill was being put in through one line of dredge pipe only, which was carried along the south beach. The pipe line comes from the pump house beyond the walls in the distance, crosses the pool on a trestle as seen, then turns and is carried along the south levee. The discharge is seen coming from the near end of the pipe and flowing down the slope toward the near end of the pool. See page 106. The water in the pipes flows about 15 feet per second and carries earth, sand, gravel, and stones up to six inches in diameter. The stone, sand, and gravel are deposited on the slope of the beach. The finer particles, mostly clay and silt, are carried on into the pool, where they drift out into the quiet water and are carried often to considerable distances. The finest are carried to the farthest corners of the pool. Some of these never settle, but are carried out in the discharge. Most of them, however, sink slowly to the bottom of the pool as mud, which thickens and consolidates as fresh layers are deposited from the pool water, and ultimately become solid and impervious. The excess water in the pool runs out through an opening next the wall in the distance. The picture shows only the middle section of the dam, which lies west of the outlet, the latter being just beyond the wall. The earthen part of the dam east of the wall has not yet been built. See also Fig. 98.

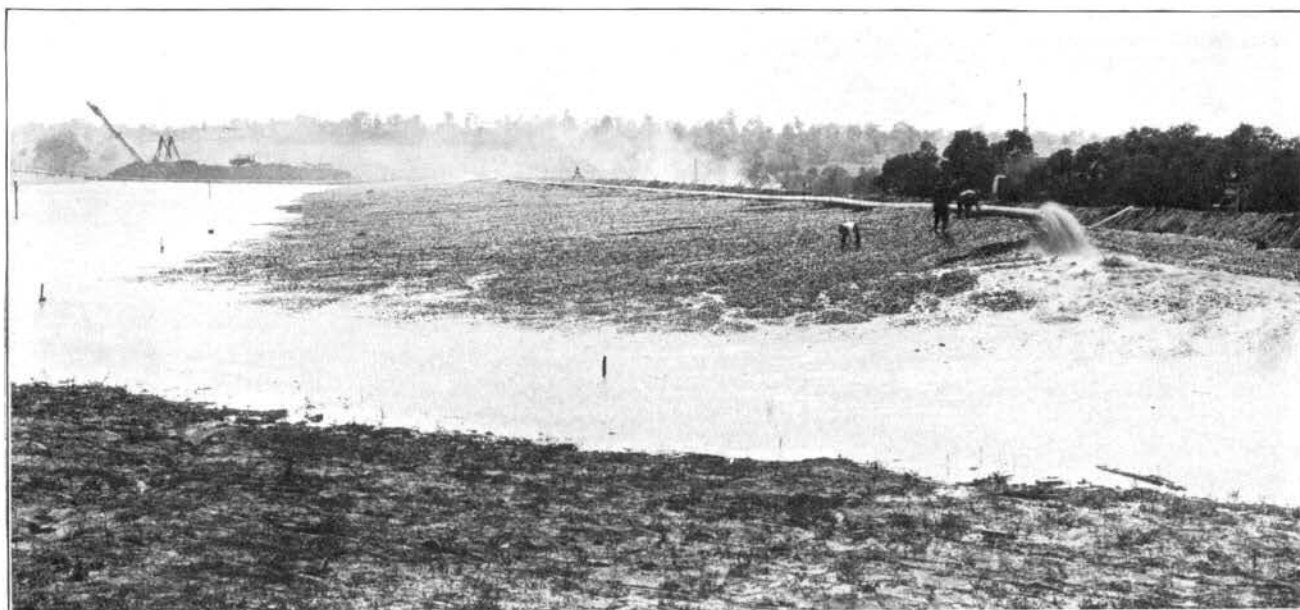


FIG 85—THE CORE POOL AND NORTH BEACH, ENGLEWOOD DAM, AUGUST 26, 1919

This picture was taken on the same day as that shown in Fig. 90, page 106, and shows the right-hand pipe line and discharge seen in that picture. It should be studied in connection with the explanation on pages 106 and 108. The building up of a cone of coarse material at the mouth of the discharge pipe may here be clearly seen, although the process of building it is only just beginning. The stones and gravel gradually build up 'till they reach the level of the pipe, the beach along which the stream of discharge water flow to the pool slowly building up at the same time. The slope of the beach is that naturally taken by the materials, being flatter with finer materials and steeper with coarse. The levee or low bank seen at the right of the pipe line is to prevent the water flowing down the outside slope of the main dam embankment which is just beyond it. The little house just above and to the right of the men (see also Fig. 92), is a field telephone booth which connects with the pump house at the foot of the dam in the distance. It is used to tell the pump attendant when to start and stop the flow of material through the pipe, stoppage being necessary whenever the beach under the pipe has been built up to the level of the pipe bottom. A fresh pipe length is then added and the pumps started again. A very simple indicator, devised by the chief electrician at Englewood, is carried on the end of the discharge pipe. This connects through an electric wire with a red signal lamp on the pumphouse switch board, which goes out whenever the pressure drops below normal.

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THE MIAMI CONSERVANCY BULLETIN

PUBLISHED BY THE MIAMI CONSERVANCY DISTRICT

DAYTON, OHIO

Volume 2

February 1920

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 Office Engineer, Miami Conservancy District, Dayton, Ohio. Matter for publication should be sent to G. L. Teeple, Miami Conservancy District, Dayton, Ohio.

Conservancy Farms for Sale

We carry this month on the inside of the back cover an advertisement which is worth the attention of any person who thinks of buying a farm. The lands there listed comprise only a small portion of the farms which as time goes on will be offered for sale. It is the intention to publish in the Bulletin, from now on, brief descriptions of these farms (totalling about 30,000 acres), as they are made ready for the market. They comprise some of the best lands in the Miami Valley.

The Germantown Dam Up to the 1913 Flood Level

It is a pleasure to announce that by the time the Bulletin arrives in the hands of its readers the Germantown Dam will be up to the 1913 flood level. Work on this dam has been pushed on into the winter, at some additional trouble and expense, in order to achieve this result, the engineers having in view the possibility of heavy spring floods which might endanger the uncompleted dam structure itself as well as property in the valley below. The coming season ought to see the Germantown dam, as well as that at Lockington, practically completed.

Plastic Fill at Taylorsville

Hydraulic engineers will find the article on page 101 of interest. The cross dam at Taylorsville, built by a method apparently hitherto little used, aroused the especial attention of the visiting engineers who were here last June, and its successful completion is worth calling to the notice of those members of the profession who have not had an opportunity of

visiting the work. As the article brings out, the plastic fill method is not applicable in all cases, requiring apparently a certain suitability of the material. Where it is applicable its superiority in speed and inexpensiveness, due in part to the fact that the work can be driven ahead in all weathers, should bring it into wider use than it has had hitherto.

Experiments With Contracted Channels

Engineers will also be interested in a paper by E. W. Lane, Assistant Engineer with the Conservancy organization, describing the results of experiments made in Dayton sometime ago, on the flow of water through different types of contracted openings in channels. These experiments have a bearing on the work of the Conservancy in the confirmation which they bring regarding the validity of certain modifications in the usual formulas, made by Professor S. M. Woodward, Consulting Engineer of the District, in calculating the 1913 flood flow; this flow forming, of course, the basis for the design of the retarding basins and improved river channels. Mr. Lane's work has a further value in demonstrating, by mathematical analysis of the results of his experiments, that certain facts regarding water flow through contracted openings, hitherto passed over as not being amenable to such analysis, really follow as a result of well known fundamental laws. Mr. Lane's paper is published in the October-December number of the Proceedings of the American Society of Civil Engineers, to which we commend our readers.

The Englewood Borrow Pit

The picture of the Englewood borrow pit, shown on our outside cover, is of interest as indicating how the Stillwater River valley above the Englewood Dam is going to look when that structure is completed. It might be described as "the hole in the ground made by 800,000 cubic yards of dirt," that being the quantity of earth removed at the time the picture was taken. This quantity is now over a million cubic yards, all of it excavated during the past season. The total amount to be removed from this pit being 3,500,000 cubic yards, the picture gives some idea of the lake which, when the dam is finished, will adorn the landscape in the valley above. This work has all been done by dragline excavators.

Winter Work on the Hydraulic Fill

The early setting in of the season of cold weather, with spells of rather extreme severity, made it advisable to close down the work of hydraulic fill at most of the dams until spring. There are several reasons for this. One of them is the difficulty of keeping the pipes from freezing. Layers of ice will form inside the pipes, gradually filling them up and making a shut-down necessary until they are thawed. Protective coverings might be applied, but at considerable expense. A second difficulty is that of keeping the men at such cold, wet work, with water spraying from the pipes and in the borrow pits, which rubber boots and mackintoshes will not entirely keep out. A third difficulty is the freezing of the wet bank of earth which forms the borrow pit face. Water from the monitor will freeze on this face, forming an icy armour which the jet can penetrate with extreme difficulty. These and other considerations have made it expedient to shut down the hydraulic fill machinery at all the dams except Germantown, and devote the winter season to such other work as can be efficiently pushed forward, es-

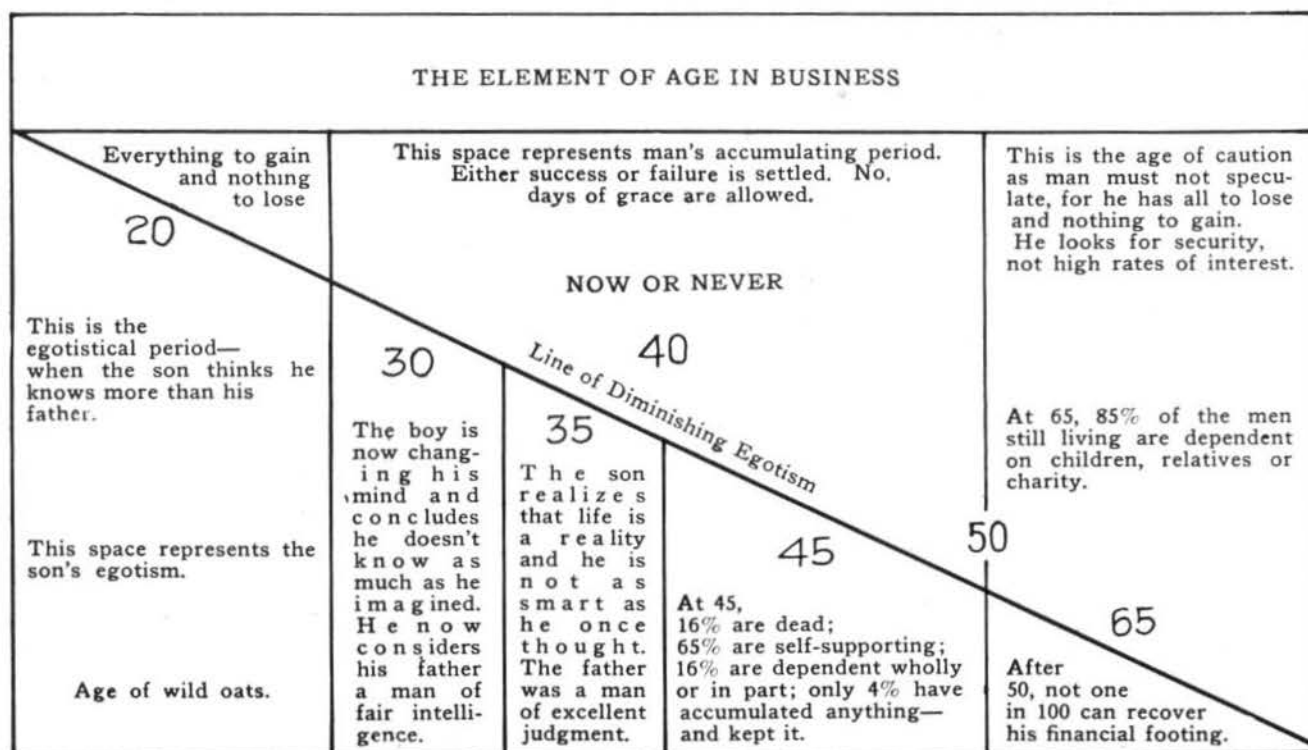
pecially the putting of all equipment in a state of first-class condition for rapid work when spring opens. At Germantown the expediency of pushing the dam embankment up to the 1913 flood level to guard against possible spring floods, as noted elsewhere, has operated to keep the work going.

Boyhood of Abraham Lincoln

Readers of the Bulletin will find it well worth their while to read the article by Chief Engineer Morgan which appears in the February number of the Atlantic Monthly, in which he gives certain interesting new data regarding the boyhood of Abraham Lincoln. Mr. Morgan discovered a man in the Ozark Mountains in Arkansas, who was a second cousin of Abraham Lincoln, and as a baby had been carried in Lincoln's arms, his mother being a cousin of the future President, and living at the time in the little log cabin in Indiana which time has made famous. Historically, the main importance of the article, perhaps, is as a corrective to what seems to be the prevalent idea that Lincoln's father was a somewhat shiftless character. Mr. Morgan's portrait shows him as a man much like his neighbors, living simply under the primitive conditions common to the locality and period. The article is an original contribution to Lincoln literature, notable for the impression it gives of perspective, fidelity and accuracy.

The Element of Age in Business

We commend the chart below, bearing this title, to all our readers. It was brought to our attention by Mr. Locher, our Construction Manager, who was impressed with its truth and with its timeliness in the present period of too lavish and spendthrift financial expenditure. It is the financial gospel in a nut shell, and as such worthy of careful study.



Plastic Fill at Taylorsville Dam

35,000 Cubic Yards of Cross Dam Successfully Built by a Hitherto Little Noticed Process Which Takes the Place of Rolled Fill.

In building the section of the dam at Taylorsville, west of the river, it was necessary to construct a cross dike along the west bank of the stream, to enclose one end of the core pool. To build this cross dam an interesting process was employed, which may be called, to distinguish it, the process of "plastic fill." The aim was to build an embankment which should be stable and impermeable to water, and as reliable as rolled fill while far less expensive to construct. It is believed that the work at Taylorsville has successfully demonstrated that with proper materials this can be done.

The cross dam referred to was originally planned to be built by the rolled fill process, and at the start that process was indeed used, the lowermost portion, two to five feet in thickness, and amounting to about 11,000 cubic yards, being spread, wetted and rolled in six-inch layers in the regular manner. The work was begun August 5, 1918, but by September 11 the engineers in charge made the change to the new method, the cost for the rolled embankment, following the upward trend of all prices, having been around \$1.00 per cubic yard. It was believed that the new method would give not only a solid and impermeable structure at less expense, but would result in a material speeding up of the work, wet weather, which completely stops rolled fill, having caused a great deal of annoying delay. The placing of the plastic fill, by adjusting the quantity of water injected into the material, can be carried on rain or shine.

by a dragline excavator into a hopper, whence it was conveyed in dump wagons to the point where it was to be spread and rolled, the track being along the east edge of the cross dam. To adapt this outfit to the plastic fill it was only necessary to remove the hopper, dump wagons and steam roller.

The substitute equipment was very simple. It consisted only of a small duplex steam pump drawing water from the river, and a 5-foot and a 10-foot length of $\frac{3}{4}$ -inch gas pipe to take the place of the nozzle used in wetting down the rolled fill. Later the steam pump was dispensed with, water being obtained from the high pressure monitor line of the hydraulic fill equipment.

The operation also was simple. The material was dumped by the trains on the ground beside the unloading track. It was picked up by the dragline bucket and dropped in a windrow along the west side of the cross-dam site, but well within the west limit of it. This windrow was built up dry to a center depth of about ten feet. One of the ten-foot lengths of gas pipe was then connected by a hose to the steam pump and used in the manner of the needle of a hypodermic syringe, the nozzle piercing vertically to the bottom of the windrow, through a row of holes about two feet west of the top of the material, and about three feet apart. The water was thus introduced, by injection and percolation, throughout the west half of the mass, from the bottom to the top.

The effect was interesting. The material was dropped into the windrow, dry. The water introduced by the hypodermic made it plastic, and it began to flow slowly, like molten lava from a volcano, under the pressure of its own weight. The windrow being wet under its west slope, the flow was naturally in the direction of least resistance—west. This had been foreseen, and was part of the program. The west limit of the cross dam was out of reach of the dragline, from its necessary position in reach of the material dumped by the trains beside the track. By dropping continually fresh material on the top of the windrow—thus loading the top—the stiff dough in the west slope was kept in motion, very slowly, till it reached the limit staked out for it—the west limit of the cross dam. It thus transported itself, under the pressure of its own weight, a maximum distance of over forty feet. If it showed signs of "weariness," and began to slow up too much, a fresh injection of the hypodermic spur or a fresh load of earth on top, started it again. The motion was always, of course, exceedingly slow—glacial in fact, or as has been said, like lava—three or four feet or less, per day, and for practical purposes under control.

It should be understood that the procedure referred to was followed only on the west 40 feet of the cross dam. The remainder of the site, being in reach of the dragline bucket, permitted a simpler process and one requiring less careful watching. The general method was to build the cross dam up in 10-foot horizontal layers, the dragline travelling down the approximate longitudinal center line of the cross dam, on the layer just completed, and depositing the new layer behind it as it went. The

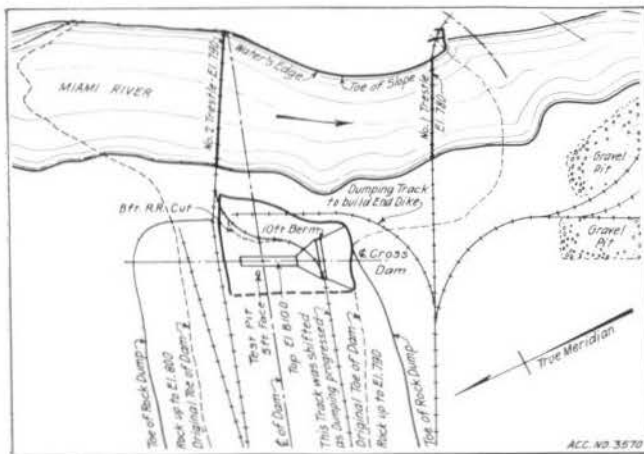


FIG. 86—LAYOUT FOR BUILDING CROSS DAM

The new method was suggested by Mr. G. L. Albert, Superintendent of the work of hydraulic fill, he having successfully employed it on the Catawba Dam, near Bridgewater, N. C., for settling dumped dry fill, and also for the same purpose, in building canal banks for mining operations in California.

The layout, shown in Fig. 86, in its main features was the same as that for the rolled fill. The material was dug from a borrow pit on the east bank of the river by a small Type 36 Marion steam shovel, loaded into 12-yard dump cars, transported across the stream on the down stream trestle by a 40-ton locomotive, and for the rolled fill unloaded

growing edge of the new layer thus sloped toward the machine, the fresh material being deposited on this slope, and each bucketful jettied as it was dropped. A flow of the fresh material was maintained by this means, of the nature already described, toward the dragline, the speed being a rough measure of the plasticity, and therefore of the water in the material. The flow was controlled in the manner already indicated, and could be completely stopped at any time by dropping a windrow of dry earth at the foot of the creeping slope, a procedure which at the same time corrected the excess water by gradually absorbing it.

It was excellent proof of the solidity of the embankment secured, that the dragline—a Class 14 Bucyrus steam machine with 70 foot boom and 2-yard bucket, and a working weight as given by the makers of 62½ tons—rode upon the structure without causing undue settlement. There was practically no time lost in grabbing for material which might try to creep from under and escape at the edges.

The strip of the cross dam referred to, 40 feet in width, lying out of reach of the dragline, was built up in layers like the rest, these layers all lying on about a 4-to-1 slope, the material in each layer being made to flow down this slope in the manner already described. The flow in each case was brought to rest at such a point that the west slope of the finished dam, although somewhat irregular, stood approximately on a 2-to-1 slope.

The total material in the cross dam is 45,330 cubic yards, of which about 35,000 was deposited by the plastic method. The total height is 42 feet. The hydraulic fill began on October 17, 1918, about a month after the beginning of the plastic fill. The cross dam was kept at a minimum of

about 10 feet above the pool level, the maximum being about 25 feet. There was a little sliding into the pool from the cross dam material where the latter was carried across the center line (cut-off) trench, but not enough to cause any trouble. The work on the cross dam was stopped during freezing weather, in the winter of 1918-19, but the mildness of the season was such that the delay from this cause was not great.

As to reliability, two tests were made during the progress of the work which proved very satisfactory. A test pit, indicated in Fig. 86, was dug to a depth of about five feet. The walls of this pit stood vertical without sign of flow or break, the material damp, solid, and in texture like the cut surface of a cake of putty. At another time a railway cut, necessary for handling trains of rock fill across the damsite, was excavated in the cross dam. (Also shown in Fig. 86). The west wall of this cut stood eight feet high, on about a ½-to-1 slope, the exposed material resembling in dampness, texture and solidity the walls of the test pit, and like them without sign of flow or break.

A final word needs to be said about the material. This was largely made up of glacial till from the east river bank, containing a large percentage of clay, the whole giving a mixture which would permit the water to escape. The point needs emphasis. Too fine and retentive a clay, which hangs onto its entrained water, would no doubt give trouble if used for plastic fill. This was in fact discovered at the Englewood dam, where rolled fill proved to be best. The new process, like any other, has its limitations. Where conditions permit, it should have a considerable and perhaps a wide application. Of its value at Taylorsville there can be no question.

December Progress on the Work

GERMANTOWN

During the cold weather pumping of the hydraulic fill has been reduced about one-third in capacity. Considerable trouble was experienced in dumping the cars at the hog box, due to the freezing of the moisture in the air dump lines and the dumping apparatus in general. Nevertheless, during December, 47,300 cubic yards were pumped, which brings the total amount placed at the end of December to 371,000 cubic yards, this being approximately 47 per cent of the total hydraulic embankment to be placed.

Work during the past month on the hydraulic embankment has been confined to the upstream slope in order to reach a height that will insure safety against overtopping from the spring floods.

The dam embankment is now at Elevation 773. This is just 20 feet above the level which would be reached by a flood equal to that of 1898, and only 7 feet below that of a flood equal to the one of 1913. Ten full days of work will bring the dam to the latter level, giving a very large measure of flood protection.

Dumping rock on the upstream slope of the dam for future surfacing is being continued as part of the winter work.

Arthur L. Pauls, Division Engineer.

January 15, 1920.

ENGLEWOOD

Work on the hydraulic fill progressed under increasing difficulties due to cold weather until December 23. At that date the central pool had become encrusted with ice of such thickness as to interfere with properly depositing the core material. Also the extreme cold constantly froze the dumping apparatus on the dirt cars bringing material to the dam. While it would have been possible to continue intermittently with the pumping operations, taking advantage of favorable days as they came, the expense of

such procedure seemed unwarranted in view of the results that would be obtained. During the month ending December 23, 59,200 cubic yards of hydraulic fill were placed, making a total to date of 1,002,160 cubic yards, or nearly 29 per cent of the total embankment required to complete the dam.

Since the shutdown of hydraulic fill the working forces have been engaged in constructing Sump No. 2 for use during the coming season. In addition, the plant has been given a general overhauling and such repairs made as to bring the various machines up to the highest point of efficiency.

The large electric dragline which has been constructing Cross Dam No. 1 has moved down into position and begun excavating the cut-off trench just east of the river, preparatory to driving steel sheet piling at this place.

New track lines have been laid in the borrow pits, including an approach to Sump No. 2.

H. S. R. McCurdy, Division Engineer.

January 15, 1920.

LOCKINGTON

Since work on the hydraulic fill was suspended for the winter on December 10, the reduced forces have worked on various odd jobs which were reserved for the cold weather. This work includes placing of rock on the dam slopes, clearing of timber near the dam, some work on Road 9, and a fence along Road 10. Repairs and alterations are being made on the steam dragline, gravel washing plant, and derrick at the sump in order to have them in first class condition for work in the spring. Arrangements were made for the use of an ice house at Lockington and an ample supply of ice has been cut and stored for camp use next summer at a cost of about one dollar a ton.

Barton M. Jones, Division Engineer.

January 17, 1920.



FIG. 87—BEACH AND SLOPE AT EDGE OF POOL, ENGLEWOOD DAM, MAY 26, 1919

This shows the sharp drop in the slope of the sand and gravel at the edge of the pool. This edge is normally at the top of the steeper slope seen in the foreground at the right, the pool water having been drawn down, at the time the picture was taken, about two feet. The picture shows also that most of the coarser material lies on the upper levels of the beach slope, toward the left, the part next the pool being mostly sand and fine gravel. There is almost no clay or silt in the beach, these materials being carried on into the pool. See pages 106 and 108. The larger stones near the pool margin are brought down the beach only in the larger streamlets of water.

TAYLORSVILLE

The Lidgerwood Dragline was delayed again last month because of a broken fair-lead, and also because of a broken I-beam in the main frame across the front end, but the output for the month was practically up to schedule.

Delivery of ballast to the B. & O. R. R. Relocation has been completed and the Bucyrus Class 14 Dragline has been tracked back to the north end of the pit, and overhauled ready to start excavating gravel for concrete as soon as the new delivery track to the west side of the gravel pit has been completed. In the meantime this gravel is being furnished by the Marion Class 70 machine.

The concreting has progressed fairly well in spite of the cold weather, the gravel screening and washing plant having been enclosed so that this work does not have to stop on this account. It has been found that our installation for heating the sand and gravel does not furnish enough heat to the fresh concrete in very cold weather if the washing plant is running; therefore a small boiler has been installed to heat the mixing water also.

O. N. Floyd, Division Engineer.

January 19, 1920.

HUFFMAN

During the month of December, 37,900 cubic yards of material were pumped into the dam, and 5,000 cubic yards of ballast gravel were delivered for ballasting the relocation of the Big Four Railroad. The delivery of this gravel was started on December 8th, and stopped December 17th, on account of freezing weather. During this time no material was pumped into the dam by the day shift.

On January 9th the hydraulic fill was entirely suspended on account of continuous cold weather. Necessary repair work is now being done on the hog box and all the equipment, so that it will be in first class working order when warmer weather comes, and the work can then proceed uninterrupted. During this shutdown, the installation of the

booster pump is also being made, so that it will be ready for operation as soon as it is needed.

C. C. Chambers, Division Engineer.

January 17, 1920.

DAYTON

Channel excavation to date amounts to 682,500 cubic yards. The total pay quantity placed in levees and spoil banks is 479,300 cubic yards, including 60,000 cubic yards of levee embankment on Contract No. 41. In accomplishing this work a total of 1,222,900 cubic yards has been handled, not including excess depth channels.

The large dragline D 16-15 has completed its work on the Stillwater Avenue spoil bank. The machine is being dismantled and moved to a point above Stewart Street bridge, where it will be reassembled for work on Contract No. 43. D 16-16, the other large dragline, has done the necessary excavation for building "docking ways" above Third Street and is now engaged in lowering a gas main and a water main which cross under the bed of the river near the Third Street bridge. The caterpillar dragline D 16-19 is grading the top of the spoil bank between Herman Avenue and Webster Street. The erection at Sunrise Avenue of the dragline from Lockington, D-16-8, is continuing.

About 900 cubic yards of concrete have been placed to date in South Robert Boulevard wall.

Piles for the "docking ways" have been driven under contract with Price Brothers Company.

C. A. Bock, Division Engineer.

January 21, 1920.

HAMILTON

The total earth moved to January 1, 1920, including contract work, was 1,054,000 cubic yards. The total amount handled by the two draglines was 998,000 cubic yards. The total amount of Item 9 was 527,400 cubic yards.

The electric dragline is again working north of the Co-

lumbia bridge, loading material on cars. The output during December was low on account of cleaning up south of the bridge and moving around the east end of the bridge. There has been very little delay due to freezing weather.

The steam dragline has left the work at Old River temporarily and is excavating for the wall at the northeast corner of the Main Street bridge. It will also do the pile driving for this wall.

Concreting on the wall south of the Soldiers' Monument has been 95 per cent completed.

The work of concreting the tail race conduits under the B. & O. bridge has been completed.

C. H. Eiffert, Division Engineer.

January 20, 1920.

LOWER RIVER WORK

Miamisburg. Jeffrey, Boorhem & Co. have finished the work of raising and ballasting the Groendyke spur track. They have suspended earth-moving operations for the balance of the winter, but will keep a few men busy clearing the right of way for the levee on the east side of the river.

Franklin. Very little work has been done during the past month owing to unfavorable weather conditions. It is probable that Jeffrey, Boorhem & Co. will shut down until spring unless the weather moderates considerably in the near future.

Middletown. Cole Bros. have about 300 lineal feet of levee to construct before reaching the C. & D. Traction line at the point where the latter leaves South Main Street and starts across the Miami River. When this is finished, which will require about ten days, they will move back to Seventh Street and begin where they left off early in December on account of high water. There is 1000 lineal feet of levee to construct from this point southward, all of which will have to be moved twice by the dragline bucket.

F. G. Blackwell, Assistant Engineer.

January 15, 1920.

RAILWAY RELOCATION

Big Four and Erie R. R. Roberts Brothers have nearly completed the Big Four track from Enon to Dayton. Track-laying on the Erie R. R. has been resumed. The unfavorable weather has retarded the usual progress of this work.

The Walsh Construction Company have completed their grading contract and have closed up camp for the winter. They will resume ballasting as soon as the weather will permit.

All concrete work on the highway bridge at Huffman has been completed, with the exception of the hand rail. This will be constructed when the weather permits.

The steel superstructure for the Fairfield interlocking tower has been set. The tower will be of frame construction, and is being constructed by M. C. D. forces.

The Western Union Telegraph Company's forces have started setting poles along the Big Four's right-of-way.

Funderburg Brothers have stopped work on the right-of-way fence for the winter.

Ohio Electric Railway. Roberts Brothers have distributed two miles of track material on the new roadbed between Fairfield and Huffman. Ties for this work are now being shipped.

Baltimore & Ohio. All ballast has been distributed, but the finishing of tamping under the track has been suspended by the tracklaying contractors, Roberts Brothers of Chicago, until warmer weather.

The raising of the tracks south of Needmore yard, which work is being performed by the railroad company, is nearly completed.

The Western Union Telegraph Company has completed building the new line along the relocation and the wires of the old line have been removed.

Albert Larsen, Division Engineer.

January 21, 1920.

RIVER AND WEATHER CONDITIONS

The river and weather conditions for the month of December, 1919, were practically normal. During the first week the rivers were a little higher than usual, for this time of the year, due to the rainfall of November 25 to 29. The cold weather about the middle of December caused the formation of considerable ice on the rivers which has not entirely disappeared by February 2.

The total rainfall during December varied at the District's stations from 1.86 inches at Germantown to 0.49 inches at Ft. Loramie. The maximum 24 hour rainfall occurred on December 6, varying from 1.00 inch at Ingomar to 0.27 inch at Ft. Loramie. At the Dayton Weather Bureau Station the total for the month amounted to 1.66 inches or 0.98 inches less than the normal, bringing the accumulated excess since January 1 down to 1.30 inches.

Observations taken by the local U. S. Weather Bureau show that at Dayton the mean temperature for the month was 26.7 degrees or 6.1 degrees less than normal; that there were 9 clear days; 7 partly cloudy days; 15 cloudy days, and 9 days on which the precipitation amounted to or exceeded 0.01 of an inch; that the average wind velocity was 10.7 miles per hour, the prevailing direction being from the southwest; and that the maximum wind velocity for 5 minutes was 38 miles per hour from the southwest on the 12th.

Ivan E. Houk, District Forecaster.

February 2, 1920.

Germantown Dam Now Up to 1913 Flood Level

It is gratifying to record that the elevation now reached at the Germantown dam, with the double capacity of conduits now in use, will protect against a flood like that of 1913. The discharge from the dam conduits with a flood at that level will be 22,000 second feet. In 1913 the Twin Creek flood discharge was 66,000 second feet. The two figures give the measure of the protection afforded by the dam in its present condition.

In this connection a study of the section of the Germantown dam shown in Figure 88 will be interesting. The shaded line below is the ground line. The full upper line gives the outline of the dam when completed. The broken lines give the height to which the embankment had been carried on the dates indicated. The super-elevation of the upstream levee is indicated on the December 23 section. The slopes inside the levees show the sand and gravel beaches. The black dots indicate the consolidated material in the pool bottom, each dot indicating the depth reached by a six-inch cast iron ball used as a sounding lead to measure the depth of water and mud in the pool. The ball came to

rest at the points indicated by the black dots, after a settling through thickening layers of mud. It will be noted that in the middle of the pool the distance between the two lines of black dots is about the same as the distance between the two corresponding levels of the water surface in the pool, indicating that in this case the material in the dam core consolidated at about the same rate that the pool was raised. See also pages 106 and 107.

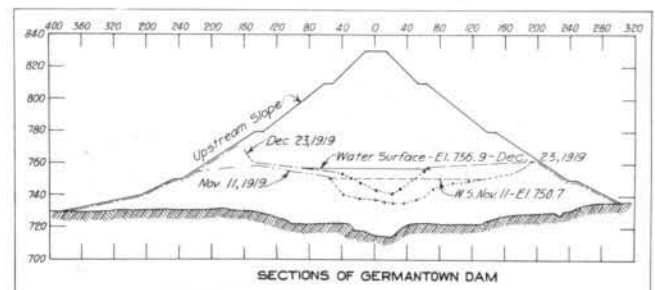


FIG. 88—PROGRESS SECTIONS, GERMANTOWN
The vertical scale is double the horizontal

Some Points Regarding Hydraulic Fill

The Process Automatically Separates the Clay and Silt from the Sand and Gravel and Deposits Each in Its Proper Place

In the original process of building a hydraulic fill dam, as developed from hydraulic mining methods in the far west, all the operations—excavation, transportation, and deposition of the earth in the dam embankment—were accomplished by means of water. Powerful jets from hydraulic monitors bored into the face of the “borrow pit,” undermining and washing down the material into wooden flumes or “sluice boxes,” which carried it and discharged it upon the top of the dam embankment, where the water automatically sorted and deposited the several constituents, each in its proper place in the structure.

At the Conservancy dams this process has been modified, in accordance with later developments, in several ways, which need not here be considered. In all of them the broad features of the deposition of the materials in the dam embankment are the same, and it is in regard to certain significant features in this process that the present article is concerned.

The simplest illustration of the process is perhaps exhibited at the Germantown dam, shown in Fig. 89. “Closure” of this dam has been effected. The body of the dam, partially finished, extends from

hillside to hillside across the valley, completely blocking it, except for the concrete conduits, which carry the waters of Twin Creek under the structure. The entire embankment is being built up over its full length.

Certain main elements appear most clearly in this picture. In the foreground is the down stream slope of the dam embankment, extending across the valley, its top forming a levee enclosing one side of a rectangular pool of water. At its further side the pool is enclosed by a second levee, formed by the top of the upstream embankment slope, the latter dropping away (unseen) to the level of the valley bottom beyond. The two ends of the pool are enclosed by the two valley slopes.

The essential parts of what may be called the mechanism of the process are shown most clearly in Fig. 90, which shows the working section of the Englewood dam embankment as it appeared on August 26, 1919. The pool occupies the center. On each side of it rise very broad, flat, sloping beaches. At the upper edges of these are the bounding levees. Inside the levees, running down the length of the beaches, are two lines of steel pipe, discharging material upon the beaches at their near ends, and re-



FIG. 89—POOL BEACHES AND DOWNSTREAM SLOPE, GERMANTOWN DAM, NOVEMBER 20, 1919

This shows clearly the relation of the pool and beaches to the dam embankment. In the foreground is the downstream slope of the dam. On the further side of the pool is the upstream slope, its upper edge being the farther levee. Twin Creek flows under the dam through the concrete conduits, whose outlet appears in the foreground. The partly built embankment extends from hillside to hillside across the valley, completely blocking it except for the conduits. The pool also extends entirely across the valley. The picture makes it clear that the core material of the dam, which is deposited from the clay and silt washed into the pool by the streams from the dredge pipe line, will occupy the entire middle part of it, from hill to hill, with sand and gravel banks or shoulders, built up from the sand and gravel beaches (see page 106), supporting it on its upstream and downstream sides. See Figs. 90 and 91.



FIG. 90—CORE POOL, BEACHES, PIPE LINES, AND LEVEES, ENGLEWOOD DAM, AUGUST 26, 1919

This picture should be compared with Fig. 89, to get a clear idea of the relationship of the pool and beaches to the building of the dam embankment. The view is straight down the center line of the dam, from the east end of it, the "cut-off trench" on the center line appearing in the immediate foreground. The dark mass just beyond the pool is the rising embankment of the "cross dam" built along the east bank of the Stillwater River to enclose one end of the pool, the level of the latter being many feet above that of the river. Thus, what is seen is only that part of the Englewood Dam lying just east of the river. The embankment west of the stream has not yet been started. The levees are seen just outside the two lines of pipe at right and left. The top of the embankment, as far as it has been built up, extends between them in the shape of an exceedingly broad, flat trough, the middle of which is occupied by the pool and the slopes of it by the beaches. See pages 105 and 106.

ceiving the material at their farther ends, through other pipes connecting to pumps which are not seen. The pipes, the beaches, the levees and the pool may all be considered as parts of the mechanism of dam building, forming the top of the embankment in the shape of a very broad, flat trough, with the pool at the center.

This mechanism brings, sorts and distributes the materials which build up the embankment, the active agent being water, the process, in fact, depending upon the same carrying and sorting power of this element when in motion, which was discussed briefly in the Bulletin for May, 1919, in the article on the Erosion and Deposition of Sediment as Related to River Improvement. The effect of the mechanism is to separate the clay and silt from the sand and gravel, depositing the first two on the bottom of the pool, and the last two on the beaches.

The building up of the beaches is best shown in Fig. 85, which shows the discharge end of the right hand (upstream) pipe line at Englewood in Fig. 90. The discharged water carries gravel, sand and earth in particles and pieces of all sizes from impalpably fine material up to stones six inches in diameter, all driven through the pipe line at the rate of about 15 feet per second. Most of the large stones are dropped in a heap at the mouth of the pipe. The sand and gravel of smaller size are carried on down the slope of the beach in runnels and streamlets of varying size. These materials are deposited all along the slope of the beach, as may be seen in Figs. 85 and 87. As a rule this deposit grows finer as the streamlets approach the pool margin, where most of it will be sand. In the larger streamlets, however, some larger stones are rolled along and may be carried as far as the pool margin. Fig. 87 shows both facts quite clearly.

(Fig. 85 is shown at an early stage after the pushing forward of the pipe line, before the separation into the runnels and streamlets has become very well marked. Compare the discharge and flow in Fig. 98.)

On reaching the pool, a different action takes place. As the streamlet strikes the quiet water, it loses its velocity rapidly, and whatever sand or gravel it carries drops at once to the bottom, forming a slope which descends into the pool quite steeply. This is shown in Fig. 87, where the water has been drawn down about two feet in the pool, disclosing the underwater slope at the margin.

The extremely fine material, however, largely clay and silt, does not drop at the edge, but drifts out into the pool, and settles very gradually as a smooth slime to the bottom. The finest particles are carried on imperceptible currents throughout the entire mass of water, some of them never settling, but going on out through the overflow.

By this process of separation, the bottom of the pool is built up of the very fine materials only. Analysis indicates them to contain about 85 per cent of clay and silt as against about 15 per cent of very fine sand, all three materials being impervious to water after consolidation. The pool being maintained at all times directly over the center line of the dam, its bottom gradually builds up into a "core wall" of these impervious materials, occupying the middle section of the dam, and extending from the bottom of the structure to the top and from one end of it to the other. Supporting this core wall at its upstream and downstream faces, will be broad, solid abutting banks or shoulders of gravel and sand, built up from the materials of the ever-deepening beaches. The core makes the dam water-tight. The shoulders support the core and give the entire structure solidity and stability, enabling it to resist the tendency of the water, which piles up behind it in flood seasons, to thrust it down the valley out of the way.

The division of the structure into core and shoulders, just referred to, is indicated in the two parts of Fig. 91, which shows cross sections of two different dams, one with a wide core and one in which the core is narrower.

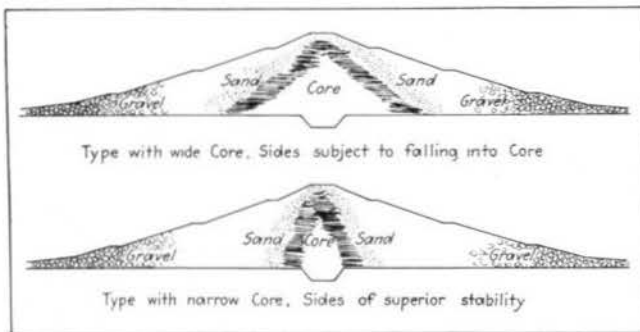


FIG. 91—STRUCTURE OF HYDRAULIC FILL DAM
Read Captions of Figs. 89 and 90

This figure illustrates also another point. Since the core is built up entirely of the fine materials, and the shoulders by the coarser sand and gravel, it is evident that by varying the relative amounts of the fine and coarse ingredients, the relative widths of core and shoulders can be correspondingly varied. Thus the materials used in building the lower dam shown in Fig. 91 would have a relatively much greater proportion of sand and gravel than the materials used in the upper dam of the figure.

It follows from the above that the width at which the core pool must be maintained will depend upon the relative amounts of coarse and fine materials supplied through the dredge pipe line. If the sand and gravel are in large proportion, as in the lower dam of Fig. 91, the pool must be narrow; if their proportion is less, the pool must be wider. This must be, since the core is formed by the building up of the pool bottom, and the only way to widen the core is to widen the pool correspondingly. The pool is maintained at a constant level by an outlet channel placed at some convenient point, which leads the overflow outside the dam embankment as fast as the water comes in through the dredge pipe. The pool is narrowed by lowering the level of this outlet, thus lowering the pool level, and drawing the pool edges down the beach slopes to narrow limits. In the same way raising the outlet carries the water up the beaches, widening the pool and with it the dam core.

Consider the case of the upper dam, Fig. 91, carried to an extreme, giving a

very wide core supported by very narrow gravel shoulders. The core materials, in fact, consolidating very slowly, much of the core, if the dam is rapidly built up, would be rather plastic, and would act somewhat like a liquid, exerting side pressure upon its confining walls of sand and gravel. This pressure increasing as the dam is built up, and the sand and gravel shoulders being thin, the latter might give way, and let the core materials flow out above or below the dam. In case of some hydraulic fill dams, such an accident has indeed occurred.

It should be clearly understood, however, that such a failure no more argues against the validity of the hydraulic fill method, than the failure of a concrete arch, such as sometimes occurs, argues against the validity of concrete arch construction. In either case the failure is due either to improper design or improper workmanship. In case of the hydraulic fill the failure may be avoided by careful provision that the earth used to make the dam does not contain an excess of fine materials such as may lead to accidents like those referred to.

This precaution has been carefully observed at the Conservancy dams, the relative width of the core material in which is approximately represented in the lower part of Fig. 91. The established rule at these dams is to make the core width approximately equal to the distance from the top of the dam down to the elevation to which the core has been carried. This makes the core at the base occupy only about one-eighth of the total thickness of the dam, this proportion becoming somewhat greater at higher levels, but never exceeding one-fifth.



FIG. 92—BUILDING LEVEE AT ENGLEWOOD DAM, JULY 28, 1919

The machine is a Type 36 Marion dragline excavator with 40 or 50-foot boom and $1\frac{1}{2}$ cubic yard bucket, which is used to build the north levee at Englewood. A similar machine builds the south levee. These machines, as may be seen, run on "caterpillar traction," like the tanks used in the late war. The pipe line brings the material for building the dam embankment, the discharge being next the machine. The dragline bucket picks up the stones and gravel dropped near the mouth of the pipe and builds them into the north slope of the dam embankment (at the left and beyond the machine) and also into the levee. The latter is built to keep the water discharged by the pipe from running down the embankment slope instead of the beach. The finished levee may be seen at the left of the little house. The latter is the telephone booth referred to under Fig. 85.

The Process of Deposition

It will be worth while to follow this process more in detail. The entire dam embankment, including levees, beaches and pool bottom, is carried up in successive stages, a few feet at a time, the lift depending on the beach slope. At Taylorsville, where the latter is flat, the lift is $2\frac{1}{2}$ feet. At Englewood, where the slope is steeper, it is 4 feet. Usually, both beaches, both levees, and the pool bottom are carried up simultaneously, material being brought and delivered on the embankment through two sets of pipe, one running down the length of each beach, parallel to the levees, as seen in Fig. 90. Sometimes, however, the beaches are carried up alternately. It will be simplest to consider the process of carrying up one beach through one stage.

The process will usually begin at one end of the pool, as the far end in Fig. 85, or Fig. 84, being that end at which the pipes arrive which bring the material, the mixed earth and water, from the "dredge pumps." Suppose the lift or fresh layer of beach desired is to be 4 feet thick, as at Englewood. The first length or two of pipe will be laid on stilts or horses, with the pipe bottom 4 feet above the old beach. The pumps are then started, bringing the material. The coarse stones build up in a heap at the mouth of the discharge pipe, as already described. The water and other material flow away down the slopes of this heap in all directions, and then down the beach slope to the pool, in streams and streamlets of various sizes. Flow down the outer slope of the dam embankment is prevented by the levee. (See Fig. 85). The fresh material is thus built up into a very broad, flat cone, whose top is at the point of discharge. Shear boards set up edgewise are used to direct the streams so as to carry most of the material toward the pool, where it will be deposited on the wide, flat beach.

In this process, the beach near and under the pipe line at the point of discharge is soon built up to the level of the pipe bottom, giving it at this point the additional 4 feet of thickness desired. When this stage has been reached, a fresh length of pipe is added, laid directed on the material just deposited. A new heap of stones is now built up at the discharge end of the new pipe length, a new cone of sand and gravel laid down, in repetition of the process just described. Thus pipe length by pipe length, what may be called the "cone of deposition" is carried down the length of the beach, till the farther end is reached.

The pumping of material is then stopped, and the pipe line taken apart, joint by joint, back to the



FIG. 93—WINDOW PIPE FOR BUILDING LEVEE, GERMANTOWN DAM, JANUARY 28, 1920.

These pipe, shown also in another view on the opposite page, differ only in detail from the window pipe at Taylorsville, described on pages 109 and 110. The pipe are so named on account of the rectangular openings cut in each length, through which part of the material coming from the dredge pumps drops to the ground below. These windows are so located that when the pipe are connected up they are all in the bottom of the pipe line. Several streams of water, mixed with sand and gravel, may be seen issuing from the windows, both in this picture and the next. The method of supporting the window pipe on the trestles built of posts and cross pieces, appears clearly. These trestles are not removed, since the materials are not worth the expense, but are left in the levee, where they do no harm.

starting end, each pipe length, as it is loosened, being laid down on the beach where it was used, ready for a fresh run, the entire beach being now 4 feet higher than it was at the beginning.

The adding of pipe lengths is simple. The pipe come in 16-foot lengths (as used on the Conservancy dams), either 12 or 15 inches in diameter, of 8 gauge high carbon steel (a little less than $\frac{3}{16}$ inch—0.17185 inch), each length weighing 440 pounds. One end of the length is flared slightly, so that each pipe will slip inside the next at the joints like stove pipe. The joint is kept tight by wire loops passing behind ears on each pipe near the joint, the loops being tightened by twisting with a wire nail or spike after the fashion of a tourniquet. If leaks appear at the joints, they are easily caulked with bits of shingle wedged in.

The slope of the beaches is determined by the sizes of sand and gravel in the embankment material. If the finer sizes predominate, more of the material will be carried to the lower levels of the beach, and less deposited on the upper, making the slope flatter. If the coarser sizes are in greater proportion, more material is deposited on the upper levels and the slope is steeper. The beach at Taylorsville, Fig. 96, is an example of the first case, and that at Lockington, Fig. 84, of the second.

When both beaches have been raised the full lift—4 feet in the case considered—the water in the pool is raised by the same amount before the next lift is added to the beaches. Otherwise, of course, the pool would fill up, since fine material is continually being deposited in the pool bottom at the same time that the sand and gravel is being de-

posited on the beaches. The pool level is maintained constant during any lift by permitting excess water to run out at the end farthest from the pumps through some sort of temporary spillway, which discharges it outside the dam embankment. The raising of the water level in the pool is accomplished by raising this spillway outlet, at each beach lift.

The deposition of the fine materials on the pool bottom—the clay and silt which will form the dam core—is a very different process from that of the sand and gravel on the beaches. The sand and gravel are deposited quickly, during the time occupied by one of the streams of water in running from the discharge pipe to the pool, the last pieces dropping on the steep slope already described, leading down into the pool from the edge of the beach. The minute clay and silt particles, however, drift out into the pool as dandelion seeds sail in still air, losing very rapidly the velocity which carried them down the beach slope, and borne slower and slower on the sluggish set of the pool toward its outlet, or on other very slow currents created by wind, while they sink toward the bottom. Most of these particles would pass a 200-mesh cement screen. The finest drift to all corners of the pool, making it turbid throughout. There is considerable evidence, however, that most of them are deposited within a comparatively short distance of the point where they enter the pool; this distance depending upon the nature of the material, its specific gravity, and its degree of fineness.

Building Up the Beach Levees

The object of the levees is to prevent the streams of water, as they issue from the dredge pipe, from running down the outside slopes of the dam embankment, and washing away the materials composing it. They are built of the gravel dropped under or at the end of the pipe line, the method employed being adapted in each case to the particular conditions encountered.

At Englewood the materials come to the beach through two lines of pipes, as already described, both operating at once. With two lines to attend to, the pipe gang are kept busy, and the additional labor necessary to build up the levees by hand would be too much for them. Under these circumstances a small dragline excavator is stationed on each levee for the purpose. These are Type 36 Marion machines, equipped one with a 40-foot, and one with a 50-foot boom, and with $1\frac{1}{2}$ -yard buckets. The beach is raised 4 feet at a run. The draglines precede the working dredge pipe outlets down the beach, scooping up sufficient of the coarse material deposited on the preceding run to build the levees.



FIG. 94—GERMANTOWN WINDOW PIPE, ANOTHER VITW, JAN. 28, 1920

The view is from the other side of the same pipe shown in Fig. 93. The flow here is down the beach toward the pool, the flow in Fig. 93 being away from the pool. It will be noted that a plank, known as a sheer board, has been placed in the path of the water in Fig. 93 to direct it back again down the beach to the pool and prevent its washing down the outside slope of the embankment. The pictures show the process at an early stage after the pipe have been pushed forward for a fresh run. Very little material has yet been dropped at the mouth of the pipe. This material builds up in piles under each window and is raked and shoveled by the men into the levee, which runs parallel to the line of pipe and only a few feet from it.

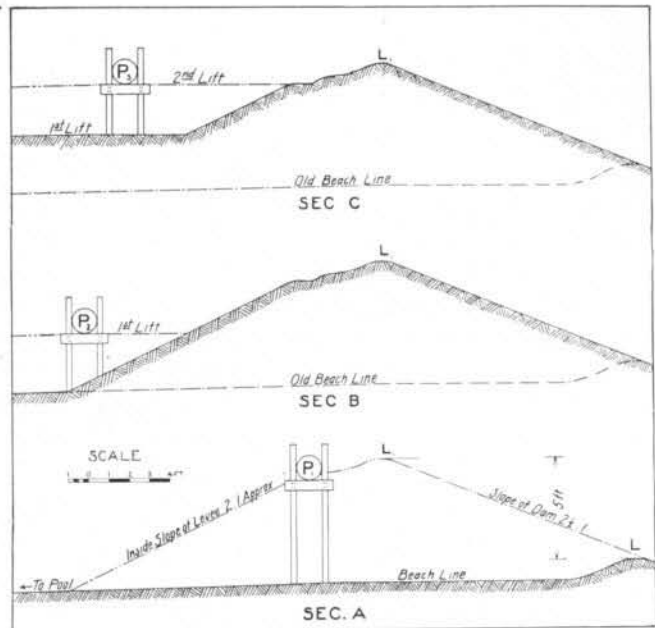
The latter are raised 8 feet at a lift—double the thickness of new beach deposit—the draglines thus taking one trip to the dredge pipes' two. This saves the machines unnecessary travel, by giving them a double stint on each trip. The draglines travel on caterpillar traction, the gravel beaches furnishing for the treads an ideal footing. The machines deposit the material in the levees and outer slopes of the dam embankment practically in place, so that little hand dressing is necessary.

At Taylorsville, for sufficient reasons, only one line of dredge pipe is in use at a time. To shift the pipe line quickly, in moving forward and back on the beach, about six men are necessary. In the intervals between shifts, these men would be comparatively idle. By the aid of "window pipe" they are enabled to build the levees by hand during these intervals, the windows delivering the material in a series of heaps distributed under the last few lengths of pipe, and close to the levee, where it can be easily raked or shovelled into place. A contributing factor, favoring the use of window pipe, is the greater percentage of fine materials at Taylorsville, both in the clay and in the gravel.

The window pipe are made from ordinary pipe by simply cutting in them rectangular holes or windows, 4 inches by 6 inches in size, so located that when the pipe are connected, the openings are all in the bottom of the pipe line. Six lengths of window pipe are used, connected up next the discharge end. The pipe are 16 feet long, and three windows are cut in each length, one in the middle and one toward each extremity. This gives, when the pipe are connected up, eighteen rectangular holes, 4 inches by 6 inches in size, and spaced about five

FIG. 95—STAGES IN BUILDING LEVEE WITH WINDOW PIPE, TAYLORSVILLE DAM

Successive stages in the process are shown in sections A, B, and C. In Section A, the top of the old levee L is shown at the extreme right. The window pipe is set up on top of a wooden trestle at P-1, with its bottom 5 feet above the beach line, and its center 4 feet toward the pool from the top of the new position L to which the levee is to be carried on the run about to be made. The broken line shows the limit to which the sand and gravel are built up on the first run down the beach, thus forming the new levee. The pipe line is then taken apart, length by length, back to the starting point, and a second run down the beach is made, the new position of the pipe line being indicated by P-2 in Section B, the now finished levee being cross hatched in this section. The bottom of the pipe, for this second run, is set only $2\frac{1}{2}$ feet above the old beach line, and the beach is brought up to the level of the pipe bottom during the run. The pipe is then taken apart again back to the starting point, and shifted to a third position, indicated by P-3 in Section C, its bottom now being $2\frac{1}{2}$ feet above the lift just completed, or 5 feet above the old beach line. A third run is now made down the beach, bring the level of the latter up to the pipe bottom and completing the cycle of operations ready for another 5-foot lift of the levee. The necessity for the double lift on the beach is due to the very flat slopes assumed by the materials at Taylorsville, as shown in Fig. 96 on this page. If the pool water were brought up 5 feet at a lift, it would run at Taylorsville 125 feet up the beach slope, widening the pool by 250 feet, and permitting



core materials to be deposited on the lower beach levels, where they are not wanted. The beaches, which build up into the upstream and downstream shoulders of the dam embankment, must contain only sand and gravel. (See pages 106 and 107, and Fig. 91.)

feet apart, in the bottom of the last 96 feet of the dredge pipe line.

The material comes through the pipe at a speed of about 15 feet per second. The six-inch dimension of the windows being lengthwise of the pipe, this means that any piece of sand or gravel, as it passes an opening, has $1/30$ th of a second to make up its mind whether it will drop through. Most of them keep on. In fact, only the finer sizes of gravel, with some sand, drops through the windows. With "eighteen holes to go," a considerable percentage—sufficient to build the levees—does drop, in eighteen convenient piles five feet apart, under the pipe line, and about 4 feet from the top of the levee to be built. From these piles it is raked and shovelled into place by the men.

The larger pieces of stone, bounding along the bottom of the dredge pipe on their way to the outlet, frequently land on the far edge of a window with a good deal of "punch," so that it becomes in time considerably battered up, as well as worn away. At Taylorsville, due to the fact that the larger sizes of gravel are in less proportion than elsewhere, this has so far not been a matter of importance.

At Taylorsville, in this process, the levee is built first and the beach afterwards, the work being done in three stages, shown in Fig. 95, in sections A, B and C. The details are explained in the caption of the figure.

Details of the levee building at Germantown, Huffman and Lockington will be given later.



FIG. 96—CORE POOL AND BEACHES, TAYLORSVILLE DAM, DECEMBER 1, 1919.

FARMS FOR SALE

The District is offering an unusual opportunity to the farm buying public to purchase farms at attractive prices. These properties are located in good neighborhoods, with good land, schools, highways, steam and electric railroads, and a number of large cities and towns within a short distance. Any one interested in the purchase of farm land—for a home and business, or for investment, should look into the matter.

We list below eight farms which we have ready for sale, and will publish short descriptions of others from time to time as we get them arranged and priced. It will not be possible for us to publish descriptions of all our properties, however, nor to repeat the description of any particular farm the second time, so that one must understand that any farm list in the Bulletin gives but a small portion of our farm property on sale.

In Lockington Basin, Shelby County, the following:

Farm L-A Goffena Farm.....L-42	Farm L-J Marshall Farm.....L-48
357.38 acres. Price.....\$25,000.00	Marshall Farm.....L-47
	159.00 acres. Price.....\$17,500.00

Good stock farm. Lies two and a half miles northwest of Houston, in Secs. 30 and 31. Nine-room frame house and smaller dwelling; main barn 50x75; stables, cribs and many other buildings. About two acres of orchard.

Good all-around farm. Located right at Hardin Station. Seven-room brick house; barn, 34x38; cow stable, 18x36; sheep house, garage, crib and wagon shed, hog house, etc. All good land. Deposit of gravel, which has a ready sale.

In Taylorsville Basin, Miami County, the following:

Farm T-A Demmett Farm.....T-71	Farm T-F Pickering Farm.....T-82
Kester Farm.....T-72	96.25 acres. Price.....\$12,000.00
189.28 acres. Price.....\$28,000.00	

An A-1 farm, three and a half miles east of Tippecanoe City, in Honey Creek Valley, and in Bethel and Elizabeth Townships. One two-story and one one-story house, bank barn, 40x72; stable, 14x20; crib, 28x48, and other buildings, all in fair condition. A large proportion of this property is good bottom and second bottom land.

One mile north of Tippecanoe City, west bank of river, short walk from Dayton & Troy Traction stop. House, 36x48; barn, 36x62; tobacco shed, 36x72; three metal cribs, 12½x10. House in only fair condition. Other buildings in good condition. This farm is nearly all good bottom land. Just enough upland for buildings and pasture. A money-maker; located close to a traction line and a good town.

Farm T-D Amanda Jackson Farm.....T-91	Farm T-E Ten Eick Farm.....T-90
194.78 acres. Price.....\$30,000.00	160.89 acres. Price.....\$20,500.00

Three miles northeast of Tippecanoe City. Eight-room brick house; barn, 40x60; crib, 26x42, and other buildings, all in good condition. This is a well located and attractive property.

Two and a half miles east of Tippecanoe City. Six-room brick and farm house; barn, cribs, hog house, etc., in fair condition. Mixed bottom, second bottom, and upland. A little stony at one end. This farm is well worth the price.

Farm T-C Marion Jackson Farm.....T-70	Farm T-B Benham Farm.....T-120
129.75 acres. Price.....\$18,000.00	141 acres. Price.....\$16,500.00

Three miles east of Tippecanoe City. Two-story frame house; barn, 40x84; crib, 26x40; hog house, 14x29; wood house, etc. All buildings may remain at present locations. A railroad switch will be built across the property, but will not materially decrease its value. Practically all the bottom land is of excellent quality.

Four miles east of Tippecanoe City. Six-room brick house. Barn, 28x50; stable, 24x30; crib, 18x28; garage and other buildings. Upland red gravelly, good alfalfa land. Bottom mostly good bottom land. Pasture slope. This farm is a good buy at the price.

For particulars address:

The Miami Conservancy District
Farm Division
Dayton, Ohio



FIG. 97—PIPE LAYOUT AND CROSS DAM, TAYLORSVILLE DAM, FEBRUARY 6, 1919

The cross dam described on pages 101 and 102 is seen on the further bank of the river, at the left, with the dragline excavator at work upon it. The pipe layout comprises three systems. The high pressure line runs from the pumps (in the house at the right across the river) up to and across the river trestle, to the near bank, turning then to the right to the hydraulic monitor in the borrow pit (out of the picture). The sluicing line roughly parallels the monitor line, bringing additional water at low pressure to help wash the eroded materials down the borrow pit to the dredge pump. The latter forces the mixed earth and water through the dredge pipe line (nearest one at the right) back across the trestle, and thence to the left to the beaches at the dam. See page 105.

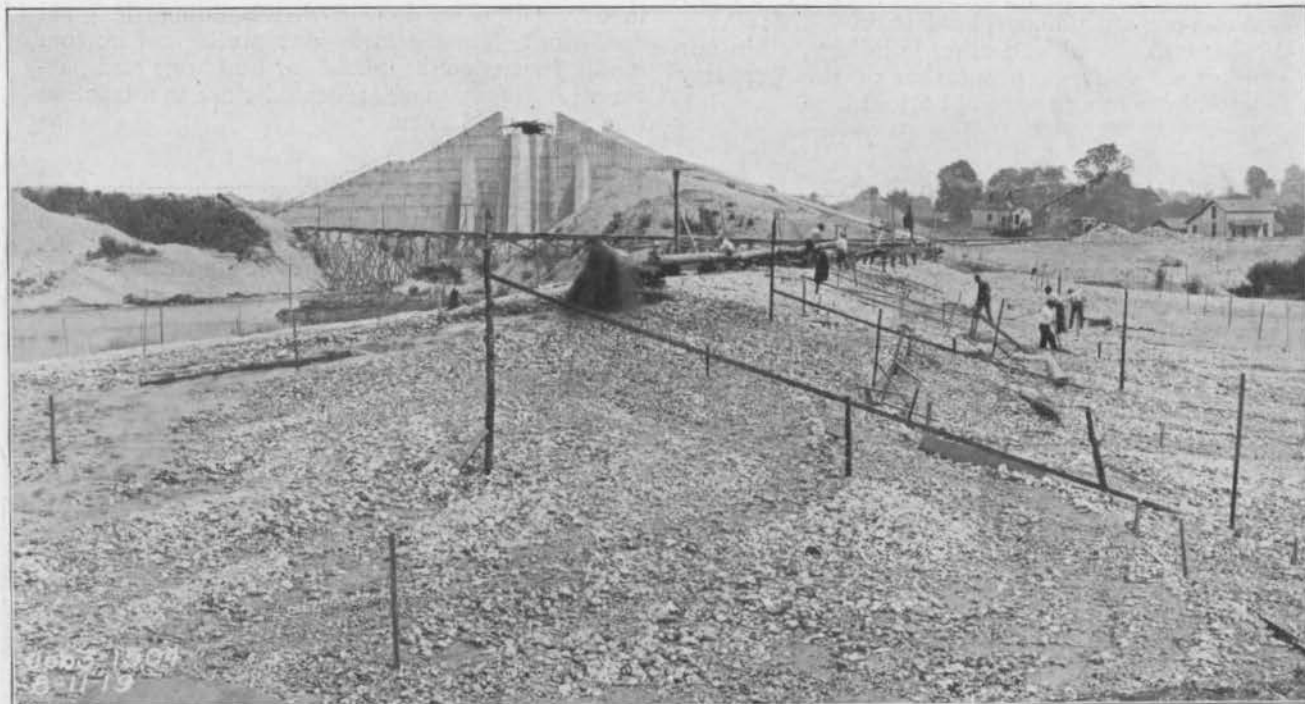


FIG. 98—BUILDING THE SOUTH BEACH AND DAM SLOPE, LOCKINGTON DAM, AUGUST 11, 1919

Shows the same beach as Fig. 84, taken on the same day from another point. The south slope of the dam embankment is being built up in the same manner as the beach (see page 106), a procedure not followed at higher elevations on the slope. The slanting boards indicate the finished slope of the dam embankment, the men raking and shovelling the sand and gravel flush with the lower edge of the board. The embankment will be carried up to the full height of the walls seen in the distance.

THE MIAMI CONSERVANCY BULLETIN SUPPLEMENT

"The News Letter"

To Promote the Conservancy Spirit on the Work

FEBRUARY 1920

OF GENERAL INTEREST

The Conservancy Film

Mention has been made in these columns of the moving picture film which has been under preparation by the N. C. R. organization. The film is now completed and ready for exhibition. It has been very carefully prepared under the general direction of Mr. C. E. Bratten, of the N. C. R. Lecture Bureau, assisted by Mr. Gilbert, the N. C. R. photographer, who had charge of the machine. It comprises four reels, each 1,000 feet long, and takes about an hour and a half to run off. The total expense of preparing it, which has been over \$4,000, has been personally borne by Mr. John H. Patterson.

The picture begins by showing the early floods in Dayton in the years 1866, 1883, and 1898, reproduced from photographs taken at the time. Following these are moving pictures taken during and after the flood of 1913, bringing back to mind the terrible realities of the great catastrophe and emphasizing the necessity of the work which follows, to the end of preventing their re-occurrence.

The film then takes up the period during which the two million dollar flood prevention fund was being subscribed, and explains the plan of flood control adopted, that of retarding basins in combination with enlarged and improved river channels. The operation of a retarding basin is shown at considerable length by means of a miniature model, artfully constructed to represent the filling and emptying of a real basin as it will appear in times of flood.

Next are shown the various phases of the work of construction now being carried out, taking up first the river channel improvement and then the building of the dams. The process of hydraulic fill construction is followed step by step, from the excavating of the materials to their final placing in the dam embankment. The building of the concrete conduits is shown in equal detail.

The film will be shown at the construction camps as fast as arrangements to that end are perfected. The first exhibition will be at the Taylorsville camp on Tuesday, February 10. Owing to the unfortunate loss of the negative while in transit between Chicago and Dayton, only one copy of the film is in existence. Owing to this fact it will be impossible to send the picture out except under the personal supervision of the N. C. R. operator. The use of it is given free by Mr. Patterson, whose well known liberality in these matters first made such a film possible. It is the intention to keep it up-to-date by taking additional pictures from time to time as the work of construction develops.

Hot Air from Dr. Smalley

The prize adventure in the recent days of thaw and ice belongs, perhaps, to Dr. Smalley. Finding the hill on the road to Taylorsville too slippery to climb, he was forced to take the detour by "Larsen's Boulevard," where his engine finally laid down and died in the middle of a foot-deep pool of ice water. There was nothing for it but to get out and wade, and walk afterwards with wet legs to the camp at Taylorsville, which the doctor did, heating up the air with brisk remarks as he went along. He kept stoves and radiators warm with his steaming shins all the way home.

Hamilton Hard Cider

One of our headquarters men, at a recent banquet in Hamilton, was much interested, not to say pleased, to note that the liquid refreshment in the glasses on the table was what appeared to be good, old-fashioned cider. It was a severe jolt when he discovered that the kick came from iron rust, the liquor having been drawn from the Hamilton water mains.

Influenza

Dr. Smalley reports that on the whole, as regards influenza and kindred troubles, the Conservancy force is coming through the winter very well. The camp at Taylorsville has been the worst hit, there having been so far 28 cases of the disease, these occurring both in the bunk houses and among the families in the cottages. Five of these were cases of pneumonia, among which there was one death, that of little Mary Tizzard. Englewood and Germantown have been comparatively free. There was one severe case of pneumonia only at either of these camps. This occurred at Englewood. At Lockington they have been so fortunate as to entirely escape. At Huffman there have been 28 cases. It is worth noting that 21 of these have been among families in the cottages and only 7 among the laborers in the bunk houses. The mothers and the children have been the principal sufferers, the trouble starting usually with the mother and being transmitted to the children. The immunity of the laborers is ascribed by Dr. Saylor to the active out-of-door life. The moral is obvious. The cases at Huffman have been much lighter than those of last year and the disease is now fast disappearing. No cases of pneumonia have developed at Huffman.

Frances Morgan, Ill, Much Improved

The Bulletin is glad to be able to announce that Chief Engineer Morgan's little daughter, Frances, who was ill with pneumonia for some time at the Miami Valley Hospital, is now much better and is at home again.

New Editors at Taylorsville

Taylorsville has a new representation on our editorial staff in the persons of Ben H. Petty, Office Engineer, and F. E. Floyd, Camp Overseer. The senior extends the glad hand of fellowship. We look to see Taylorsville propaganda go up with a whoop driven by two new brooms. We wish also to thank Mr. Rogers and Miss Benedict for their help in the past.

McIntosh Circumnavigates a Hay Wagon

It happened, we believe, on the road to Huffman, when the Chief met a farmer who refused to turn out. It was easy to go down the icy slope of the road to get by but not so easy to climb back, the Chief's rear wheels skidding until he found himself headed again for Dayton. He had to overtake and pass the farmer a second time before he could get turned around once more toward Huffman. "Now will you give me the road," said the Chief, and looked so big and fierce that the farmer gave him safe right of way.

Narrow Escape from Romance

That is what our friend Moyer calls it. Chief McCarthy at Taylorsville called upon him not long ago for help in the shape of a chef and wife for the mess hall at that camp. No chef and wife were available. Mr. Ensminger, Chef at Wilbur Wright Field was foot-loose, but without a wife. Also Miss Ethel Hamilton of Osborn was available but without a husband. Miss S., Moyer's assistant, suggested that the difficulty might be cured by a wedding. Sounded out on this proposition, Ensminger and Miss Hamilton both declared they were willin', that in fact they had the matter already arranged and expected to marry on the following Sunday. Moyer was much excited over this pleasing prospect and equally disappointed when it fell down. The wedding took place, but the happy couple did not go to Taylorsville. Thus, according to Moyer, romance was blasted in the mud.

THE MIAMI CONSERVANCY BULLETIN

DAYTON

Death of Charles Weiland

We record with regret the death of Charles Weiland, night repair man at the garage, which occurred at noon on January 19, of pneumonia. It was quite sudden, as Mr. Weiland was at his regular work on the night of Friday, the 16th, only three days before. He leaves a wife behind, to whom all his friends of the Conservancy extend sympathy in her severe loss.

E. W. Lane Temporarily Transferred to Government Service

E. W. Lane, Assistant Engineer, in the Headquarters Office, has been granted leave of absence for three or four months for work with the United States Census Bureau. He left on February 7th for Missouri. His work is the collection of statistics regarding the reclamation of swamp lands in the southeastern corner of the state. His work there will throw much valuable light on the swamp reclamation problems which this country must more and more face as time goes on.

M. C. Lewis Goes to the Illinois Water-Way

We record with regret the departure of Mr. M. C. Lewis of the Taxation Department, who left for Chicago on February 4, to take a position on the extension of the Illinois Fourteen-Foot Lakes-to-Gulf Water-Way, the same project which has recently taken several other Conservancy men. Mr. Lewis, who is an engineer, expects his new work to be in that department. He will probably have charge of a field party engaged for the present in making surveys of real estate to be acquired as a necessity of the project. Mr. Lewis leaves his wife and child for the present in Dayton, expecting to send for them a little later. All of his many friends regret his departure and wish him every success in his new work.

Death of Mr. Hitchcock's Son

The Bulletin records with deep regret the death on January 15, of the 12-year-old son of Mr. Hitchcock of the Taxation Department. The boy had suffered for some time with an incurable ailment and all efforts to save him proved unavailing. All Mr. Hitchcock's friends in the Conservancy extend their sympathy to him in his heavy loss.

Albert Larsen Now President of the American Association of Engineers

The local chapter of this association, which has become quite active in recent months, at its last election selected Mr. Larsen as its Vice President. By the departure of the presiding officer elected at the same meeting, Mr. Larsen has now succeeded to the headship of the Dayton Chapter. There is certainly a place for the American Association of Engineers, as its rapid growth indicates, and we are sure that under Mr. Larsen's leadership the Dayton Chapter will continue to prosper.

Shop, Warehouse and Garage

The boys in the warehouse are a little suspicious. Charlie Winch was seen near Burkart's Packing Co., Saturday, January 21st. Someone was kind enough to say that he was over there to get the kidneys taken out of his feet. We don't need kidneys at the warehouse.

We understand Chas. Gleason of the warehouse has now found himself a young lady who lives in the extreme east end. He now stays out until 8:30 p. m.

Mr. Hesche of the warehouse has had a great deal of sickness in his home and we all extend our sympathy to him and his. We are glad to see him back on the job.

We understand Eddie Holiday of the Garage is now a politician. He is ward heeler in the Hungarian Settlement.

If you want to hear a heated argument get Dad Hall and Henry Wangler together on the prohibition question.

Mr. Frank Martin of the "Flying Squadron" is the proud father of a baby girl, born on January 24.

We understand Opie Reams is considering a job as night watchman for some department store in connection with his work in the shop. Ask him about it.

The boys in the shop hope to see Mr. Walter Strong, shop foreman, who is sick, back on the job as soon as possible.

Mr. Lem Gage is also home sick and we wish him a speedy recovery.

Mr. Randall of the shop has undergone a serious operation, and we are glad to hear that he is getting along as well as could be expected.

The boys in the shop were very much surprised to see Tommy Lahey return from his visit home over the holidays with only one suit case. We expected him to have at least two suit cases and a possibly a couple of trunks, and last but not least, a Xmas bride on his arm. Tommy says "Fooled again."

Athletic Association Elects Officers

The Athletic Association at a recent meeting elected the following officers for the coming year: President, E. L. Chandler; Vice-President, F. A. Everhardt; Secretary, H. L. Rogers; Treasurer, Walter B. Stockman; Bowling Committee, F. A. Everhardt, E. B. Maltby, W. L. Sylvester.

Conservancy Bowling League

Royal Alleys, Feb. 4, 1920.

Standing of the Teams

Teams	Won	Lost	Pct.
Rustlers	55	2	.965
Mekanix	34	26	.566
Purfics	29	31	.483
Railroads	25	32	.438
T Squares	17	37	.315
River Imps	11	43	.204

A new high single record of 244 has been established by Gleason of the T Square team.

The latest claim at Taylorsville is that they are getting dollar bills out of the borrow pit by hydraulic monitor, but we reject the story as just another piece of Taylorsville propaganda. Its anything to advertise with those birds, and they are geniuses at it.

OUR JUNIOR EDITORS

Huffman

The Equipment of Huffman Dam

The equipment of Huffman Dam consists of an electric dragline, two sluicing pumps, monitor pump, three dinky engines, steam dragline, a derrick, the camp's waterworks and the boiler room.

The electric dragline lifts gravel and dirt from the banks of the Mad River, and it is then loaded into side dump cars and is hauled to the two sluicing pumps, where it is forced through pipes to the dam by twenty-three hundred volts.

The monitor pump furnishes the water for the sluicing pumps. There are also two dinky engines, five cars apiece, which haul the dirt to the sluicing pump, where it is dumped and the dinky goes for another load.

While one train is being unloaded at the pump, the other is being loaded at the dragline. After the gravel is forced through the pipes to the dam, it is piled into banks by the steam dragline. This dragline keeps moving from one end of the dam to the other, banking the gravel as it goes.

A device is used for the lifting purposes that is done, and also to load the coal into the cars. A small engine is used to move the derrick from one job to the other.

The camp is supplied with water from a pump which pumps the water from a well into a tank. The tank's pressure forces the water into hydrants.

The boiler room furnishes the steam for the radiators in the mess hall, the grocery store, the doctor's office and the main office.

Robert Kemp, Eighth Grade.

Geneva Saylor sent in an excellent essay on Abraham Lincoln. We are sorry it is too long to print.

Taylorsville Cooking Class

A few weeks ago the girls of the Domestic Science class served the teachers and boys of the Manual Training class their supper. Every one enjoyed the supper of baked beans, biscuits and cocoa.

Aline Slayback, Fifth Grade.

THE MIAMI CONSERVANCY BULLETIN

Board of Editors

Germantown	Miss Julia Darnell
Englewood	Albert L. Wald, J. W. Quinlisk
Lockington	C. H. Shea
Taylorville	Ben H. Petty, F. E. Floyd
Huffman	Mrs. C. C. Chambers
Hamilton	R. B. McWhorter
The Woman's Club, Dayton, Ohio.....	Miss Mayme McGraw
Dayton Warehouse.....	J. T. Hall

Granite Tablets for the Dams

Reference was made in the last number of the Bulletin to the granite tablets which are to be set up at the several dams, warning against their use for storage or power purposes. These tablets have now been completed and are on their way to Dayton from Barre, Vt., where they were made. They are of gray Vermont granite, and will be set up in place in the near future. A cut showing their appearance, and the inscription of warning, will be published in the next Bulletin.

To Our Junior Editors

Since the offering of prizes for the best junior editorial work, the senior notices that some juniors seem to think that the longer the piece they send in, the better chance they stand to win. This is not so. Really, the shorter piece stands the better chance. It is an old and true saying that "Brevity is the soul of wit." Size counts for less than quality. A ton of coal is a wagon load. A diamond weighs less and brings more. Jack the Giant Killer wasn't as big as the giant, but he won. At Gettysburg, Edward Everett, a famous orator, talked for two hours. Then Abraham Lincoln got up and talked for two minutes. Everett's oration nobody remembers. What Lincoln said they will never forget. So don't be fooled into thinking, when you write—"the longer the better." It isn't true.

This is not saying that no long pieces are wanted. Some of the best things sent in have been among the longest. Quantity counts, but it needn't all be put into one piece. It will be usually better to put it into several shorter pieces. The shorter pieces we can print in the Bulletin. The long pieces we can seldom print, even when they are very good. They take up more space than our little sheet can spare.

The Coon Hunt

One winter evening, when the weather had changed and was warmer than usual for the time of the year, we went hunting. It was drizzling rain and was very dark. Father said: "How would you like to go coon hunting?" I was more than pleased, for I seemed to be born like the Indian with an instinct to hunt. So we gathered together the lantern, gun, shells and dogs, Dick and Beauty.

We finally arrived at the woods. All of a sudden the dogs struck a trail and their voices was music to our ears. They treed it on a large oak tree near a corn field. It took us no time to get there. It was sure fun, falling over logs and brush. We saw Dick looking upward and baying with all his might. Daddy put his lantern on his head and threw a light in the tree. The coon's eyes looked like two balls of fire. He shot him and down he came. The dogs grabbed him and shook it with all their might. It laid still; then we knew it was dead. We bagged it and took it home and received a neat little sum for its hide.

Mary Wolverton, Fifth Grade.

Among the Taylorville pieces we have noted two little plays, "The Squirrels," by Albert Proteau, and "The Saucy Leaf," by John Yancik, which are very interesting, but also too long to print. Little stories or plays like these make a good change from the usual things sent in.

Englewood

A Hike

During the holiday vacation I racked my brains to think of something unusual to do. Suddenly a happy thought struck me. Why not hike into Dayton? The next question was, "Who should I get to go with me?" Then knowing that Mrs. Everdell was a good walker, I decided

to ask her. She consented to go.

So early one morning we started out. We had great fun reading the names on mail boxes. After we had covered about two-thirds of the distance, we sat down and partook of some lunch. Then we went on, greatly refreshed. After about two hours we got into the city limits. There we caught the street car and went on into see "The Heart of the Hills," which made a fine climax for our day.

Mary Williams, Eighth Grade.

A Hallowe'en Party

On Friday evening at seven o'clock our teacher, Mrs. Everdell, invited the children of the camp to a Hallowe'en Party, which we all accepted. Most of the children wore false faces and were dressed in a funny way. The rooms were fixed up very prettily with applies hanging on strings and drawing on the walls. We ducked for apples in a tub which the boys liked more than the other games.

Then there were pans of popcorn which the boys popped in the afternoon.

We enjoyed the evening very much.

Joseph Bouladier, Fourth Grade.

TAYLORSVILLE

Weather Propheteering

Feb. 2. Time 6:00 a. m.

Old man Ground Hog yawned, kicked off the covers, rolled out of bed and ambled upstairs to his dugout entrance to get a whiff of fresh air and read the thermometer. As he stepped outside his shadow bobbed up behind him, whereupon he immediately dove down his hole again, wood-chuckling to himself, "Me for the hay for another six weeks."

Our loquacious and sagacious rodman, "Bud" Crampton (19 years old) says we can bank on this ground hog prophecy. He has seen it come true a hundred times already.

He "Needs" the Dough

Jens Jensen is back again from Salt Lake City to resume his duties as head baker. Mr. Jensen started our bakery about a year and a half ago. His return will be welcomed by the camp residents, as he surely knows how to bake the "staff of life."

Death in Camp

Ed Wolverton, general foreman, died suddenly on the night of January 14, from heart trouble. He had been suffering with asthma for some time, but had remained on duty up to the day of his death. A sum of \$540.00 was raised in camp for the wife and seven children. Ed ranked high as a foreman, and his loss will be keenly felt on the job.

Slide, Kelly, Slide

In regard to this slippery condition underfoot, we feel somewhat like the old negro parson when he said: "Enough is enough, but too much is a plenty." For the past two weeks it has been possible to look out of our office window almost any time and see some hapless pedestrian executing a perfect "tail spin" on the ice-covered walks. No serious injuries have resulted thus far.

Hinton and Farmer, Inc.

Messrs. N. L. Hinton and Clay Farmer of the field party have floated a new enterprise. Mr. Hinton, who is a close student of collie and bulldog nature, has agreed to trade or sell dogs of these breeds, either singly or in numbers. Mr. Farmer, a renowned hunter, will sell beagle hounds, both trained and untrained. The men guarantee satisfaction to all patrons.

Little Girl Dies

Mary Adell Tizzard, the four-year-old daughter of H. W. Tizzard, derrick man, passed away on the morning of January 28, after a short siege of pneumonia. Mary was very popular among the camp residents, and her loss is deeply felt. The heartfelt sympathy of their many friends is extended to the parents in their sorrow.

Terpsichorean Club

The many devoted adherents of Terpsichore showed their loyalty by holding a dance on January 24. A goodly crowd enjoyed the event, which was held in Community Hall.

THE MIAMI CONSERVANCY BULLETIN

Assistant Superintendent Hager

A new assistant superintendent, Mr. D. C. Hager of Hagerstown, Md., has assumed his duties on the Taylorsville job. Mr. Hager shows signs of the stuff that will make things hum. We predict for him a successful career at Feature No. 4.

Our hospital facilities have been fully taxed by the Influenza epidemic. As yet, there have been no fatalities.

GERMANTOWN

Snap Shots at Various Folks

Mr. and Mrs. C. O. Shively had a delightful time in New York, where they spent two weeks of their vacation.

Mr. and Mrs. Chris Foehr, Jr., were with their home folks in Cincinnati for several days during the Christmas holidays.

Mr. and Mrs. Russell Minton and family spent the Christmas holidays with their folks at Piqua, Ohio.

Mr. and Mrs. O. D. Stewart and daughter spent Christmas with relatives at Van Wert, Ohio.

Miss Sadie MacDonald enjoyed a two weeks' vacation with her sister, Mrs. Alex MacKinnon, of Englewood Dam.

Do You Know Why?

Why Stub Graham refuses to play pool?

Why Dave Carlton wants to get married?

Why Julia Marie Darnell just must get to Dayton every week end?

Why dragline runners have such a strong preference for school teachers?

Why Mr. Albert, the hydraulic engineer, picked up a certain fat young lady twice on Fifth street, between Main and Jefferson?

Why Miss Carroll has not answered our frequent inquiries?

Why Will Fuller refuses to read the Dayton Journal?

Why D. M. Rafe, our warehouseman, smiles?

Why Harnish wants the ice to disappear?

Why Louis Graham and Will Fuller are such friends?

ENGLEWOOD

The Christmas entertainment mentioned in last month's issue of the "Bulletin" more than filled the expectations of young and old at Riverside. Carefully managed by Mrs. Everdell, the school children's program proved a complete success. Practically every child attending the Englewood school took part in the program.

Mid-Winter Vacations

Many families in Englewood took advantage of the holidays by visiting other cities. Mr. Hennington, the night superintendent, saw the bright lights of New York; Mr. and Mrs. O. F. Welbaum found diversions in Cincinnati; G. K. Rodgers saw the "Old Home Town" of Fall River, Mass., while A. L. Wald and wife celebrated Xmas in Kentucky.

Annual Election of Officers

The Riverside Community Association met in the Community Hall January 5. Discussion of plans for the Camp's general welfare was followed by election of commissioners, resulting as follows: Messrs. Knerr, Wald, Mulheron. The commissioners selected the following Association officers: Mr. Gibson, chairman; Mr. Mitchell, vice chairman; Mr. Wald, treasurer. Vacancies created in the social committee by the departure of Quinlisk and Cornish have been filled by Mulheron and Rodgers.

Leap Year Plays Havoc With Romance

One diamond ring has made the rounds and adorns the finger of its original donor. Another lad was heard to say in a tone denoting submission and consent, "Yes, ma'am, I'm a railroad man."

"Al" Hawkins, Reformer

"Al" Hawkins wishes to announce that every day between 11 and 12 o'clock, excepting Sunday, he will give a short talk on "The Bible and Its Functions." This remarkable change in Al has all taken place since July 1st.

Fire in Camp (Nearly)

Awakened from their quiet and erstwhile undisturbed slumber in the Mess Hall, by violent rattling of the door, Spady and Mitchell dashed wildly to find the cause of this

terrific onslaught. Mr. McKinnon, our renowned fire chief and camp overseer, stood on the veranda shouting "Fire! Fire on the Hill!" as he rushed on to notify other members of the E. R. D.

Lying down in two places was all that was required to bring the long and lean Mr. Spaid in front of Bjorgum's cottage and supposed scene of the conflagration. Bjorgum stood on the front porch, the very picture of peace and contentment, greeting the fire fighters with "A lovely evening, isn't it?"

Moral: Before burning out your flue notify the E. F. D.

A Baseball Problem

If Babe Ruth sold for \$125,000, would Taylorsville like to buy nine baseball players from Englewood to improve their team for next season?

A Victim of the Slaughter

Mrs. Chas. Wagner received an S. O. S. from a rural relative of hers, stating that the mid-winter butchery was about to take place down on the farm near Waynesville, Ohio. We wonder, will the head cheese it when the smoked dog barks, and the cracklin's crack around Wagner's cottage soon? We've never sausage stuff'er anything like it, nor is this intended to be a big tail. Oh lard no!

LOCKINGTON

Friends of Mrs. F. J. Watson are glad to learn that she is recovering from an operation performed at a Detroit hospital. She is expected to return to her home about February 1.

Mr. and Mrs. Lester Agenbroad have moved into the Camp.

Mr. H. T. Meiners, our chief of party, has resigned to take a position in Louisville. Mrs. Meiners is now in Louisville and Mr. Meiners expects to move the latter part of the month.

Coasting has given the children of the Camp a chance to try out their sleds during the past week and they have made the best of their opportunities.

HUFFMAN

An eight and one-half pound boy was born to Mr. and Mrs. A. F. Burns on January 3, 1920. He is called Fred Junior. We extend congratulations to the proud parents.

Among those who spent Christmas away from Camp were Mr. and Mrs. Nagle, Mr. and Mrs. Vincent Chambers, Dr. Saylor and family, Mr. Schirtzinger and family, Mrs. Schuler, Mr. and Mrs. Dye, Mr. Bailey and family, and the Cullens.

There were many good dinners served in Huffman on Christmas Day. The Clawsons had as their guests Mr. and Mrs. Pauls from Germantown. Mr. and Mrs. Hutzelman entertained their parents of Dayton. Mrs. Darnell had eleven guests on that day.

The Huffman men started the new year right and gave a dance on New Year's Eve. The men certainly know how to do things, "I'll say they do," when it comes to eats. We hope it will be a fortnightly affair from now on.

The Sunshine Club met at the home of Mrs. Clawson, January 14th. The charming hostess served delicious refreshments, with Mr. Clawson assisting.

Mr. and Mrs. Steadman have moved to Dayton. We are sorry to lose them.

HAMILTON

We were pleased to have the engineering employees of the Dayton river job, and also several members of the headquarters office force, visit our work on an inspection tour recently.

John E. Faist is ill at present, but we understand his condition is improving and that he will return to work in a day or so.

Mrs. Cutler has returned to her home in Worcester, Mass., after an extended visit to Mr. and Mrs. A. F. Griffin. She is the mother of Mrs. Griffin.

Mrs. G. W. Schrader has returned from Dayton, having been called there recently on account of the illness of her mother.

An epidemic of measles is now raging in Hamilton, and the Conservancy children have not entirely escaped. However, all are reported better.

Dominick Ordolani, mechanic in the Hamilton shop, is seriously ill with pneumonia and has been removed to Mercy Hospital.

THE MIAMI CONSERVANCY BULLETIN

MARCH 1920

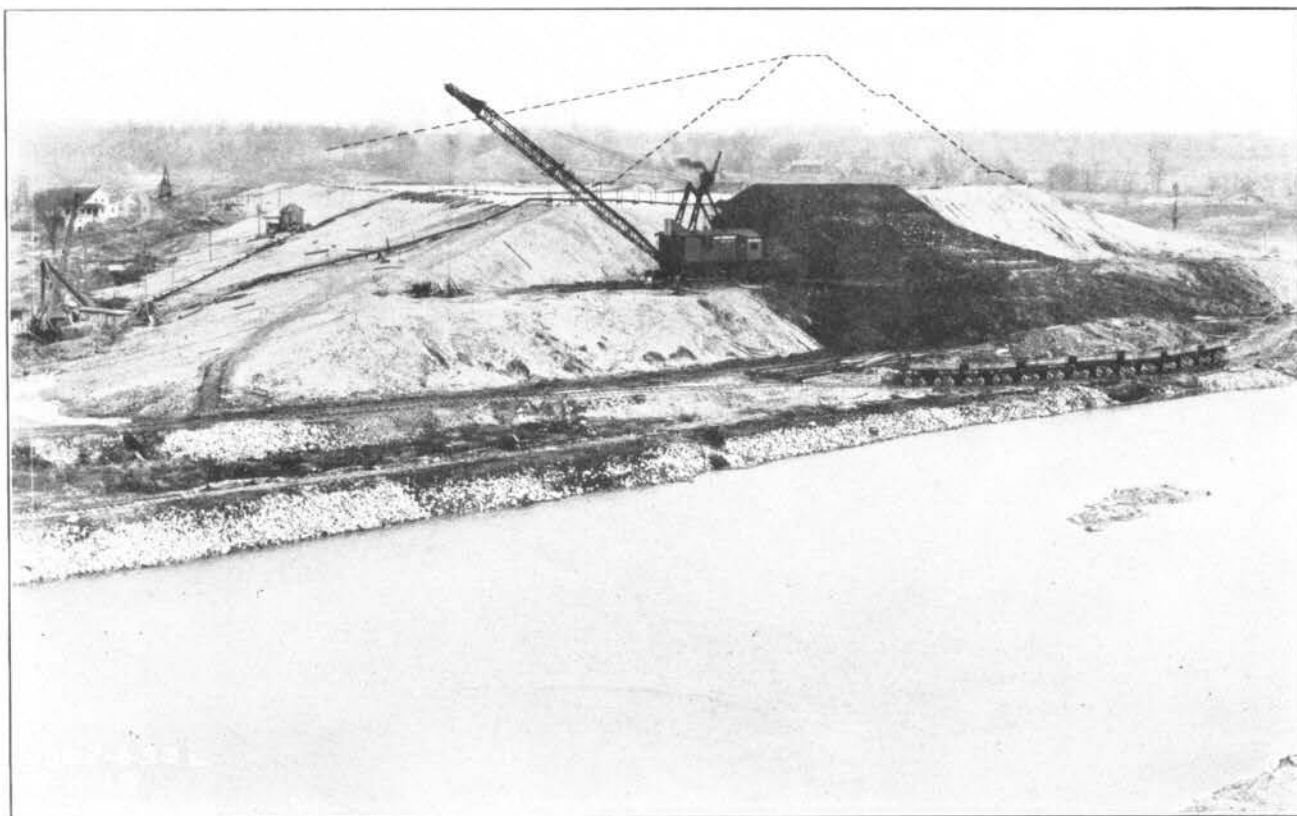


FIG. 99—HYDRAULIC FILL AT ENGLEWOOD, DEC. 11, 1920. SEE PAGE 120



FIG. 100—CONCRETING PLANT, ROBERT BOULEVARD WALL, DAYTON, FEB. 19, 1920.

The 5-ton truck backs up the incline at the right, and dumps the sand and gravel into hoppers at the top, leading to bins. Chutes from the bins lead to a car below, through measuring boxes, to permit exact proportioning. The car climbs the incline beyond the bins, and dumps the measured sand and gravel into a hopper above the mixer, where the proper measure of cement is added. Concrete cars on a track deliver the mixed concrete from the mixer to the forms.

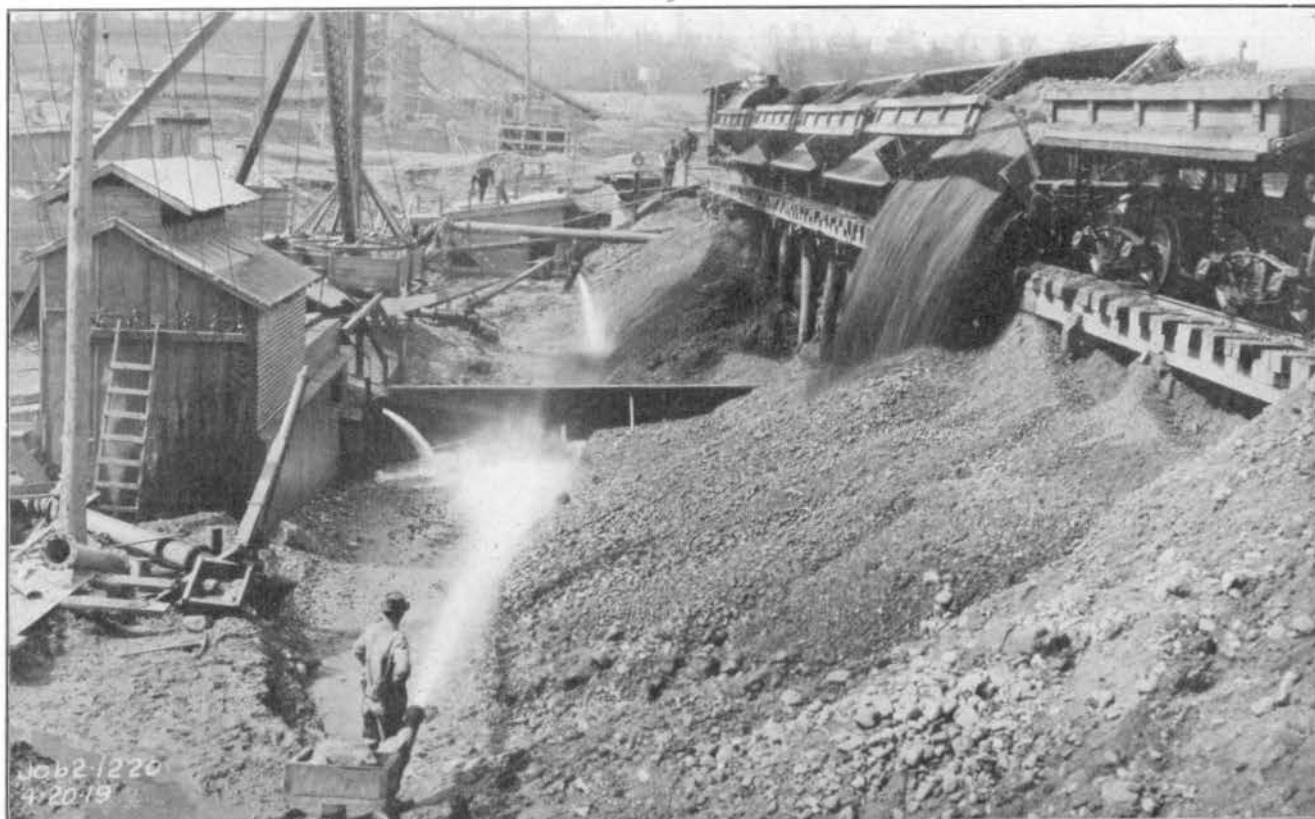


FIG. 101—HOG BOX, ENGLEWOOD DAM, APRIL 20, 1920. SEE PAGE 118.

Essentially a trough 150 feet long and 27 feet wide, with a wall across it in the center. A hydraulic monitor at each end washes the dumped earth down a hole in the trough, in the corner where the cross wall meets the wall at the left. The mixed earth and water are then pumped to the top of the dam by pumps in the house at the left.

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Chas. H. Paul, Asst. Chief Engineer
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THE MIAMI CONSERVANCY BULLETIN

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DAYTON, OHIO

Volume 2

March 1920

Number 8

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Subscription to the Bulletin is 50 cents per year. At news stands 5 cents per copy. Business let-
ters should be sent to Office Engineer, Miami Conservancy District, Dayton, Ohio. Matter for pub-
lication should be sent to G. L. Teeple, Miami Conservancy District, Dayton, Ohio.

Park Reservations at the Dams

Plans have recently begun to be formulated which in their final effect, and as a "by-product" of the main end of flood prevention, will prove to be a great gain to the whole Miami Valley. The District is obliged to keep control of the banks of the streams for a considerable distance above the dams, in order to maintain a fringe of forest upon them, the object of this fringe being to restrain and retard drift wood, logs, etc., which, driven swiftly down stream in time of flood, might work injury to the dam outlet structures. Also, at each dam site, where the "borrow pits" are excavated which furnish the earth materials to build the dam embankments, there will be, after the work of construction is completed, a considerable lake, which will be connected with the stream. Naturally, the borders of this lake will also be wooded. There is thus created necessarily, at each damsite, a natural park, adorned with woodland, meadow, lake and stream, which only needs a comparatively slight fostering and care by competent hands, to make the most beautiful park and lake system in the state of Ohio. It is a case of true conservation of natural resources, resources which are now in the ownership and control of the public, and which, it is felt, should not be permitted to pass again out of public enjoyment and control. The park areas along the streams will be narrow areas, following the necessities of flood control as already stated. At the lakes, near the dams, the parks will widen, again following work which was necessary to the project. Immediately above the dams, rock riffles will be created, just sufficient to keep the streams nearly bankful for some distance up the valley, and thereby also raising the level in the lakes, thus deepening marshy shore areas which might become mosquito incubators. It is expected that

the damsites will by these means become in future times not only an insurance against floods, but a continual resort for health, beauty and pleasure, open at all times to all the inhabitants of the Valley and of the state. The improvement planned will eventually result also, as has been repeatedly proved in similar cases, in a rise in property values.

The Pressure Cells at Germantown

Mention was made in these columns some time since of the installation of pressure cells in the cores of the Conservancy dams, whose object is to determine the rate of solidification of the dam cores by measuring, at various depths, the horizontal and vertical pressures in the earth materials composing them. A technical account of these measurements, and of the conclusions so far deducible, was given in the Christmas number of the Engineering News-Record, and attracted much notice from engineers. The cells, it will be remembered, are imbedded in the core at regular intervals of depth, beginning at the bottom of the dam, the arrangement being such that measurements can be made giving the horizontal pressure, and also the vertical pressure, existing at the cells, at any time. In a liquid, as is well known, the horizontal and vertical pressures at any point are the same. In a perfectly solid material, the horizontal pressure at any depth will be zero, and the vertical pressure, as in the case of a liquid, will equal the weight of a unit column of superincumbent material at the point of measurement. In materials in an intermediate condition of solidification, the vertical pressure will also equal the weight of the unit column, but the horizontal pressure will be something intermediate between that weight and zero. The difference between the horizontal and vertical pressures will thus be a

means of measuring the state as to solidification of the materials in the core. The results at German-town show that at depths of 25 to 30 feet, the material already shows a very considerable degree of solidification, such as to give good assurance that the core in this respect will be up to the quality desired. Analyses of the soils used in making the hydraulic fill are being made by the Bureau of Soils at Washington. These analyses show small percentages of clay in the finer sizes, indicating favorable materials, and harmonizing with the solidification indicated by the pressure cells. An account of the pressure measurements and the deductions therefrom will soon be published in the Bulletin.

New Osborn

Newspapers of the valley have been printing notices recently in regard to the project of a relocation of the village of Osborn, made necessary by the building of the Huffman dam. Osborn has a population of about 1200 people. It lies so far below the spillway level of the dam that in case of maximum flood it will be ten to fifteen feet under water. Under these circumstances it was necessary to require a removal of the inhabitants to some safer location, and to this end the District was compelled to condemn and purchase the entire body of real estate in the village, legal transfer being made in 1916. Since then there has been a considerable removal of the former property holders, their places being taken, however, by others, so that the population has not diminished but has rather slightly increased. About half the former owners, however, still occupy their property, paying rent to the District. Naturally many of these, probably most of them, are among the more substantial citizens of the village, and as the time draws near when the railways, both steam and electric, will remove to their relocated and rebuilt lines and leave the place, not exactly "high and dry" by the wayside, but something like it, the inhabitants are bestirring themselves to pick up the town also and follow the railways to a new location.

The problem is one never faced before by a town in Ohio. The difficulties are not only physical, financial and social, but legal. There are no precedents to follow. When the villages on the slopes of Vesuvius are overwhelmed by an eruption, and the people driven forth, they move back and rebuild on the fresh layer of scarcely cooled lava, on the old site. But Osborn cannot move back. She must move on. Whither? And how? It is "some problem" for a town of 1200 people to tackle, but they are doing it, and are well on the way to solution. Organization of a company to carry out the project took place at Osborn on March 4. An account of the plans will be published in an early number of the Bulletin.

The Case of Sulphur Springs

Since writing the above the editor has learned of a dilemma somewhat similar to that which faces Osborn—the case of Sulphur Springs, Oklahoma. This town of about 800 inhabitants had grown up in a haphazard way by the "squatting" of white settlers upon Indian reservation lands, around springs of health-giving waters which had given the village its name. Sanitary conditions became such that the springs were being ruined through pollution. By

special act of Congress, after careful survey and report by U. S. engineers to the Secretary of the Interior, the inhabitants were paid a fair cash value for their properties, and given ninety days in which to remove to a new townsite laid out on the opposite side of the little valley. It seemed a great trial to the inhabitants at the time, but in the end proved a blessing in disguise. The new Sulphur Springs arose, a much fairer and more attractive place than the old, and the town has since made material gains in size and general prosperity.

"The Reality of the Unseen"

It must have given more than one engineer, as it gave the writer, a strange sensation to sit last Saturday evening and listen while one of the great physicists of the world affirmed his belief in the actuality of inter-communication between the living and the spirits of the dead. We refer, of course, to the lecture by Sir Oliver J. Lodge on "The Reality of the Unseen." We had all heard of Sir Oliver's conversion to the faith he now holds, but no doubt also we had most of us rather discounted it. It was hard to believe. We could not quite realize it. But now there he stood, white-haired and venerable, clothed in a kind of senatorial dignity as one of the great spokesmen for science, and calmly gave the justification—scientific justification—for the faith that is in him. As one might be sure, it is no mere will-o'-the-wisp of cheap spookery which he follows. What he sees goes much deeper and higher. In the age-long warfare between science and religion he bespoke a truce. The champion of science dropped his sword. And it was strange with what gentleness, with what one might call a high humility of spirit, he did it. Prayer, inspiration, and communion with the spirits of the dead, all are realities, he said. Science must follow step by step, investigating by her logical processes these things which she has so often scorned, and so arrive at last "on the mountain top" where religion has, he admitted, already arrived by other means. The thoughtful engineer, accustomed to quite other attitudes in the prophets of science, could only sit and marvel to see this one stating so serenely such convictions.

Touch and Go

Persons who not long since stood on Third Street Bridge in Dayton and watched the men at work laying the last few lengths of gas and water mains across the big trench in the river bottom, probably did not realize just how the engineers in charge were feeling about it. There had been rain—inches of it—and the Great Miami, as is well known, rises to rain "like a trout to a fly, swift and onartain." It rose nineteen feet above the trench bottom, and within a foot of the top of the frail levee thrown up around the trench by the dragline to keep the flood out. The levee was gravel—the only material obtainable—and leaked like a sieve, the water cascading down the interior trench wall to drown out the pipe line, and the big pumps galloping to keep up with it. The trench once drowned out, with the spring flood season ahead, meant two months probable delay and endless vexation. Luckily the river stopped coming up, and the work was completed. Spectators stared idly and moved on. But the engineers breathed large breaths of relief.

Stream Control and Hydraulic Fill at Englewood

Temporary Spillway to be Built and River Closed This Season. Program for Completion of Dam in 1922. 1,000,000 Cubic Yards of Embankment Now Placed.

By H. S. R. McCurdy, Division Engineer

The first important consideration in the program of construction was the problem of stream control. It must be kept in mind that the Conservancy dams are situated above large centers of population, where any sudden release of impounded water might spell disaster. Therefore the sequence of operations must be so planned as to be safe beyond a reasonable doubt, even should a repetition of the great 1913 flood occur. This is done in two ways, depending upon the type of outlet works. At Lockington, Huffman and Taylorsville the outlet works, as previously stated, are simply openings through the lower portion of the spillway weir. It is, therefore, a simple matter to construct the bottom and side walls of the structure, making an admirable flume for the passage of water. The weir itself is not built in until the dam has reached a safe height. For the covered-conduit type of outlet works, as at Englewood and Germantown, however, the stream control problem offers greater difficulty. Here it is necessary to retain the original waterway or provide an artificial one until such time as the adjacent portions of the dam can be carried up to an elevation of safety, and subsequently to make the closure during the season of low flows. At Germantown the problem is simplified by the narrow valley and the yardage involved in raising the embankment clear of the danger point is sufficiently small to permit the river closure to be made this season. In fact, the work is now at a safe height. These closures are greatly facilitated by building the outlet conduits with a temporary carrying capacity about double that in the finished design, thus diminishing the retarding action of the dams in a corresponding ratio.

At Englewood the stream control problem is somewhat complex. The country is so flat that a closure entirely across the river valley during one low-flow season is not to be thought of. The alternative, therefore, lies in what amounts virtually to building the dam in sections. The first season a cross dam is built on the east bank of the river. This cross dam is nothing more or less than a short section of the main embankment built from toe to toe, to serve as a retaining wall for the end of the hydraulic fill. Where this cross dam lies within the outer por-

tions of the main embankment it is built of porous material; where it crosses the middle portion of the main dam impervious material is used. Thus the composition of the main dam from end to end is not interfered with by the fact that the cross dam is interposed. The latter is carried up only fast enough to keep well clear of the hydraulic fill. The impervious middle portion is rolled in 6-inch layers, using a 12-ton steam roller. The sand and gravel shoulders are pumped into place as part of the main hydraulic fill.

With the cross dam in place to elevation 840, something over a million yards of hydraulic fill can be pumped without disturbing the river channel. This is a good season's work. In the meantime west of the river a temporary spillway, guarded on the east by a cross dam carried to elevation 850, will be constructed, and next April, with about nine or ten months of immunity from severe floods ahead, the river closure can be made and the hydraulic fill carried up to elevation 850. The third season sees a comparatively easy closure of the temporary spillway, and no further worry from flood flows, even should a repetition of the 1913 flood occur. The dam should be completed the fourth season. An inspection of Fig. 102 will make the foregoing program clear.

The Englewood borrow pit is located upstream from the dam, as will be seen in Fig. 103. The material is excavated by means of two 115-ton dragline excavators, one electric and the other steam, equipped with 85-foot booms and 4½-yard buckets. The draglines are ranged along the same track, one about 1,000 feet in advance of the other. An inter-

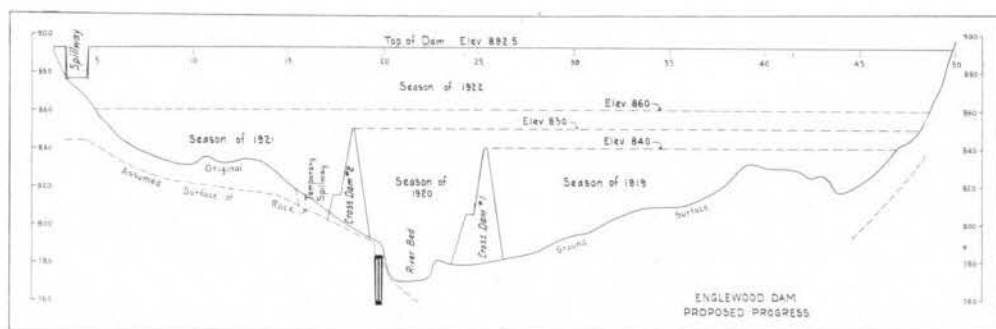


FIG. 102—CONSTRUCTION PROGRAM FOR ENGLEWOOD DAM EMBANKMENT

The program calls for the finishing of the work in four seasons, ending in December, 1922. The horizontal line at the top shows the finished elevation of the top of the dam. The irregular line at the bottom is a cross section of the Stillwater River valley on the dam center line, at the beginning of the work. The three dotted lines show respectively the elevation reached by the growing embankment at the end of the working seasons of 1919, 1920 and 1921. The embankment built during 1919 is entirely on the east valley slope, ending at Cross Dam No. 1, shown on the east bank of the river. The coming season will carry the top of this embankment up to elevation 850, and across the old river bed to the top of Cross Dam No. 2, which will be built during the early part of the season, the river meantime being carried in the concrete conduits shown just at the west edge of the river bed. (They appear very high and narrow, due to the fact that the vertical scale of the drawing is much exaggerated.) Any flood during this season will be carried by a temporary "spillway" shown just to the left of Cross Dam No. 2. 1921 will see the top of the dam carried to elevation 860, and 1922 to elevation 892.5, 122 feet above the old river bed.

esting comparison is offered as to the relative merits of steam and electricity as power for machines of this type. With electricity at slightly less than 1.6 cents per kilowatt-hour, the steam dragline is somewhat more expensive. The latter is more rapid in operation, but the cost of coaling runs the unit cost above that of the machine using electrical power. The depth of face in the pit averages perhaps 15 feet, and the draglines load into standard-gage 12-yard air-dump cars. Under these working conditions each machine can comfortably move from 150 to 180 cubic yards per hour. A double-track system is arranged, with suitable crossovers, in such manner that no interference occurs in the handling of trains.

There are four trains from the borrow pit containing seven cars each, which are handled by 40-ton locomotives. They climb a 2-per cent compensated grade onto a trestle 175 feet long, paralleling and close to the upstream toe of the dam. From the trestle the cars dump into what has been given a name more practical than euphonious—"the hog box." One standing at a point of vantage and watching the material snouted and swilled to the sump by the sluicing giants can readily see the application. The hog box is essentially a trough 150 feet long and 27 feet wide, ranged alongside the track from the borrow pit which, at this place, is carried on a pile trestle. The floor of the hog box is 13 feet below the rail and cones at approximately 4 per cent to an opening in the opposite side from the track. The opening discharges into revolving screens through which the material passes to the sump. The sump is a concrete well, 8 feet by 16 feet, divided by a partition into two chambers 8 feet square. The bottom of the sump is 16 feet below the floor of the hog box.

The material as dumped from the trains into the hog box may be dry or wet, according to whether the draglines happen to be digging above or below ground-water level. As the material lies in the hog box, it is washed through revolving screens into the sump by means of two hydraulic giants or monitors, one at each end of the hog box. Pressure for this sluicing water is furnished by two 10-inch centrifugal pumps, operating at a speed of 1760 revolutions per minute and each driven by a 100 horsepower motor. The pressure is kept at about 60 pounds and the jet is directed through a 3-inch nozzle.

The revolving screens are the product of several rejected schemes for eliminating the oversize rock from the material being fed to the dredge pumps. At first sloping gratings of several types with square openings were tried. These were fairly satisfactory when the material was not coming too fast or when there was not too great proportion of clay lumps. At such times the tendency was for the gratings to clog. Furthermore, each grating required the services of three men, clearing away the material. But the revolving screens seem to have effected a complete and simple solution of the rejection of oversize. The screens are cylindrical in shape, 4 feet in diameter, have an effective screening length of about 9 feet and are pierced with 6-inch circular holes in one case and 6½-inch holes in the other. The latter size is in the last screen installed and is an attempt to use the largest size openings without choking the dredge pumps. While the 6½-inch holes are satisfactory it is not known as yet whether or not

this size can safely be increased.* The screens pitch ½ inch to the foot. The first screen installed was given a speed of 14 revolutions per minute, but in its companion, installed later, the speed has been reduced to 9 revolutions per minute, and seems to give, if anything, more efficient service. Each screen is operated by a 7½ horsepower electric motor, chain-connected, the reduction in speed being accomplished through a countershaft. From the screens the acceptable material drops directly into the sump, while the oversize rock goes out of the end into bottom-dump buckets which are hoisted out with a stiff-leg derrick and dumped into a standard car in which they are hauled away to the downstream slope of the dam. Not only do the revolving screens serve to reject the oversize rock but, in addition, they fulfill another most important function. The tendency of the giants, even with the most skillful handling, is to wash the material into the sump in masses. Thus, one minute the dredge pumps would be handling comparatively clear water while the next they would be staggering to clear themselves of an overload. The action of the revolving screens, however, tends to rectify this irregular feed and to deliver the material to the suction of the dredge pumps in a uniform flow. It is of the utmost importance that this delivery of the mud to the pumps be as uniform as possible. A neglect of this has a dire effect upon the output.

Directly beneath each screen is an inverted truncated pyramid with an opening 2 feet square directly above the suction of the dredge pump. The object of this is to remix the fine material passing one end of the screen and the stones passing farther on. The suction from the dredge pumps are inclined at an angle of 45 degrees from the vertical, and in order to lead the material to them along the easiest lines the floor is shaped as an inverted pyramid. It has been found that with a flat floor the mud has a tendency to pile up until at some point a great mass will slough off and bury the suction. Then comes the plug and a vexatious delay until the suction pipe is cleared.

The business end of the hydraulic-fill plant is the dredge pumps. At Englewood the present installation comprises two 15-inch centrifugal pumps, designed for 150-foot head, operating at a maximum of 505 revolutions per minute and each driven by a direct connected 500 horsepower variable speed slip-ring induction motor. These pumps are made of cast manganese steel, containing perhaps 5 or 6 per cent of manganese (although the makers have not disclosed this). As yet this particular alloy seems to be by far the best fitted for standing the abrasive wear of sand and gravel. The shell of these pumps is from 2½ to 3 inches in thickness, depending upon the place. An item of the utmost importance is the design of the impeller, a matter which is complicated by the range of head against which the pump is called upon to operate. For instance, at Englewood the dredge pumps are working under heads which at the beginning are not more than 25 feet, but which are steadily increasing until a maximum of 150 feet will be reached, at which point a booster pump will be inserted in the line. To compensate for this variation, different sized runners are being tried, a smaller one for the lower heads and increasing in size as the heads shall increase. This arrange-

* Seven-inch holes are now in successful use.

ment is adapted to develop more fully the power of the motors. With a large runner operating against low heads the pump and water must run at low speed, and hence a large percentage of horse power is wasted in heating the grids used for lowering the speed. Diameters of runners of from 38 inches to 46 inches are being tried, but as yet it is too early to state results. The matter is, however, one of importance and will be carried along to definite conclusions.

The life of one of the manganese steel pumps as at present designed, pumping sand and gravel, is slightly less than 200,000 cubic yards. At Englewood the second pair of pumps is now in service, but the designers are making modifications in design for future deliveries, from which are expected better results. The impellers show wear at 50,000 cubic yards, but can be used, with doubtful efficiency, for perhaps 100,000 cubic yards. The consensus of opinion among those studying the operation of the pumps is that it does not pay to use equipment after it is badly worn. Economy is better served by scrapping the old shells and runners the moment they show signs of letting down. Inasmuch as the dredge pumps are the neck of the bottle, and the entire organization is succeeding in its purpose only to the extent that the pumps are functioning, it is obvious that they should operate at the highest pitch. To increase the life of the impellers, renewable shoes, for the wearing parts, are now being successfully used.

The operation of the dredge pumps and monitor pumps requires about 31 cubic feet per second of water. The location of the sump is 450 feet from the river. Rather than pump the water this distance a 4-foot corrugated-iron culvert was laid, through which the water flows by gravity. Near the sump a concrete well was built in the line to serve as a sump for the monitor pumps. Each of the two monitor pumps handles 2,000 gallons per minute. The nominal capacity of each dredge pump is 7,000 gallons per minute, which is the amount to be provided for, inasmuch as the discharge from the monitor pumps feeds into the sump.

The dredge pumps pick the material up from the sump and discharge it to the dam through 15-inch pipe. Where the pipe line runs up the side of the dam, and is therefore more or less permanent, the heaviest class of standard cast-iron flanged pipe is

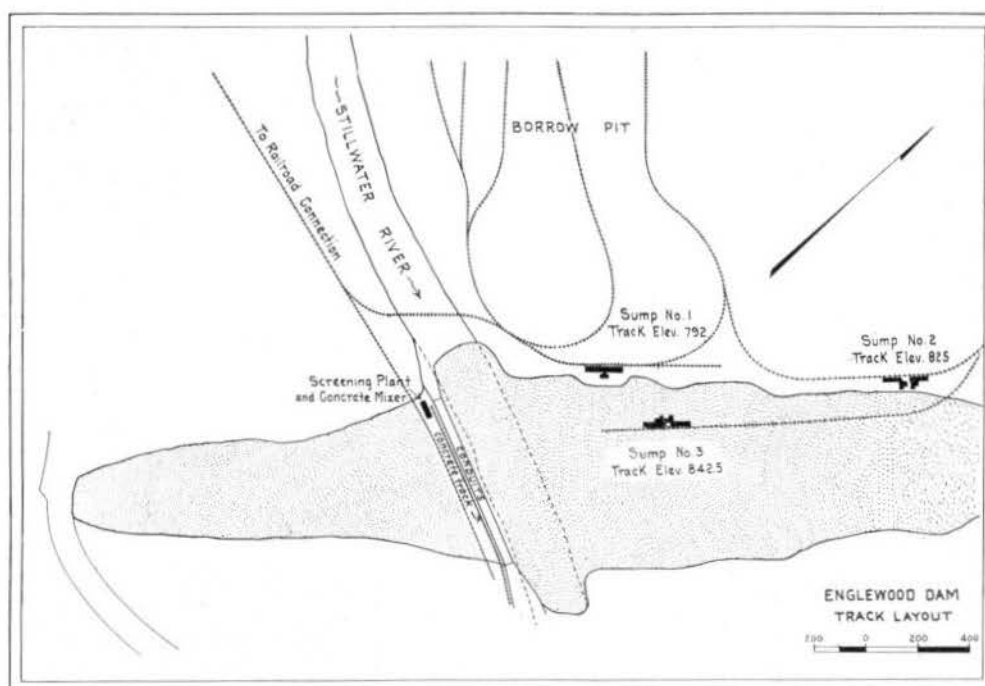


FIG. 103—TRACK LAYOUT, ENGLEWOOD DAM.

The stippled area is the outline of the dam as finished. The sumps are shown in black on the east (left) slope of the river valley. No. 1, on the valley bottom, was used last season and is now used only as water supply for monitor pumps. Sump No. 2 is up the slope, at 33 feet higher elevation. Sump No. 3 is on a berm of the dam embankment, 17.5 feet still higher. Materials excavated from the borrow pit above the dam site are carried in dump cars to the sumps over the tracks shown. A hog box, pumps, etc., are at each sump, the operation being as described under Fig. 101. The pumping for the embankment for 1920, as shown in Fig. 102, will be done from sumps Nos. 2 and 3.

used. For the shore lines, however, where the pipes are changed for each run, a lighter pipe than the cast iron—one that can be handled with rapidity and ease—is required. For this purpose one of the large rolling mills is manufacturing a special welded high carbon steel pipe. This metal contains 0.50 to 0.60 per cent carbon and about 0.75 manganese, the product beyond these limits being too stiff and springy to keep the curvature given by the rolls. The pipes are slip or stove pipe joint, i. e., have a slight flare at one end, and are held together by wire stretched over hook lugs. The thickness of shell is 11/64 inches, the pipes are in 16 foot lengths and weigh 28.83 pounds per lineal foot. It is not known just what the life of these manganese steel pipes is, for the very good reason that, to date, none have worn out. The greatest yardage that any of the pipes have passed to date is about 300,000. Riveted steel pipe, made from ordinary steel plate containing 0.10 to 0.20 carbon, proved very shortlived. Claim has been made that the high carbon pipe will last ten to fifteen times as long as ordinary steel, and this may prove to be so. To insure an even wear around the circumference of the pipe, they are turned 120 degrees for each new run. Observation shows that practically all of the solids flow within the lower third of the pipe, the upper two-thirds being filled with water bearing only the lightest particles. Consequently, for a given run it is the lower portion of the pipe only which is subjected to any considerable wear. No difficulty is experienced in practice in doing this; one end of each pipe is numbered 1, 2, and 3, 120 degrees apart,

and each time a line is relaid the pipes are revolved until the next number is uppermost.

The trick in pumping earth materials seems to lie in developing the consistent maximum capacity of the pumps and then feeding them uniformly to that capacity and no more. If the pumps are not receiving all the solids they can handle, money is being wasted. If, on the other hand, the pumps receive more than they can handle for any considerable time, a plug ensues and the entire pumping outfit spends many profane hours in clearing out the pipe—not a pleasant or easy job at best. Of course, short overloads, if not too heavy, can be handled by the reserve power in the motor, but there is a limit to the length of time this reserve can be applied without injuring the motor, and also a limit to the amount this power can handle. The whole method involves a synchronizing of effort on the part of the monitor men and the pump runner. Either working without due regard to the other can waste efficiency or plug the system. If the pump man does not throw in an extra finger on the switchboard at exactly the same time that the monitor men are crowding the dirt, trouble ensues. At Englewood the first plan for coordinating the various operations consisted in establishing a control tower overlooking the hog box. Here were installed pressure and vacuum gages, electric-bell connections to pump man and monitor men, and connections with portable telephones at the end of the pipe lines. By his electric-gong signals the foreman in the tower could direct operations—signal the monitor men for more or less feed, as the case might be, or notify the pump man to increase his power. This was a big advance over anything tried before, but it had one weak spot—the gages in practice did not always operate as swiftly or as surely as was desired. Sometimes the line would plug before the gages had given warning. But the difficulty has been solved by a very simple little device. The first sign of plugging in the pipe is manifested by a reduction of velocity. This at once becomes apparent at the discharge from the pipe lines by a slackening of the issuing stream. With this in mind the resident electrician, Mr. H. S. Knerr, rigged up a small attachment, consisting essentially of a steel clapper working on a hinge and forming contact at one end with an insulated wire running to the pumphouse, and at the other end with the jet from the pipe. The theory of the contrivance is that, with a full jet issuing from the pipe, the clapper is pushed against the contact points and the circuit is closed, but as the jet falls the contact breaks and the circuit is opened. Connected in the circuit are incandescent lamps, one at each monitor and one at each pump. Thus the monitor men and the pump man are constantly and instantly informed as to the condition of flow through the pipe, and can govern themselves accordingly. This simple device has resulted in a marked increase in the output and has borne a large share in the elimination of plugs.

Studies are being made, as the dam progresses, of the behavior of the core. It is known that it is becoming stiff at the lower elevations. A 1½-inch diameter pole shoved into the core meets sensible resistance at about 15 feet. The stiffening increases until at 25 or 30 feet a man's weight will force the pole no farther. It is the intention to test the rate of stiffening in the core by noting the penetration

of a 6-inch cast iron ball. By this means a direct comparison can be had between the cores at the five Conservancy dams. Furthermore, this ball method was in use at the Calaveras Dam for the Spring Valley Water Company in California, and comparisons in penetration can be had with that dam. It is also the intention to insert in the core a number of pressure-recording devices, developed by the Engineer of Tests, Bureau of Public Roads, Washington, for the purpose of measuring pressures in semi-fluid masses.

At the time the pumping plant was laid out very little authentic data was available in reference to friction head in dredge pipe. It was thought that, with velocities of 12 feet per second, the loss of head would be about 4 feet in 100 feet. In the clayey glacial till, such as is being pumped at Taylorsville, this is approximately true, but in the gritty sands and gravels at Englewood and Germantown, using velocities of 12 feet per second or upward, it is found that the friction head is unexpectedly large, amounting to as much as 8 feet per 100 feet. Such a condition throws a heavy penalty upon length of discharge line, and accordingly, at Englewood, studies are being made to abandon the present sump late this season and to use, progressively, three other sumps so located as to reduce both static and friction head to the least amount compatible with securing a satisfactory railroad grade from the borrow pit.

A matter entering vitally into the rate of progress of the hydraulic fill is the per cent of solids in the water handled by the dredge pumps. At times clear water is being pumped; at others as much as 15 or 20 per cent of solids is carried for short periods. The present average is probably from 6 to 10 per cent. Obviously, the higher the percentage the lower the unit cost, and studies are being made along these lines to find out just what can be handled. In the first place, there is vast room for improvement in the sumps. A sump is now being designed at Englewood from which much is expected. The principle being followed is to drop the material passing the revolving screens into the path of the water flowing to the suction of the pump and to fashion the entrance to the suction into a bellmouth to reduce the loss of head at entrance. But it is one thing to get the material into the pump and another to pass it through a long discharge line without plugging the latter. This feature is engaging the attention of the engineering force and studies are under way looking to some form of spiral or rifling device which will keep in suspension the solids in the discharge pipe and offset the tendency to settle in the bottom of the pipe.

The monthly progress at Englewood, working two 15-inch dredge pumps, two shifts of ten hours each, has averaged 85,000 cubic yards. Some minor changes in the screens and sump have lately served to increase that figure so that at present (September 1) each pump is delivering consistently 150 cubic yards per hour, or a total for the two of 6,000 cubic yards per day. The total amount pumped to Jan. 1 aggregates approximately 834,000 cubic yards.

(Note on front cover picture. The upper dotted line shows the final elevation. The other dotted lines indicate the shape of the cross section. The old river bed is in the foreground. The section seen is about 7/12 of full height and contains 1,000,000 cu. yds.)

The pumping must begin promptly on April 1. To do this, sumps and scows must be built, pumps set, spillway laid, tower erected, etc. These operations take different periods of time to complete. Often one must be finished before the next can begin. All these relations the diagram shows clearly. The vertical divisions represent days of the month, the dates being indicated by names and numbers above and below. The horizontal rectangles represent the various jobs of work to be finished for the pumping. "Building Sump No. 3" must begin on Feb. 16 and end on March 24. On the latter date also must end the work on pumps, motors, spillway, scow, etc., all of which must then begin tuning up together, as indicated, for the work on the actual fill on April 1. Each foreman has a copy of this diagram.

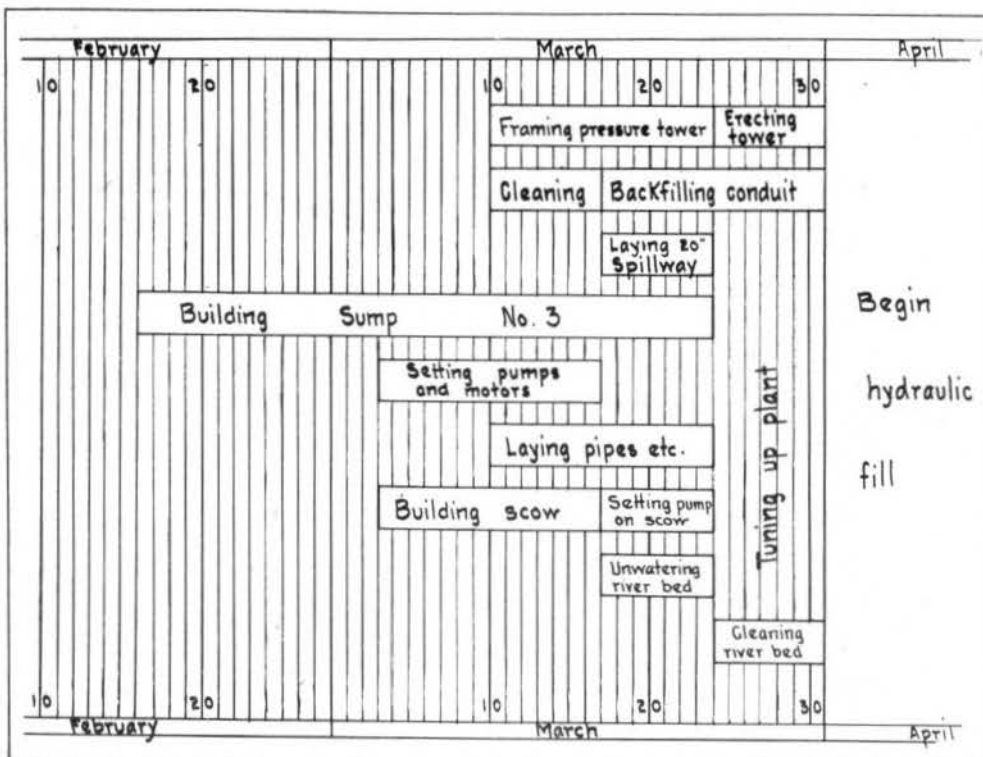


FIG. 104—WORKING SCHEDULE PRELIMINARY TO HYDRAULIC FILL FOR 1920 AT THE ENGLEWOOD DAM.

January Progress on the Work

GERMANTOWN

Work on the hydraulic fill was carried forward with difficulty during the cold weather. During the month of January 42,500 cubic yards were placed, making a total to date of 412,400 cubic yards. This is approximately 52 per cent of the total hydraulic embankment. On February 6th, the work on the hydraulic fill was suspended, the upstream slope of the dam having reached elevation 780, which point it was necessary to attain to prevent overtopping by a possible repetition of the 1913 flood.

Since the hydraulic fill has been shut down the workmen have been engaged in making necessary repairs to equipment and hog box, so that they will be in good shape for work when warm weather comes. While the equipment is in the process of repair, a booster station is being built on the second berm of the dam, and it is planned to begin pumping with the booster as soon as operations are again started.

A new track is also being constructed along the borrow pit for future excavation.

Arthur L. Pauls, Division Engineer.

February 14, 1920.

ENGLEWOOD

The past month the working forces have been engaged in various preparatory measures for prosecuting the work during the coming season. Sump No. 2 is practically completed. The dumping trestle for Sump No. 3 and the excavation for the pump houses are practically finished. These sumps are the pumping installations by means of which the hydraulic fill will be placed into the dam. They are built at points located by an economic adjustment of the haul by train and the height and distance necessary to pump the sluiced material.

To protect the motor operating the monitor water supply pump against flooding after the river closure shall have been made during the coming summer, a scow has been built. Upon this scow the pump and motor will be installed, connected with the pipe line up the slope of the dam by pipes fitted with flexible ball joints. By this means the pumping plant can readily rise and fall with the water

in the retarding basin during floods and still operate.

The steel sheet piling, driven to form an effective cut-off at the easterly bank of the Stillwater River, has been completed and the pile driving equipment shipped to Huffman. Thirty-nine hundred square feet of $\frac{3}{4}$ -inch arched-web piling, 35 lbs. per sq. ft. of wall, extending over 152 lineal feet, have been driven. Over the greater portion of its length these piles were driven to a firm seat upon the underlying ledge rock.

Track approaches to the new sumps have been graded and ballasted, dragline and locomotive boilers have been re-fueled and various plant repairs made.

Soundings have been taken through the ice in the hydraulic core pool to ascertain the degree of hardening which has taken place in the core of the dam. The indications are that the clay and silt mixture, which was deposited in suspension, is stiffening satisfactorily.

H. S. R. McCurdy, Division Engineer.

February 16, 1920.

LOCKINGTON

Due to unfavorable weather conditions, the dredge pumps have been forced to remain idle. A second dredge pump unit of manganese steel has been installed and is ready for service. The pipe lines supplying water to the monitors have been relocated.

The overhauling of the Class B dragline has been completed and as soon as the weather permits this machine will resume its operations, excavating the cut-off trench across the valley bottom east of the outlet structure.

The gravel surfacing of Road No. 8 has been completed, with the exception of a short stretch near its east end. The gravel was obtained from a pit near the south end of the road.

Clearing of the timber along the creek banks north of the dam has progressed favorably.

A working force has been maintained large enough to carry on the scheduled winter work and to start hydraulic filling in the spring.

B. M. Jones, Division Engineer.

February 24, 1920.

TAYLORSVILLE

The progress of the rock excavation for the outlet works shows slight improvement over the two preceding months. The excavation from the part of the channel that is to be lined with concrete is now finished. The Lidgerwood will continue on upstream with the excavation of the inlet channel.

The Bucyrus dragline, Class 14, has moved back to the north end of the west gravel pit and gravel is being taken from this pit now for concrete, as the sand from it is much more satisfactory than that obtained from the east pit.

The progress on the concrete has been only fair, but probably as good as could be expected with the weather and the labor shortage. The gravel washing plant and the mixing plant have been enclosed and heated so that concrete can be placed in the forms at a temperature of from 50 to 60 degrees, even in zero weather. But the cleaning up of the rock excavation ahead of the concrete becomes very slow and expensive when the temperature is not above freezing for a good part of the day.

The heavy ice has gone out of the river, giving but little trouble. This was due to a few warm days without any rain to cause high water.

O. N. Floyd, Division Engineer.

February 16, 1920.

HUFFMAN

As noted in the February Bulletin, the placing of hydraulic fill in the dam was discontinued on January 9th, on account of unfavorable weather conditions. The cold weather has been very continuous since that time, with the exception of the period from February 5th to 14th, when pumping was continued very satisfactorily. Another cold snap beginning the 14th has forced a second shut-down, continuing to date. The ten-day run gave a good opportunity to test out the booster pump that had been installed during the January shut-down. The operation was very satisfactory, and the value of using this booster pump on the long distance discharge pipe lines was verified. When pumping on the long line to the north end of the dam the hourly output was increased over 50 per cent with the booster pump in use over that obtained when using only the primary pump and the same length of line. The value of this booster pump decreases as the pipe lines are shortened, so a by-pass has been built to allow the elimination of the booster on the shorter lines, when the primary pump alone is able to maintain the proper rate of output.

The Lidgerwood steam dragline has completed the raising of the cross dam north of the diversion channel. This has been built up to an elevation that will take care of all the pumping that can be done until danger from spring floods has passed sufficiently to allow the closing of the gap between the cross dam and the concrete wall.

A cut-off trench is being dug with the steam dragline across the old bed of Mad River, and along the center line of the dam, in which steel sheet piling will be driven. Preparations are being made to drive this piling as soon as the trench has been completed.

C. C. Chambers, Division Engineer.

February 21, 1920.

DAYTON

The principal work carried on during the past month has been the dismantling of dragline D-15 at Herman Avenue and its re-erection at Stewart Street, the erection of dragline D-8 at Sunrise Avenue, and the overhauling and repairing of dragline D-19 at Webster Street. This work is progressing satisfactorily and is being done at a time when it least interferes with construction, because of the deep frost and ice conditions. Dragline D-16 has continued with the work of lowering the gas and water main across the river at Third Street. Little channel excavation, therefore, has been removed during the month.

A stone crusher has been installed at the gravel plant to crush the oversize material.

About 10,000 feet B. M. of lumber has been salvaged from the temporary dam structure opposite Sunset Avenue.

Fair progress is being made with the construction of South Robert Boulevard wall, 1415 cubic yards of concrete having been placed to date.

Channel excavation to date amounts to 674,000 cubic yards. The total pay quantity in spoil banks and levees is 483,000 cubic yards, including 60,000 cubic yards of levee embankment on Contract No. 41. In accomplishing this

work the total yardage handled amounts to 1,195,300 cubic yards. None of these figures include excess excavation from the launching basin and scowing channels, which amounts to 38,700 cubic yards, and which was taken out for construction purposes only.

C. A. Bock, Division Engineer.

February 20, 1920.

HAMILTON

The total material handled to February 1, including contract work, was 1,099,000 cubic yards. The total amount of Item 9, channel excavation, was 570,000 cubic yards.

The electric dragline is working on the east side of the channel between the Columbia bridge and the railroad bridge. During January this machine loaded on cars 43,000 cubic yards of Item 9. The material being excavated at the present time is being hauled into the site of Price Bros. concrete block plant. The piling is being delivered for the trestle north of the Columbia bridge, the contract for the driving having been awarded to Price Bros.

The steam dragline has completed the excavation and pile driving for the concrete wall at the northeast corner of the Main Street bridge. Sixty feet of the footing have been concreted. The wall south of the soldiers' monument has been completed.

The steam dragline has moved to the west side of the river, where it will excavate for the wall at the southwest corner of the Main Street bridge and then build the levee south from this point.

C. H. Eiffert, Division Engineer.

February 19, 1920.

LOWER RIVER WORK

Construction work in the towns of Miamisburg, Franklin and Middletown is at a standstill, the contractors having shut down on account of cold weather and the depth of frost in the ground.

F. G. Blackwell, Assistant Engineer.

February 16, 1920.

RAILWAY RELOCATION

Big Four and Erie. The Big Four tracklaying is completed and the Erie will be completed March 1.

The Fairfield Signal Station is about 50 per cent complete. The ground work is well under way, as well as the signal tower. Progress on the Tates Point Signal System has been held up on account of the weather. The Western Union have erected all their poles and are now setting the cross arms. One pole line will be constructed for both railroads.

Grading for the highway at Huffman at the overhead bridge is in progress. The overhead bridge is almost complete with exception of the hand rails.

The ballasting will start as soon as weather will permit.

Ohio Electric. The contract for the steel superstructure for the bridge over Mad River has been given to the Brookville Bridge Company.

The tracklaying will soon be started on this line. Some of the ties have already been distributed.

Baltimore & Ohio Railroad. The work on this line has been confined to the installation of the automatic block signal system. All other work has been suspended on account of the weather. The ballasting of the track will be resumed as soon as weather will permit.

The Baltimore & Ohio Railroad's own forces have been working on the track raising and bridge elevation of the Miami River bridge, No. 3, during the winter months and the work is nearly completed.

Albert Larsen, Division Engineer.

February 16, 1920.

RIVER AND WEATHER CONDITIONS

The only unusual feature of the river and weather conditions during the month of January was the large amount of ice on the ground from the 24th to the end of the month. This was caused by the melting and freezing of about 8 inches of snow which fell during the earlier part of the month. A rainfall of about a quarter of an inch on the 23rd, after which the temperature again fell to below freezing, aided in changing the snow to ice.

The rivers were comparatively low throughout the month. The total precipitation varied at the District's stations from 0.35 inches at Ingomar to 2.32 inches at the Germantown Dam. The maximum 24-hour rainfall occurred on January 9, varying from 0.91 inches at the Ger-

mantown Dam to 1.10 inches at Fort Loramie. At the Dayton Weather Bureau station the total was 1.80 inches, or 1.21 inches less than normal.

Observations taken by the local U. S. Weather Bureau show that the mean temperature for the month was 23.4 degrees or 6.6 degrees less than normal; that there were 7 clear days, 8 partly cloudy days, 16 cloudy days, and 14

days on which the precipitation amounted to or exceeded 0.01 of an inch; that the average wind velocity was 11.6 miles per hour, the prevailing direction being from the northeast; and that the maximum wind velocity for 5 minutes was 36 miles per hour from the northwest on the 2nd.

Ivan E. Houk, District Forecaster.

February 23, 1920.

Proportioning Concrete Materials at the Taylorsville Dam

Saturation of Sand to Give Constant Volume of That Material in the Mix. Economy Furthered by Rejecting Buckshot Sand and Pea Gravel.

The amount of concrete to be placed in the outlet structure at Taylorsville is the largest at any of the dams, comprising about 55,000 cubic yards. The type of the structure is the same in general as that at Huffman and at Lockington, already described in these columns. (See Bulletins for August and September, 1919). The work is massive, requiring reinforcement only in a few special places. The materials for the aggregate, as well as the sand, are obtained from gravel pits in the valley bottom below the dam site. They are screened and washed in a special plant erected near the work to be done, of a design described in the Bulletin for April, 1919. Before beginning to place the concrete, it was advisable to make a preliminary study of the sand and gravel to be used, in order to obtain the most economical mix which would give the desired strength. The investigation was carried out by Mr. H. R. Daubenspeck, Assistant Engineer, under whose direction the screening and mixing are carried on, and the results of his work are presented in the following article.

The screening and washing plant is shown in Fig. 105. It delivers to the bins sand of all sizes from $\frac{1}{4}$ inch down; fine gravel from $\frac{1}{4}$ inch to $1\frac{1}{2}$ inch; and coarse gravel from $1\frac{1}{2}$ inch to 3 inch. Material rolling through the upper (3 inch) screen is chuted into the coarse gravel bin, up to 6 inches in diameter. The proportions of these grades, as the material

comes from the pit, are quite variable. On the average, the fine gravel exceeds the coarse by about 50 per cent. The grading of the fine gravel and of the sand is also variable over considerable limits, giving rise to difficulties with the mix unless careful watch is kept.

With materials of this kind to deal with, it was of course out of the question to apply fine spun theories to the proportioning of the concrete. Broad considerations, based on simple relations of grading to voids, which really underlie all the theories, formed the basis on which the experiments were carried out. It was determined to make the conditions under which the tests were made conform as closely as possible to those under which the concrete would be actually mixed. The ends sought were immediate and practical, having direct reference to the materials to be used.

Tests were first made to determine the combination of the two grades of gravel which would produce the densest mix. As figure 105 indicates, the sand and the two grades of gravel are fed to the concrete mixer by gravity through separate chutes, in which are inserted measuring boxes for getting the proper proportions of the materials. These measuring boxes were carefully calibrated and used to measure the gravel for the tests, the mixing of the two grades being done by the concrete mixer, exactly as in actual concreting. The mixed ma-

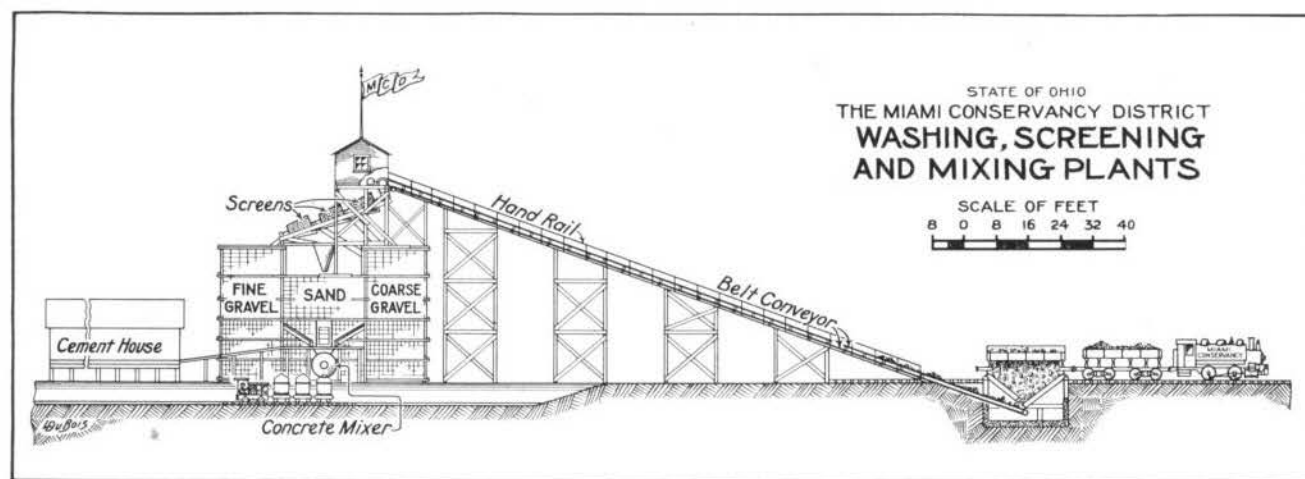


FIG. 105—GRAVEL WASHING AND SCREENING PLANT.

The materials from the gravel pit, brought by train, are dumped into the hopper at the right, whence they are elevated to the top of the washer by the belt conveyor, and dumped into another hopper. Thence they pass successively to the three conical screens, which revolve on inclined axes, as indicated, and separate the materials into sand, and two grades of gravel, fine and coarse. The finer screen is shown in Fig. 106. Jets of water wash the materials as they are screened. Chutes lead the several grades to the three bins marked in the diagram. From the bins other chutes lead to the concrete mixer, the materials passing through measuring boxes built into the chutes, by which they can be combined in proper proportions to form the concrete. The cement is wheeled to the mixer from the cement house in barrows.

Table 1

Test No.	Coarse Gravel* 1½" to 3"		Small Gravel 1¼" to 1½"		Total Volume		Ratio of mix to original volume (%)	% of voids in mix
	Cu. ft.	% of mix	Cu. ft.	% of mix	Before Mixing Cu. ft.	After Mixing Cu. ft.		
1	16	50.0	16	50.0	32	25.8	80.6	34.8
2	14	46.7	16	53.3	30	25.0	83.3	36.7
3	12	40.0	18	60.0	30	25.8	86.0	36.7
4	10	35.7	18	64.3	28	25.0	89.3	36.7

materials were then dumped into a square box, 4' 3" x 4' 4" x 2' deep and the volumes and the voids measured, the object being to secure the least voids and therefore approximately the densest mix, that could be obtained by varying the proportions of the two grades of gravel.

The volumes were obtained by leveling down the material in the box with a straight edge, and then measuring down to the top of the material at a number of points, from the lower edge of a straight edge laid across the top of the box. From these measures the volumes could be easily calculated.

The voids were measured by shoveling enough of the mixture into a metal can, of 2.5 cubic feet capacity, to fill it level full, and then pouring in water till the latter also should be level with the top of the can. The amount of water was measured as it was poured in, the measure being a 10-quart circular tin bucket, of uniform diameter to permit easy measuring of fractional quantities.

The results of four such tests are given in Table 1 above.

The figures indicate that the mix containing equal parts of the fine and the coarse gravel contains not only the least ratio of volume of the mix to original volume, but also the least percentage of voids, and it was determined to adopt it as the standard mix for the concrete. Using the large gravel in larger proportions than this was inadvisable owing to the excessive waste of fine gravel, due to the preponderance of the fine over the coarse in the pit, amounting as already indicated, to about 50%. To increase the proportion of coarse gravel in the mix beyond the 16-16 figure would involve such an expense for hauling, washing, screening, and wasting the large excess of small gravel that the loss would more than offset the gain due to economy in cement.

The ratio of the aggregates being thus determined, it remained to test the sand for the mortar. In these, the amount of moisture in the sand proved to be important, and was investigated with considerable care.

In preliminary tests to determine the voids in the sand, by filling a square box of one cubic foot capacity, and pouring in water, it was found that the sand settled, until, in some cases, when fully saturated, its volume was reduced by about 20 per cent. With damp sand, such a phenomenon was of course to be expected. The reduction in volume was found to be dependent also on the quantity of moisture in the sand as it came from the bin, the tests being made with the regular material as it came from the screening plant. When fresh from the screen, the sand was rather wet. Where it lay next the steam

* This column includes also over-size stone up to 6" in diameter.

pipes which had been introduced to keep it from freezing during the winter concreting, it would become quite dry. In intermediate positions, it would show intermediate percentages of saturation.

The sand was also tested by mixing it with the aggregates as in making concrete, the operation being carried out in the regular concrete mixing plant, as shown in Fig. 105. In these tests, varying quantities of moisture in the sand were found to give varying measures of mortar in the mix, for evident reasons. The damp sand hangs together in irregular masses, cohering by reason of the moisture which coats it, with irregular voids between the

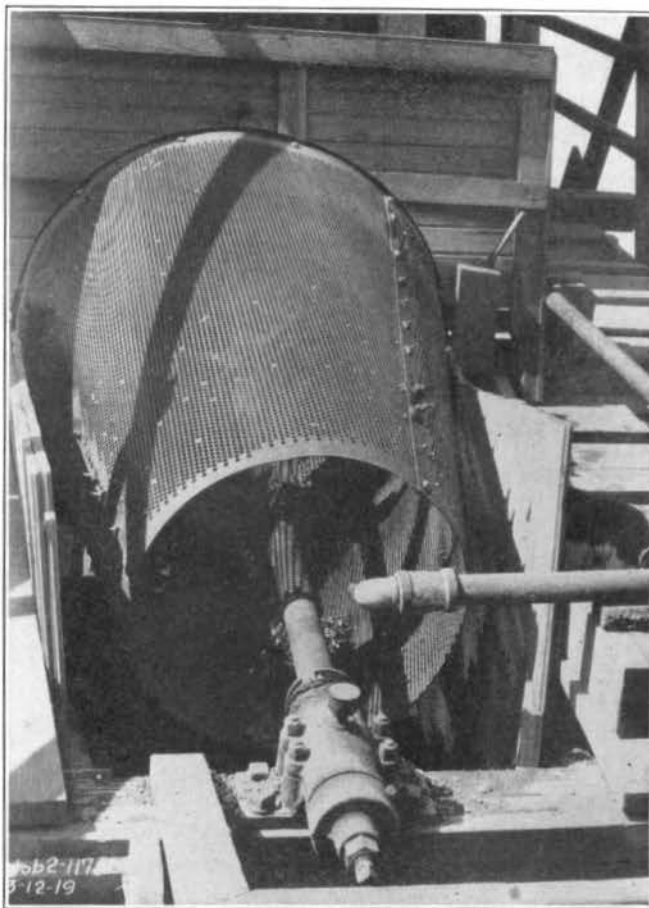


FIG. 106—THE SAND SCREEN.

This is the lower of the screens shown in Fig. 105. It revolves on the inclined shaft shown. The holes are ¾ inch in size. Pieces smaller than about ¼ inch drop through into the sand bin. Larger pieces slide and roll down the inside slope of the screen and on out of its mouth to the fine gravel bin. The pipe at the right jets water through a nozzle down and into the mouth of the screen, washing the materials and helping also to screen them. Taken March 12, 1919.

Table 2

No. of Test	Coarse Gravel Cu. ft.	Fine Gravel Cu. ft.	Sand Cu. ft.	Volume Mixed Cu. ft.	Remarks
5	16	16	14	34.4	
6	16	16	13	36.7	
7*	16	16	00	25.8	Check on Test No. 1
8	12	18	13	33.6	Sand Damp.
9	16	16	10	32.1	Sand More Damp
10	16	16	13	30.5	Sand Saturated.

masses. Dry sand does not cohere; neither does wet sand, both permitting the grains to take their natural pack. Thus with damp sands, the voids will vary with the degree of dampness, while with dry or wet sands, the voids remain, for a given sand, practically constant. Evidently, then, to get rid of the irregular proportion of mortar, due to the irregular quantity of moisture in the sand, it would be only necessary to saturate the sand with water during the charging into the measuring box.

Table 2, showing tests 5-10 inclusive, exhibits these facts.

Tests 5 and 6 show the effects of varying dampness of sand on the volume of the mix. In both, the same proportions of coarse and fine gravel were used—the adopted standard 16-16 mix. In test 5, 14 cubic feet of sand were added; in test 6, only 13 cubic feet. Yet the latter mix, containing one cubic foot less of the original ingredients, occupied, mixed, 2.3 cubic feet greater volume, due to its greater sponginess of texture, this in turn being due, undoubtedly, to its differing moisture content.

These two tests were made with sand taken at random as it came from the bin to the measuring box. Tests 8-10 show the effect of controlling the moisture, the amount of the latter being not meas-

Tests 8 and 9 is a trifle obscured by the differing ratios of sand and fine and coarse aggregates, as is also that between Tests 9 and 10; nevertheless, the general relations are quite clear. Between tests 8 and 10 the comparison is decisive, as the shrinking of damp sand when thoroughly wet would lead one to expect.

Constancy of mortar in the mix being thus assured by saturation of the sand, its amount was determined, not by making the sand equal to the voids in the mixed aggregates, with cement equal to voids in the sand, by any theoretical process, but practically, by careful observation of the behavior of the mixed concrete in the mixer and in the forms. With the irregular grading of the sand and of the fine gravel, previously noted, this was especially important.

For the sand, the grading is shown in Table 3, giving the result of a series of analyses with the Universal Sand Tester. This apparatus is equipped with five screens, the mesh, size of wire and size of opening for each being given in the table. The figures in each test show the per cent of the total material passing the various screens.

The figures show the great variability in the grading; also the occurrence in the gravel pit of pockets

Table 3

Screen No.	6	10	20	35	65
Diameter of wire.....	.036	.035	.0172	.0122	.0072
Size of opening.....	.131	.065	.0328	.0164	.0082
Test No. 1.....	90%	78%	63%	22%	2%
Test No. 2.....	85 "	72 "	66 "	23 "	3 "
Test No. 3.....	81 "	67 "	56 "	23 "	2 "
Test No. 4.....	74 "	58 "	34 "	10 "	3 "
Test No. 5.....	68 "	50 "	31 "	7 "	1 "
Test No. 6.....	55 "	26 "	14 "	7 "	2 "
Test No. 7.....	59 "	36 "	20 "	8 "	2 "
Test No. 8.....	67 "	42 "	21 "	3 "	1 "
Test No. 9.....	73 "	48 "	27 "	5 "	1 "
Test No. 10.....	71 "	41 "	15 "	7.5%	1 "
Test No. 11.....	71 "	40 "	22 "	5%	1 "
Test No. 12.....	75 "	49 "	33 "	10 "	1 "
Test No. 13.....	77 "	58 "	28 "	12 "	1 "

ured but roughly estimated, the sand in No. 8 being called "damp," in number 9, "more damp," and in number 10, "saturated." The last contained all the water it would hold by capillarity. These tests show successively diminishing volumes in the mixed material with the increasing moisture in the sand, indicating thus a closer and closer pack of the mix and a correspondingly lesser and lesser quantity of required cement for the voids. Comparison between

* Test 7 was simply a repetition of Test 1 in Table 1, to check the voids in the 16-16 gravel mix. It happened to check precisely.

(as in tests 5-11 inclusive) of "buckshot sand," i. e., sand showing preponderance of the larger grains. The same pockets are likely to show a corresponding preponderance, in the fine aggregate, of "pea gravel," and in both cases the materials give trouble at once in the mixer and in the forms. The "life" goes out of the mix. In the form it "piles up like a heap of rocks," and is difficult to shovel or tramp into place. In the mixer it sulks and hangs, with corresponding loss of time in getting out the batch.

The reason is the same, whether the excess be of buckshot sand or pea gravel, and may be easiest

grasped by taking the latter case, and supposing the fine gravel to be all of pea size. Then the voids in the coarse gravel would still be filled by the pea gravel, since the measured quantities remain the same; but the voids in the pea gravel, being uniform, would be greater than for properly graded fine gravel, for reasons given in the article on Proportioning Concrete in the Bulletin for January, 1919; and the mortar, being adjusted to the properly graded material, would fail to fill the voids in the pea gravel. Thus the mortar, which in working acts as "grease" to the gravel, both in the mixer and in the forms, would fail in that function, with the resulting difficulties noted above.

These troubles are mended, when not too great, by getting rid of the excess of the buckshot sand and pea gravel. The excess buckshot sand is carried over into the gravel bin. This is accomplished by diminishing the force of the jet of water (see Fig. 106), which shoots in at the lower end of the sand screen. This jet drives back the fine gravel as it slides down the slope of the revolving screen, and gives the sand time to find the holes and drop through them into the sand bin. By diminishing the force of the jet, much of the larger sand will fail to find a hole and will thus slide on into the fine gravel bin.

Here it is got rid of, as well as the pea gravel which accompanies it, by so arranging the chute that the materials drop onto a "buck-sand" screen, set up slantwise, just as in ordinary screening by hand. The sand and pea gravel drop through next the outer wall of the bin and are carried into a car on the gravel track by a chute. The coarser sizes slide down the buck-sand screen to the side of the bin next the mixer, whence they are drawn into the measuring box for fine aggregate. The obnoxious materials are wasted.

When the quantity of these materials involves too expensive a waste, the dragline excavator in the gravel pit shifts the digging, and attacks a fresh spot where the material shows a better grading. The beds of bad material usually occur at the lower levels, so that by shifting to a higher stratum, the difficulty can be cured.

Part of the cost of wasting the excess fine gravel is due to the expense of an attendant at the waste chute, and the use of cars and locomotive. It is proposed to get rid of this by reaming out the holes in the lower 12 to 18 inches of the revolving sand screen, to a larger ($\frac{1}{2}$ ") size. The buckshot sand and pea gravel will then be largely drawn off through these holes, and led to the gravity chute which carries the waste water, used in screening,

back to the river.

The variable and somewhat unfavorable grading of the fine gravel available makes it necessary to use a somewhat larger proportion of sand in the mix. The voids in the 16-16 mix of aggregate are about 9 cubic feet. With this mix it is necessary to use 13 cubic feet of sand to secure a smooth working concrete, the cement being 4 cubic feet. This makes the mix a 1 : 3.25 : 6.4 concrete. Enough water is added to give the mixture the consistency of a medium stiff porridge. The mix conforms to the well-known practical rule of employing the mortar giving most economically the necessary strength—which means in practice using the least cement which will give the strength—and then "feeding" it all the aggregate it will bear and at the same time work without undue difficulty in the forms.

In this connection the saturation of the sand before charging it into the mixer was found decidedly advantageous. It not only insured uniformity in the charge of sand, already referred to, but it aided the speed and smoothness of the mix, permitting the charge to flow easily into the drum of the mixer, and the materials to readily mingle. A measured amount of water was run into the measuring box with each sand charge. Wetting the gravel aggregates by playing a hose on them just before they entered the measuring box, helped the process. The final adjustment of the water in the mix was made by jetting it into the mixer through a nozzle till the desired consistency, judged by eye, was reached. The effect of the preliminary saturation of the sand on the speed of the mix was marked. It also helped the mix by preventing the newly charged materials from hanging and riding up on the rising side of the mixer and spilling out of the hole at the charging end, which if merely damp they would do. In addition to preventing the loss of materials, this increased the size of the batch, and speeded up the process thus in another way. In placing 3,000 cubic yards of concrete, measured in the forms, the 1-yard Smith mixer averaged 1.2 cubic yards to the batch.

Repeated attempts to make use of the excess of the fine aggregate, by running it without admixture of the coarse, after the latter had been used up in the regular combination, proved to be uneconomical, requiring so great an addition of cement to the mix to make the concrete workable in the forms, that the saving in fine aggregate was more than counterbalanced by the cost of the added cement.

The work at Taylorsville is under the general direction of O. N. Floyd, Division Engineer, H. L. Freund, Assistant Division Engineer, and H. M. Sherwood, Superintendent of Construction.

Concreting Plant for Robert Boulevard Wall, Dayton

Plant of Stationary Type. Materials Delivered to Bins and Mixer Through Elevated Hoppers, and to Forms by Concrete Cars on 3-Foot Gage Track.

Between Third and Fifth Streets, in Dayton, the necessities of enlarged capacity and improved alignment of the river led to an unavoidable cutting in upon Robert Boulevard and the adjacent valuable property along the east bank. In order to reduce this to the lowest limits, it was advisable to substitute a concrete wall for the usual earth levee necessary to guard against overflow in flood seasons; thus saving the space occupied by the long

land slope of the levee. The wall will extend from the east abutment of the Fifth Street Bridge to the east abutment of the Third Street Bridge, a total distance of 1036.4 feet. (See map, Fig. 107). The total height is 25 feet; the base thickness or width of footing, 14 feet; and the thickness at the top, 12 inches. The wall is being built in 16-foot sections, separated by vertical joints cutting through the entire wall, both neat work and footing, with a layer

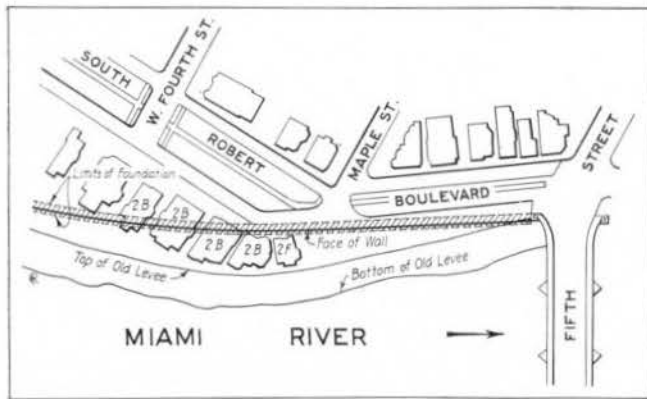


FIG. 107—MAP OF ROBERT BOULEVARD WALL.

of asphalt between the sections. The work will require for completion some 4500 cubic yards of concrete. The design is of the semi-reinforced type, as giving maximum economy of construction, and is shown in Fig. 110, to the caption of which the reader is referred for explanation of the chief features.

To provide the necessary concrete for such a wall the engineers had choice of a mixing plant of either the stationary or the movable type. The latter would follow the wall as it was built, chuting the concrete directly into the forms. The former would chute the concrete into wagons or dump cars, which would haul the mixed material to the place where it would be used. In case of the movable type, the materials to be mixed to make the concrete would have to follow the moving plant, the delivery in this case being by motor trucks. Owing to the inaccessibility of the moving plant in the crowded locality, in certain places, and also to eliminate the handling of the material at the mixer by hand, the stationary type of plant was adopted. It is shown in Fig. 100. The arrangements where the wall is under construction are shown in Fig. 108, the mixed materials being transported to this point from the mixer by dump cars, running on a narrow gage track. This figure gives the plan and elevation of the whole plant as it was at the beginning of the work.

The excavation for the wall is being carried to an average depth of about 20 feet, the bottom width being 14 feet. The excavation is made with one of the timber stiff-leg derricks with 62 foot steel boom (described in the Bulletin

for December, 1919, in connection with the Ohio Electric railway grading). It has a 3-drum steam hoisting engine, is equipped with both dragline and clam shell buckets of one-yard capacity, and runs on skids and rollers. Excavation being inexpensive with this machine, little sheet piling is being used to enclose the excavation for the wall, the sides being carried up in earth at about a $\frac{1}{2}$ -to-1 slope, making the top width of the opening about 35 feet. In some places, where the trench runs close to buildings, sheet piling will also have to be used.

The general plan of the forms is indicated in Fig. 110. The lower form, for the footing, is not shown, being of the ordinary built-in-place type. The wall forms, as shown, are movable sectional forms, the two faces held apart by spreaders and clamped together by bolts and nuts. They are in 16-foot lengths, corresponding to the sections in the wall, and are swung forward from section to section by Derrick No. 2, which is a twin machine, practically, to Derrick No. 1, already described. These wall forms are divided horizontally into two parts, permitting their adaptation to two slightly different proportions of the wall used in different localities; and permitting also an easier taking down and setting up of the sections, the latter, 16' by about 20' in size, being rather bulky without division into pieces.

Derrick No. 2, besides handling the forms, does such backfilling behind the finished wall footing as is necessary to secure the earth under the narrow gage concreting track, the steep slope of the excavation, under thaw, sloughing off somewhat in places. Most of the back fill will be done more cheaply by the big dragline in the course of the

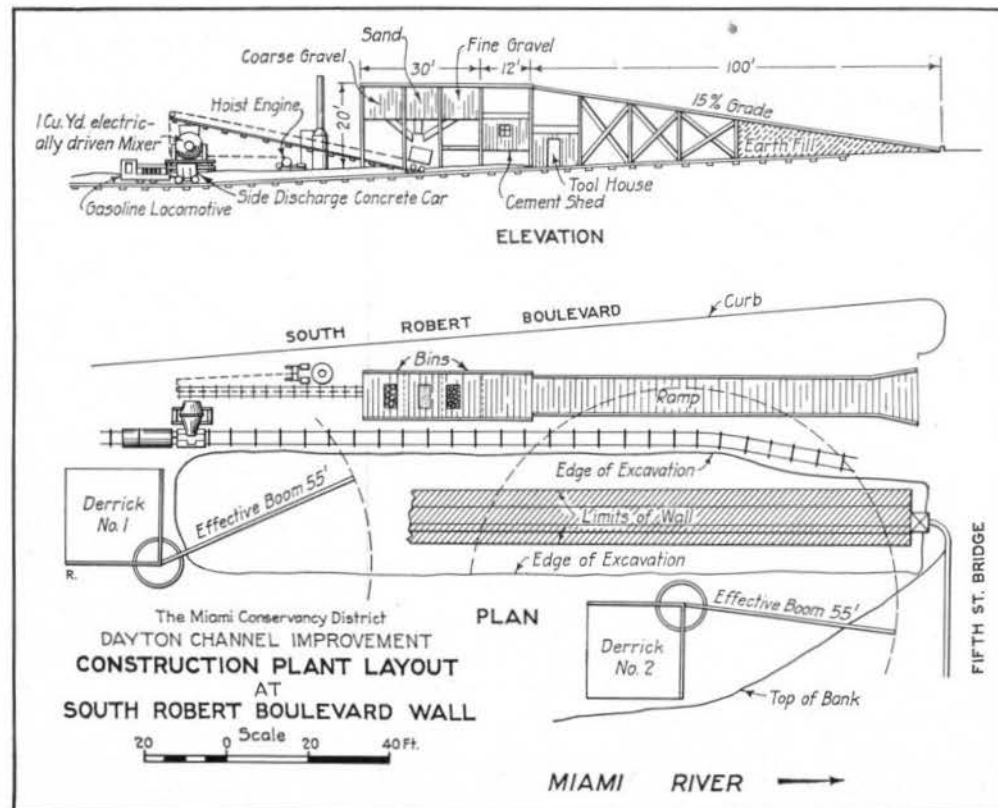


FIG. 108—CONSTRUCTION PLANT LAYOUT AT ROBERT BOULEVARD WALL.

regular river channel improvement. Derrick No. 2 also hoists and dumps concrete cars, which in case of the upper forms cannot chute the material directly into place.

The sand and gravel for the concrete are obtained from the bed of the river and are washed, screened and sorted in a plant practically identical with that shown in Fig. 105. From this plant, situated on the river bank at the mouth of Wolf Creek, the prepared materials are hauled in 5-ton motor-dump trucks to the mixing plant at the work, near the east end of the Fifth Street bridge, where they are dumped into hoppers at the top of an incline, leading to bins for the sand and the aggregates. The sand runs from $\frac{1}{4}$ inch down; the fine gravel from $\frac{1}{4}$ to $1\frac{1}{2}$ inch; and the coarse gravel from $1\frac{1}{2}$ inch to 3 inch. The bins hold about 15 cubic yards each.

From the bins the materials are drawn through chutes into a bottom-dump car running on a track built at 15° incline, which leads to a platform over the mixer. Between the chutes and the car, measuring boxes are interposed, which permit the proper proportioning of the material. These proportions are 4 sacks cement to 9.6 cubic feet of sand, to 10 cubic feet each of the fine and the coarse gravel. This gives a 1 : 2.4 : 5 concrete.

The car is hauled up the incline by a single drum hoist engine, and dumps at the top into a hopper



FIG. 109—HOUSES ON ROBERT BOULEVARD, WRECKED TO BUILD WALL.

These are the houses marked "2B" and "2F" in Fig. 107, the first house above being the "2F" house, a frame structure, the others being of brick. They were all built on made ground, part of it levee, and encroached on the natural border of the river, necessitating their removal. The wall in Fig. 100 runs just in front of the first two houses, (as seen here,) and through the sites of the next three. The wall takes the place of a levee, and is used as requiring less space, thus leaving Robert Boulevard as wide as possible. Its top is about on a level with the middle of the upper sash in the first story windows.

which holds one complete batch. This hopper is kept filled and ready at all times. From the hopper the batch is drawn into a Smith one-yard mixer, driven by a $7\frac{1}{2}$ H. P. alternating current motor, and given a one-minute mix. From the mixer it is discharged into concrete cars running on a 3-foot gage light railway leading alongside the wall excavation, whence it is discharged into the concrete forms. The cars are drawn by a 3-ton Plymouth gasoline dinkey.

The concrete cars are of two types. One is a side dump car, discharging its materials into the form for the footing through a sloping chute. Materials for the upper part of the wall cannot be thus chuted, the wall top being on a level above that of the concrete track. In this case a bottom dump bucket of special form is used, riding on a small platform car, from which it is lifted by Derrick No. 2 and dumped wherever wanted. Both types are of one cubic yard capacity.

Most of the wall built to date has been poured in freezing weather. To meet this condition, the bins are warmed with steam pipes, two in each compartment, placed just above the bottom discharge gates. The water used in the mix is also heated, in a wooden tank, by means of a steam coil. The boiler supplying steam for these pipes also feeds the hoist engine which pulls the cars of material up the inclined railway to the mixer. The concrete, by the means described, has been placed in the forms at a temperature not below 50 degrees F. in the coldest weather. After being poured it has been protected by covering the entire form with tarpaulin, under which salamanders charged with coke are kept burning. With these precautions, no concrete has been frozen.

The design of this plant is due to Leslie Wiley, Superintendent of Construction on the District's railway work. The Dayton channel work is under the general direction of C. A. Bock, Division Engineer, E. L. Chandler, Assistant Division Engineer, and H. A. Hanson, Superintendent of Construction.

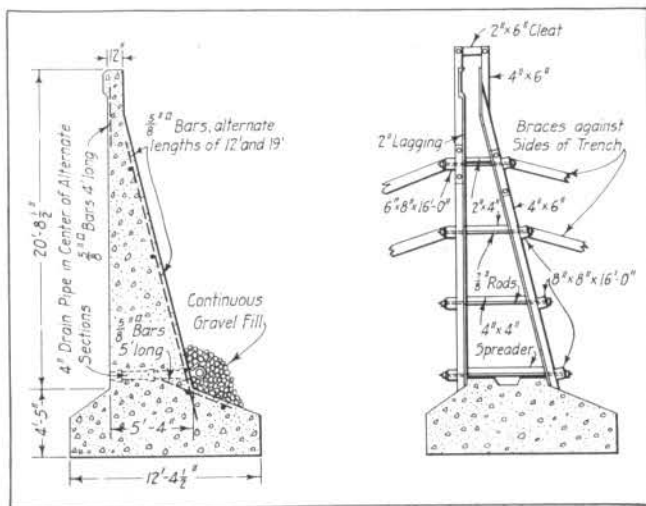


FIG. 110—SECTIONS OF WALL AND FORMS FOR CONCRETE.

The base is $12' 4\frac{1}{2}''$ wide and the total wall height $25' 1\frac{1}{2}''$. Base and wall above are built separately, keying with each other as shown at the right. The same mix of concrete is used in both. The design is of the semi-reinforced type, as being most economical.

THE MIAMI CONSERVANCY BULLETIN SUPPLEMENT "The News Letter"

To Promote the Conservancy Spirit on the Work

MARCH 1920

OF GENERAL INTEREST

Food and the Cost of Living

At Mr. Morgan's suggestion, we are printing some facts, taken from "How to Live," a journal of health and hygiene, which certainly ought in these days to interest every intelligent person who eats and has to pay for food. They throw light on two questions—are you suffering partial starvation, while thinking yourself well fed? and secondly, are you paying for your food—(you probably are)—considerably more than you need to?

As regards the latter, it is pointed out that the Life Extension Institute of New York, some time since, demonstrated that it could feed a dozen husky New York policemen a proper ration at a cost of twenty-five cents a day per man, and could do it today (with higher prices) at a

This is "old stuff." But the table, at the present prices of food, is not old stuff. It is the point of the story, practically applied, and near enough up to date to be worth inspecting and cogitating. It shows a proper ration, at least cost at the time it was made. If you are up on "proteids," "carbo-hydrates," and other etcetera highbrow "dope," you may be able, by studying your market and grocery bills, to go the table one or two better. If you can, go to it. If you can't, go to the table.

The most striking thing about the table is the amount of milk indicated—21 quarts in seven days—3 quarts per day—at 16 cents per quart, totalling \$3.36, by far the largest single item in the list. The article indeed makes a strong point of the healthfulness of milk,—even at 16 cents per quart. It emphasizes milk, fruit and green vegetables as "particularly healthful components" in our food, and

A Proper Food Supply for a Family of Five for a Week

Kind of Food	Amount Lbs.	Cost		Percentage of Total Cost of Food	
		Dec., 1918	Aug., 1919	Dec., 1918	Aug., 1919
Meats and fish.....	6¼	\$ 1.49	\$ 1.31	12.1	10.9
Eggs, ¾ dozen.....	(15 oz.)	.40	.30	3.2	2.5
Milk (21 quarts).....	46	3.36	3.08	27.4	25.7
Cheese	1	.40	.43	3.2	3.5
Fats	3½	1.26	1.26	10.2	10.5
Sugar	4	.40	.44	3.2	3.3
Grain products (bread, cereals, etc.).....	20	1.88	1.85	15.3	15.4
Vegetables	23	1.50	1.65	12.2	13.8
Fruit	8¾	1.30	1.45	10.2	12.1
Nuts (peanut butter).....	½	.17	.14	1.3	1.2
Coffee	¼	.08	.08	0.7	0.7
Total Cost.....		\$12.24	\$11.99		

cost of around 35 cents. The following table, giving figures for December, 1918, and for August, 1919, for a family of five, on a proper ration, tells in detail how the trick can be turned.

The total cost for a week, \$11.99 for August, 1919, divided by 35, (seven days' food for five people,) gives the cost per day per person—a trifle under 35 cents. Are you doing as well? If not, why not?

As to starvation, it is pointed out that people die of it in the midst of apparent plenty, and never discover what ailed them. Pellagra, that "dread disease" of the South, is a starvation disease of this peculiar kind; starvation for the lack of certain elements in the foods, although of these foods more quantity may be provided than can be eaten. It is a condition due not so much to poverty as to ignorance. Aside from pellagra, few people realize how possible it is for the children even of the rich and the well-to-do to suffer from lack of "fuel food," due to the ignorance of their parents. Children take to candy by a true instinct, because it supplies "fuel." Sugar, fat, potato, rice and white bread are all fuel foods. Sugar is all fuel; that is, is all burned up directly to supply people with "pep" or nervous energy. Lean meat, on the contrary, is built up into muscle. One supplies steam, the other rebuilds the human engine which uses the steam. Both are needed for a proper ration. Lacking either, you may "starve," in the sense above described.

feels it cannot urge them too strongly as safeguards to a proper diet. Incidentally, as regards pellagra (incidental, perhaps to us, but not to the people of the South,) it quotes a Committee of the American Public Health Association, of high authority, as reporting, after an investigation, that "an increased production and consumption of milk would seem to be the most important single measure for the eradication of pellagra in the Southern States."

GERMANTOWN Birthday Dinner Parties

Mrs. A. L. Pauls entertained with a six o'clock dinner party in honor of Miss Sadie McDonald. The table was artistically decorated with a beautiful birthday cake in the center. A delicious dinner was served.

Mrs. McGinnis surprised her husband with a delightful dinner party on his birthday.

All Extend Sympathy

"Stub" Graham, our popular club house boy, sure has the sympathy of all who see him. Many suggest that he have his upper lip operated on by a tonsorial surgeon for the growth started there.

Was He Jobbed?

The boys told C. O. Shively recently to short cut across the dam over the ice on the pool. He tried it and broke in up to his neck. He is wondering now if he was "jobbed."

THE MIAMI CONSERVANCY BULLETIN

A dance was given February 14th by members of the camp and was greatly enjoyed by everyone present. We were glad to welcome quite a number of visitors from Germantown.

Several of the members of our camp have been on the sick list this month.

Miss Mary Somers is visiting relatives in camp, Mr. and Mrs. Somers.

Mr. and Mrs. Pilcher and son Harold are guests of Mr. and Mrs. Wehrly.

Why does Mr. Albert always make Germantown on Friday?

Mr. Christ Foehr and wife are spending a few days in Cincinnati with home folks, so he will not be here to pull his "famous get away" at the next party. Ask him about it.

The One Way Out

P. W. McGinnis suggests to his father how he can keep from paying 50c a meal at the Mess Hall. "Get married and board at home."

ENGLEWOOD

Ladies' Club Revived

The ladies in camp are busying themselves with social pursuits. For some time the Ladies' Club has been rather inactive, but now, rest assured, they are making up for lost time. It seems the series of events started with a surprise party on Mrs. A. L. Wald in honor of her birthday, Jan. 27. This was followed in close succession by parties at the homes of the Mrs. Mitchell, Williams, Spaid and Mulheron, with several other gatherings at Community Hall. One of the attractions at each affair has been a delicious luncheon served by the hostess.



Slim goes hunting - bees and flying squirrels.

Squirrels and Honey

Slim Van Alst has decided to open up a menagerie; in fact, he already has a family of flying squirrels on exhibition which he captured while cutting timber. The same tree housing the squirrels also contained a large amount of honey, which latter of course Slim is looking after.

Our Storekeeper Leaves His Post at Englewood

Mr. T. L. Mitchell, our esteemed and prosperous storekeeper, no longer distributes groceries to his friends at Riverside. It has been a known fact that besides being able to wield a register crank and handle the many details with which a storekeeper comes in contact, Mitchell also possessed a good bit of information along agricultural lines. He will soon have an opportunity to test these latter qualifications on a farm in southern Ohio. Mitchell tells us there are hundreds of chickens on the place, in fact a complete barnyard menagerie. He is not only taking over the farm, but also all live stock and farming implements.

All of Mitchell's friends, which means the entire population of Englewood camp, are at this writing planning on a farewell jubilee to be held in Community Hall, Feb. 28. We will then, individually and collectively, extend to Mr. and Mrs. Mitchell and daughter Capitola our best wishes for success and happiness in their new home.

Advertising

Silently she wound her way through the camp streets at 4:30 a. m. and disappeared in the darkness on the road to Englewood. None save the milkman and police saw her as she halted on the square in the little town above. Peering through the darkness disclosed nothing to her so she hastily fulfilled her mission by tacking a cardboard sign on a corner pole. Facing toward camp she made the trip in record time, but to no avail, as the dawn overtook her and all eyes were fixed on Mrs. Alpers as she returned to camp. By way of explanation she admitted having gone to "town" in order to post a sign and not wishing to be conspicuous on Englewood's busiest (?) corner decided that 4:30 a. m. would be her "zero hour."

All of Englewood Rejoices

The general and appreciable increase in wage and salary has certainly imbued the spirit of good will and gratefulness in the men employed on the Englewood Dam. Practically all on the payroll were affected both financially and psychologically.

C. J. Spaid, New Storekeeper

Mr. Spaid has taken over the General Store, coming from the Mess Hall, where he has served as first cook for the past year. Spady promises "service at all hours."

LOCKINGTON

Mr. and Mrs. R. E. Schlotterbeck are the proud parents of a baby girl, born January 31. The little girl has been named Onah May.

Mrs. Frank Watson has returned to her home and is rapidly recovering from an operation performed several weeks ago.

Mr. and Mrs. Lester Agenbroad are rejoicing over the arrival of a baby boy, Lawrence Donald, at their home on February 12.

To date this camp has been free from the epidemic of influenza and pneumonia, and it is hoped that Mr. Flu will continue to ignore us on his annual visits.

During the month Mr. and Mrs. Axel Person of Dayton paid a visit to their old neighbors in the camp.

TAYLORSVILLE

Flirting With the Undertaker

W. M. McClellan, of the master mechanic's crew, had a very narrow escape from death in a peculiar accident about 1 a. m., Feb. 16. With some other men, he was thawing out some pipes connected with the large unwatering pump in the rock cut, by burning waste saturated with kerosene. By mistake, Mac picked up a 2-gallon can of gasoline, kept for use in a small gasoline pump. The gasoline exploded and he was immediately enveloped in flames from head to foot. As it happened, he was standing near the sump at the time and he immediately leaped into the icy water, thus extinguishing the flames. It was a tough remedy, with the thermometer playing tag with the zero mark, but Mac says that ice-covered pool looked good to him. His presence of mind permitted him to escape with a rather badly burned hand and minor burns about the face.

Can You Beat It?

To celebrate the honor of being appointed one-half local editor on the News Letter, Ben H. Petty is letting them run wild on his upper lip—wild and red. It is a feeble effort, but nevertheless B. H. P. says he will challenge anyone in the District to beat it, the points considered to include age of growth, quality, quantity and brilliancy. Bailey please take notice.

F. E. Floyd, the other half-editor, refuses to enter the contest, his alibi being that he is still eligible for matrimony.

How Did It Happen?

We were greatly surprised and highly honored to be favored with the premier showing of the new N. C. R. Flood Prevention film in Community Hall on the night of February 10. The pictures were taken by an N. C. R. operator and show various phases of flood prevention work throughout the valley.

We had as patrons at the premier showing, Messrs. Smalley, Teeple and Moyer from the Dayton office. The Bulletin editor favored us with an introductory speech, explaining the nature of the film and its importance—a "bald" presentation of facts regarding its production. This being the first time the film had ever been shown to any audience, we feel that the "Columbia" has nothing on us.

THE MIAMI CONSERVANCY BULLETIN

EDITORIAL

Board of Editors

Germantown	Miss Julia Darnell
Englewood	Albert L. Wald, George Rodgers
Lockington	C. H. Shea
Taylorville	Ben H. Petty, F. E. Floyd
Huffman	Mrs. C. C. Chambers
Hamilton	R. B. McWhorter
The Woman's Club, Dayton, Ohio	Miss Mayme McGraw
Dayton Warehouse	J. T. Hall

We are glad to welcome a new fellow-quill-driver at Englewood, Mr. George Rodgers, of the field party, and a co-operative student at Cincinnati University. Watch his stuff in the April number.

Our Junior Editors

We are turning over our editorial column this month to the Juniors. Do you notice the improvement over our dry senior stuff? Unfortunately, we have only room for two selections. Taylorville and Englewood get their turn next.

Huffman

The Dairy Near Our Camp

About a quarter of a mile from our camp, situated on a hill, is the modern dairy from which we get our milk.

This dairy has twenty stalls and five box stalls. The walls are plastered and the floor is of cement. There are two other rooms, one in which the feed is ground by an electric food grinder, and the other where they cool and separate the milk. There is also an upper room where the feed is kept. It is equipped with electricity, and an automatic drinking fountain for each cow.

There is a silo connected with the barn.

As all the cows are registered Jerseys, the milk is very rich, and the farmer has delivered the milk regularly, ever since the camp has been here.

Geneva Sayler, Eighth Grade.

Germantown

Germantown Dam

The dam is 110 feet high, 25 feet top width, 700 feet average bottom width, 1250 feet top length.

It contains 830,000 cubic yards of material. The dam was started in March 1918.

The first year's work was the making of the conduits for carrying the water through the dam. The reservoir covers 3,000 acres when full.

The dam is expected to be finished sometime around the Christmas of 1920. The hydraulic fill was started in July 1919.

In time of a flood the reservoir fills, and allows just as much water to pass through the conduits as the stream can take care of below the dam.

Martha Hancock, Seventh Grade.

Our Answer

No, Englewood, we don't want your nine baseball players to boost (?) our team, because we don't care to finance such expensive stars. After having witnessed the "pay-off" in the dressing room following the game last July 4th, we refuse to be interested in their acquisition.

Really, Englewood, we are sorry we "trimmed" you on your own grounds before the guests from all over the District at the big celebration last year, thus wet-blanketing the balance of the program for you. But we tried to make amends later by permitting you to win from us our own backyard. So let's forget it.

Savings Accounts

Mr. Whalen and three or four assistants from the City Trust and Savings Bank of Dayton were here Saturday noon, Feb. 20th, inaugurating a plan whereby Taylorville employees can make weekly deposits in said bank. A representative of the bank will be here at every pay-off to receive deposits, thus relieving the workmen of the trip into Dayton. About 25 accounts were opened and this number will no doubt be increased appreciably in the future. It is a splendid idea, fathered by Dr. Smalley, affording a handy medium for those who are in the habit of saving and a striking inducement for others to get into the game.

HAMILTON

Billy Eiffert, son of Division Engineer Eiffert, is recovering from measles.

Mrs. Charles LaLonde, wife of Master Mechanic LaLonde, has been ill with "flu" several days this month.

Oscar Ross, timekeeper, has returned to duty after a week's vacation. While away he spent several days in Cincinnati and took the higher degrees of Masonry, including the 32nd.

Virgil Waer, son of Timekeeper Harry Waer, has recovered from an attack of influenza.

Grant Powers, pit foreman at the electric dragline, has returned to work after having been ill a week.

Sante Dicola is the operator of the new Marion dragline now working on the south spoil bank.

Superintendent W. T. Rains has moved from 617 Dayton street to North Third street, near Buckeye.

Mrs. R. H. Tweedy of Courtland, Alabama, has been with her daughter, Mrs. R. B. McWhorter, during the latter's recent illness with "flu." Mrs. McWhorter and son Robert are returning to Alabama with Mrs. Tweedy, March 2nd, for a short visit.

Mrs. Esther Davis, of Seneca Castle, N. Y., mother of Draftsman Frank E. Davis, is visiting Mr. and Mrs. Davis at their residence on Dayton avenue.

Dominick Rotono, oiler on the steam dragline, has returned to work after a visit to his home in Utica, N. Y.

Deaths

Mr. Griffin was called to his home at Troy, N. Y., on the 16th of February because of the serious illness of his aunt, who died a day or so later.

Mr. Schrader received a message telling of the death of his mother at Sayler Park, near Cincinnati, Saturday, February 28th.

Mr. Cheyne, operator on the electric dragline, was called to his home in Michigan recently because of the death of his uncle.

We extend our sympathy to all of these men.

HUFFMAN

Mr. and Mrs. Herbruck Entertain the Sunshine Club

Mr. and Mrs. R. A. Herbruck and family extended their gracious hospitality to the members of the Sunshine Club on Thursday evening, February 12, at their beautiful home on the Mays Road. The ladies enjoyed every minute of the evening, from the time they started on their hike to the Herbruck home until their return at 11 p. m. A short time was devoted to needlework and business, after which Mrs. Herbruck entertained the ladies with several contests for which clever prizes were given. Music and dainty refreshments concluded the pleasures of the evening.

The club has been scattering sunshine by sending flowers to the sick of the community.

Mrs. Clem Schirtzinger had the pleasure of a week's visit from her sister, Miss Rose Shafer, of Columbus, Ohio.

Mrs. Dye and Mrs. Hodge were hostesses to the Sunshine Club on February 25.

Dr. Sayler and family enjoyed a visit from his cousin and wife, Mr. and Mrs. Ohmer Etter of Imperial, Canada, on February 17 and 18.

Mr. and Mrs. W. B. Hodge and Mary Jane spent the week end of February 14 in Bellefontaine, Ohio.

We are glad to welcome Mr. and Mrs. Carpenter to the camp. They have taken the cottage vacated by the Nances.

It only took one day of warm weather to start the baseball fever at Huffman. The old bats and gloves have been brought out and the play looks like base hits and no errors. As soon as old winter gets one foot in the grave, we are off, and you had better watch Huffman this year.

Mrs. V. M. Chambers of Damascus, Ohio, spent two weeks in camp the first of the month, visiting with her sons, C. C. and B. V. Chambers and their families.

Mrs. Jack Cook and Jack, Jr., left recently for several weeks' visit with relatives and friends in Ithaca, N. Y.

Mrs. Bailey and Isabelle left February 26 for a short visit with Mrs. Bailey's parents in Greensburg, Ind.

Stork at His Old Tricks

The stork visited our camp again this month, leaving a fine boy with Mr. and Mrs. Kinnamon. His name is Jack and he was born February 18.

THE MIAMI CONSERVANCY BULLETIN

The Valentine Dance was quite a success. Everybody had recovered from the "flu" and was glad of a chance to be gay.

Mrs. Roy Hutzelman entertained several friends and relatives at a dinner Sunday, February 22, in honor of Mr. Hutzelman's birthday.

Several campites witnessed the "Bird of Paradise" at the Victory Theater, February 25.

DAYTON

To Major R. W. Schroeder

By Eldee

Up—up—he climbed, with eagle eye
Set on the "ceiling of the sky";
A grim man in an aeroplane
Alone—with no thought of the pain,
The agony that racked his soul—
Intent but on his cherished goal!

High in the polar atmosphere,
The raging, roaring tempests drear
Strove demon-like to beat him down!
He only answered with a frown,
Or set his teeth—and grimly laughed!—
While ever up he drove his craft.

The world has known brave men before,
Undaunted ones of ancient lore,
Who stolidly faced sternest trials
With countenances wreathed in smiles;
And heroes of more recent date,
Who trusted precious lives to fate.

But, Major Schroeder, here's to you!
You've dared the terrors of the "blue!"
No man, since Adam ate the spud
Has left so far this ball of mud!
The whole world doffs its lid to you—
You've won the record of the "blue!"

Arrival of Mary Elizabeth Woodward

Professor and Mrs. Woodward are rejoicing over a new daughter, answering to the above name, born on March 2. The young lady weighed seven and three-quarter pounds, at arrival, and took to her ambrosia, we understand, with unusual promptitude and vigor. Long may she flourish!

We note with deep regret the contretemps in headquarters drama, noted just below. Think of Madam De Graw as Little Eva! Is there no substitute for Sibley?

WOMAN'S CLUB

Demise of Drama

The resignation of Mr. Sibley makes impossible the presentation of that old but always popular drama, "Uncle Tom's Cabin," which was to have been given for the edification of the Conservancy employees under the direction of Messrs. Shine and Sibley. Mr. Shine feels unable to handle such a vast production without the aid of his valued assistant. This is a bitter disappointment to all parties concerned, for the production promised dazzling features, magnificent stage setting, and a cast which included those world renowned artists, Madam DeGraw, Marie Bruner, Celeste Van Horn, Mabelle Helmig, Julius Caesar Pease and Signor Everhardt. Horatio Makley, who was assigned the post of stage critic, is inconsolable at this lost opportunity to distinguish himself. Signor Everhardt, the warehouse artist, who kindly consented to act as Uncle Tom, looks as blue as if the bottom had dropped out of warehouse bowling, while Miss Helmig, who confidently expected to achieve undying fame in the role of Eliza crossing the ice, feels like falling in the river. To Miss Helmig especially we extend our sympathy, familiar as we are with her surpassing histrionic ability.

Laugh a little less at your neighbor's troubles and a little more at your own.

The Wise Old Owl

"A wise old owl lived in an oak. The more he heard the less he spoke. The less he spoke the more he heard. Can't we be like that wise old bird?"

Miss Mary Miller of the Taxation Department returned recently from Detroit, where she enjoyed a delightful visit

with friends. Miss Miller, while conceding the attractions of the brown-eyed boys of Detroit, nevertheless prefers the blue-eyed boys of Dayton.

Field Flourishing in Alliance

Eldee received a letter lately from Dorr E. Field, now of Alliance, Ohio, and recently of the Drafting Department. Mr. Field is evidently prospering. He came near allying himself with Henry Ford's famous organization at Detroit, but he and Henry couldn't get near enough together on price to make it pay to pull up again. He is in a fine little 6-room corner house, 15 minutes from the office, at \$30 per month. Suburbs of the New Jerusalem!—\$30 per month!—Six rooms! Two steps from town—think of it!

Shop, Warehouse and Garage

Chas. Eby is reported to have been seen on Main street the other day escorting a big, fat, colored lady, and doesn't deny it.

Dominico Marino—the Five Horse Power of the Shop. (Watsa Number.)

Cord Vandevender—The Ladies Man of the Shop. (Where does his money go?)

Frank Swift and his gang—The Flying Squadron of the Shop. (The Ford that never fails.)

Peggy Ames—The Phonograph of the Shop. (Air hammer has no effect.)

Mr. Tressler of the Garage states that he now has a real force of repair men. He never hears any complaints on repair jobs. Here they are:

Red Jordan.....	Ford Expert
Al. Noneman.....	Pierce-Arrow Expert
Frank Hoeffler.....	Dodge Expert
Rich Wovries.....	Skid Expert
Clingman.....	Battery Expert
Parrish.....	Trimmer
Scott.....	Chief Lubrication Man
Walsh.....	Night Overseer
Sheats.....	Day Overseer

Albert Jolly is reported to know more about the Osborn job than the Division Engineer.

We understand that Fred Woodalls' daughter won \$30.00 in a city contest for the best essay on "Army Enlistments."

Ask Johnson of the Warehouse what a Ruda-Bagas is.

We understand that Donley of the Electrical Department took a trip to Germantown after nuts. He found the trees well laden, but—well, he'll tell you the rest.

Conservancy Bowling League

Standing of the teams March 3, 1920

Teams	Won	Lost	Pct.
Rustlers	68	4	.945
Mekanix	43	29	.598
Purifics	34	38	.472
Railroads	31	35	.470
T Squares	23	46	.333
River Imps	11	52	.175

Mr. Everhardt advises that the Miami Conservancy District should enter at least three teams in the City Bowling Tournament. The representatives of these teams should be the best bowlers picked from all the teams in the M. C. D. league. The cost for entry is \$1.00 per man. Inasmuch as the management of the Royal Alleys has treated us very well during the season we should enter these teams as an appreciation to them as well as helping them in boosting Dayton in the coming State Tournament. Anyone who desires to enter on one of these teams, kindly get in touch with Mr. Everhardt. This also applies to anyone on the jobs who desires to enter in this tournament.

Praise the Board, O My Soul!

(With Apologies to Longfellow)

Tell us not in mournful phrases,
Life is but an empty dream;
They have passed around the "raises,"
Made us leap with joy,—and scream!

Life is real, life is earnest,
When the figure on our check
Changes but the least gol-durn'est
In an upward trend, by heck!

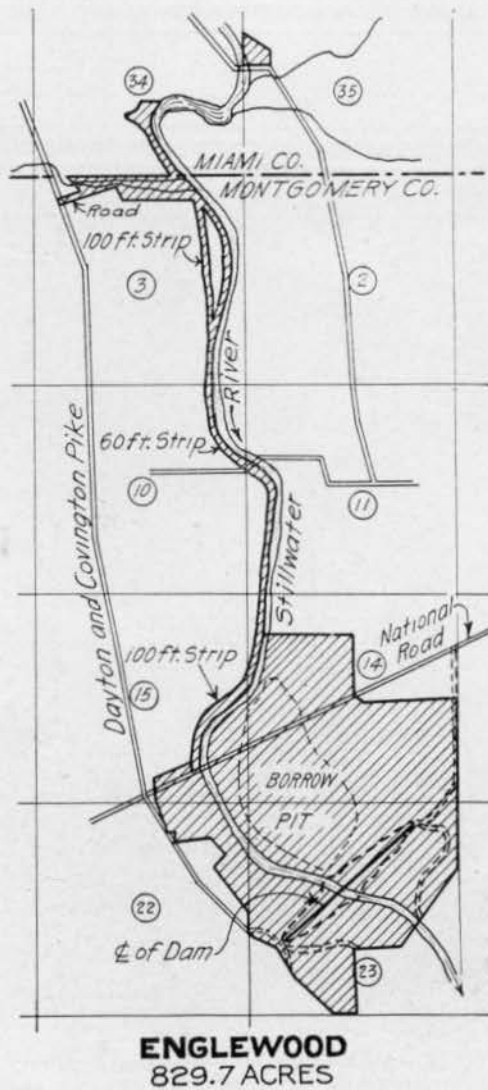
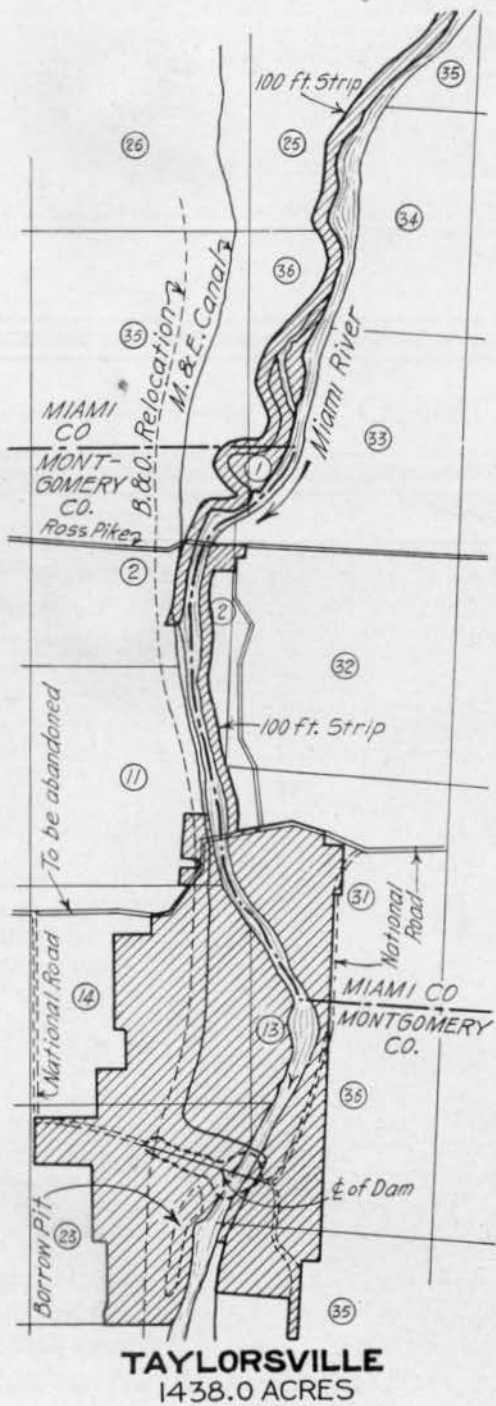
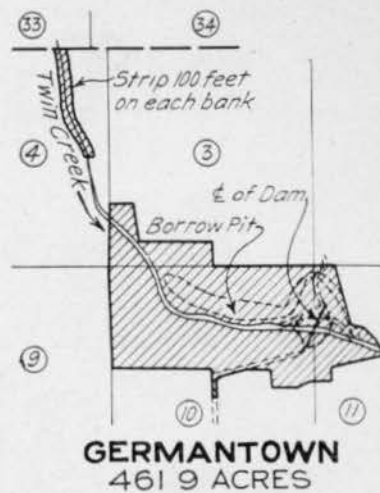
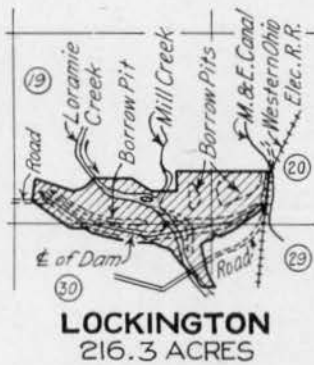
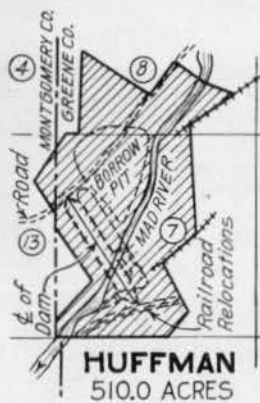
—Anon.

THE MIAMI CONSERVANCY BULLETIN

APRIL 1920



FIG. 111—5-INCH HYDRAULIC "GIANT" FOR LOCKINGTON, MARCH 26, 1920. SEE PAGE 136



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THE MIAMI CONSERVANCY BULLETIN

PUBLISHED BY THE MIAMI CONSERVANCY DISTRICT
DAYTON, OHIO

Volume 2

April 1920

Number 9

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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.

Work of Hydraulic Fill Resumed

Pumping operations for the work of the hydraulic fill has been resumed at all the dams except Taylorsville. The delay here is due to the necessity of waiting for the Baltimore and Ohio R. R. tracks to be moved to their new location, the hydraulic fill being now up to the level of the old line. It is hoped that within a month the pumping at Taylorsville also will be again in full swing. Huffman was the first job to get under way, the pumping there being begun on March 2, with both day and night shifts. At Lockington it was begun on the 15th, at Englewood on the 18th, and at Germantown on the 22nd. At Englewood the pumping is into the pool at the uncompleted east end of the dam, and is done from Sump No. 2. (See Fig. 103 in last Bulletin). The river section, carrying up the fill from the old bed of the Stillwater, will be begun soon. At Germantown the closure of the valley is already complete, and the embankment up to 1913 flood level. The fill here is likely to be completed by December of the present season. At Lockington also the same is probable. The fill at Lockington is now being pumped into the middle section of the embankment, next west of the outlet structure. The west end being already up to full elevation, leaves the east section the last to be done. At Huffman the pumping is into the section northwest of the diversion channel which was dug to carry Mad River while the outlet structure was being built, this channel being a few hundred feet northwest of the old bed. At Taylorsville the pumping will be into the section between the Miami River and the old B. and O. R. R. tracks. Consultation of the plans of the dams given in the Bulletin for July, 1919, will make the pumping program for the season, as given, quite clear.

Railway Construction Nearly Finished

The opening of the new season finds the work on the railway relocations in its last stages. The laying of the new rail on the steam roads—the Baltimore and Ohio, the Erie and the Big Four—has been finished. On the Ohio Electric it has been finished from Dayton to Fairfield. All the above has been done by Roberts Brothers of Chicago, the O. E. R. R. work being under the Walsh Construction Co., of Davenport, Iowa. Ballasting of the Baltimore and Ohio is complete except the final surfacing and lining, which was postponed until spring to avoid difficulties due to such work in freezing weather. Roberts Brothers are just beginning this final stage, and trains will probably be running on the new line within three weeks. Ballasting on the Big Four and Erie is under way and will be finished and the new lines turned over to these roads within three months. On the Ohio Electric the same is true as far north from Dayton as Fairfield. North of Fairfield the new track will be laid with rail taken up from the old line south of that point, there being enough of such rail in excellent condition for the purpose. Bridges on all the lines are practically finished except the new bridge for the Ohio Electric over Mad River. The contract for this has been let to The Brookville Bridge Co., of Brookville, Ohio, and the structure will be erected the coming season. This will be a Pratt truss of 150 foot span. The 3-hinged concrete arch carrying the Springfield Pike over the relocated railways at Huffman dam is complete except the hand rails. The approaches have been graded but not yet gravelled. This bridge is similar to the structure over the B. and O. R. R. at the Taylorsville dam, except that the former is a skew arch instead of a straight one.

Railway Bridges and Track Material to Be Sold

In connection with the above, attention is called to the advertisement on the back outside cover of this issue. The material there referred to is now in course of being removed from the old lines of the four railways which the District has been obliged to relocate, mentioned in the preceding editorial. The bridge structures have been in use from 5 to 15 years, and are still in excellent condition. The same may be said of the greater part of the used steel rails and other track material. The attention of city and county officials and of highway commissioners and engineers, as well as officials of steam and electric railways, is called to these materials. In the present era of high prices, they afford an unusual opportunity to obtain at moderate cost, and for early delivery, equipment which otherwise may prove difficult and expensive to get hold of.

The Conservancy Park System

The attention of the public is again called to the Conservancy Park System, referred to in the last issue, and of which a description is given in the following pages. The Board of Directors of the District has taken action to keep these lands in the public ownership, as permanent Conservancy property. This action was called for in carrying out the necessities of the flood prevention project, and such being the case, the public is to be congratulated that the lands can also be dedicated to public use and enjoyment as a park and playground, without derogation to their utility as an adjunct to the larger end. That the action of the Board will have the approval of the citizens of the state and valley, and more and more so as the years go on and the value of the parks becomes increasingly apparent, there is no reason to doubt.

Warning Against Use of Conservancy Dams for Water Power

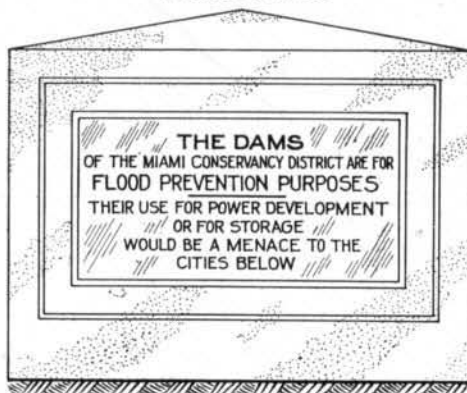


FIG. 113—MONUMENT FOR DAMS

We are breaking the regular routine of the editorial page by introducing the little cut shown above, for the purpose of once more emphasizing the fact already several times insisted upon in these columns, that the Conservancy dams have not been designed, and must never be used, for water power purposes. The cut is a reproduction of the design of the stone monument, with its description, to be erected at each of the dams, as a perpetual warning that the use of the dams for water power will constitute "a menace to the cities in the valley below." There has been in the past, and there still exists, a

tendency to a persistent misunderstanding of this matter by some of the people. The monuments referred to, it is hoped, will help to give reassurance on this point, as well as warning. They are of gray Vermont granite, from the famous quarries of Barre, in that state and are now in the Conservancy warehouse awaiting shipment to the several damsites.

Cut of Conservancy Parks

It perhaps needs explanation that the cut of the Conservancy parks shown on the inside of the front cover is not one map, but an assembling on the same page of five maps, one for each dam site, drawn to the same scale for purposes of comparison. The shaded areas are the park lands as reserved. The fact that certain tracts are larger than others simply means that the needs were more extensive in the larger areas, or that favorable extensions in some cases could be made at slight expense. The scale will be given by the sections, which in most cases are one mile square, each section being numbered, the number, where possible, being at the section center. The arrow indicates the north point. The borrow pits and the dam sites are indicated by dotted lines. Except at Lockington, the borrow pit area will be occupied after construction by a lake. A road will lead across the top of each dam, along its center line, connecting with other roads of the neighborhood. At Taylorsville the present location of the National Road across the Miami Valley will be abandoned, and a new location substituted crossing the dam, as indicated on the map.

An Interesting Construction Problem

An interesting construction problem confronted the Conservancy engineers at Hamilton in the carrying of the tail race of the new Ford-Son power plant tail race under the Baltimore and Ohio R. R. bridge. The latter is a four-arch stone structure, and the tail race is built of concrete, in two branches, one passing under each of the two center arches. The excavation for the tail race had to be carried 12 feet below the foundations of the bridge piers, and the problem was to carry on the excavation and the tail race construction without danger to the stability of the piers, the bridge meanwhile carrying the full main line railway traffic. This work will be described in detail in the next number of the Bulletin.

Recording Indicators

The Conservancy engineers have found it advisable to install a number of recording instruments on the District's electrical equipment, these instruments furnishing a continuous record of current and voltage used by various motors during the twenty-four hours. These have had an excellent effect in speeding up the work, promoting efficiency and preventing waste, in some cases returning the cost of the recording apparatus in a few weeks' use. The most interesting and significant feature has been their effect on the morale of the men. Between day and night gangs on the dredge pump outfits, for example, there is the universal and perfectly honest human tendency to "pass the buck." The recording ampere-meter, put on the witness stand, tells its unimpeachable tale as to which gang was "delivering the goods." Then the other gang, its pride stirred up, "gets busy" and boosts the yardage pumped. Particulars will be given later.

The Conservancy Parks

An Area of 3455.9 Acres Has Been Reserved, Including the Chain of Small Lakes Created by the Excavation for the Dams, Constituting a Beautiful, and for Ohio a Unique, Park System.

The Conservancy Park System, recently established by the board of directors, is a happy by-product of the flood prevention work. It is desirable for the District to retain ownership and control of certain lands adjoining the dams and of other strips of land along the rivers above the dams. This being the case, the use of these retained lands for a system of parks follows naturally. That these will be beautifully wooded areas, with lakes, rivers, hills, springs and brooks, is a pleasing bit of good fortune. For the present these areas will not be developed, but kept in their natural state as a recreation ground for the people of the Valley. The future can decide what further steps may be taken.

The cut on the inside cover page shows the system as proposed. It comprises five subdivisions, one for each of the retarding basins. The acreage reserved in each case is as follows:

Germantown	461.9 acres
Englewood	829.7 "
Lockington	216.3 "
Taylorsville	1438.0 "
Huffman	510.0 "

The most notable feature will be the lakes, the more so that this region has very few such bodies of

water. They occur in connection with the necessary excavation to obtain materials for the building of the dams, which are to be of earth. The total quantity necessary will run to more than 8,000,000 wagon loads. The depressions made by the excavation fill naturally with water, thus creating lakes. At Englewood, where the excavation amounts to 3,500,000 wagon loads, the lake will be three-quarters of a mile long. Its area will be above 100 acres, and it will have a shore line of six or seven miles. This lake will have a beautiful and interesting feature in the shape of what is virtually an island, of 15 to 20 acres extent, connecting with the mainland on the northeast by a peninsular strip, along which a roadway will be constructed, permitting visitors to drive directly to the island. This island, now a wooded mound in the valley bottom a little above the dam site, and on which the trees will be preserved, will be one of the finest features of the reservation.

At Huffman the lake will be about 30 acres in extent, and will also be the most attractive feature. At Germantown, it will be somewhat smaller, but beautifully located along the foot of a densely wooded hill. At Taylorsville and Lockington the



FIG. 114—CONSERVANCY PARK AT "PIG EYE CREEK"

This is about $3\frac{1}{2}$ miles above the Englewood Dam; a tract about 30 acres in extent, connected with the main park at the dam by a strip of riverside wood road. A fine park area, running from the Covington Pike to the Stillwater River, including bluff, hill slope and lowland, most of which is already wooded, with trees in great variety. Taken Feb. 20, 1920.



FIG. 115—CONSERVANCY PARK—STILLWATER RIVER BANK

This is at the northern extremity of the Englewood Park, about 2 miles above Union, and $4\frac{1}{2}$ miles above the dam. The riverside park drive just south of it is along a high wooded bluff, commanding a view over the valley for miles. Taken Feb. 20, 1920.

material for the dams is largely obtained from the valley slopes rather than the valley bottom, and on this account the bodies of water will be less conspicuous features.

At Englewood and Germantown the extent of the lakes will be increased by the building of low rock fills, blocking the stream just above the dam and creating artificial rapids. At Englewood this fill is being built by loading on cars the "oversize" rocks from the borrow pits, as they are screened out at the dredge pump inlet, and dumping them off the north side of the railway trestle into the river. The dams being built by the hydraulic fill method, these rocks cannot be used on the main dam embankment, because they are so large as to "stick in the throat" of the pump, and choke it. They must be got rid of somehow, and they are as cheaply dumped on the proposed rock fill as anywhere else. The effect of this fill will be to form a rapids or riffle, raising the water in the river about five feet above ordinary low water flow, thus making it run about bankful. The lake level will be raised by the same amount. This will cover up several marsh-like areas along the banks and shores, will enlarge the lake, widen the stream, and kill off mosquito-breeding pools by deepening them, all at practically no expense. The backwater effect of this artificial rapids will extend up the river about two miles. The methods and results at Germantown will be similar.

The retention of areas for considerable distances

*The reasons for this greater tree wealth of America as compared with Europe are interesting. Fossil remains of the pre-glacial epoch indicate that in the earlier time Europe was as rich in tree forms as our own continent. But when, for reasons not yet fully ascertained, the great northern ice cap began slowly spreading and sliding southward toward the warmer zones, it found on the two continents quite different conditions. In Europe the advancing ice sheet (hundreds and even thousands of feet in thickness) encountered mountain ranges in its path—the

upstream from the dam is desirable for the protection of the outlet structures from floating drift in times of flood. There will be concrete piers just above the outlets for this purpose, with floating log booms anchored by chains to the piers, but to make assurance doubly sure in this particular, and to prevent the accumulation of litter during a flood, it is deemed advisable to plant drift screens of willow, cottonwood, etc., along the banks and across the valley farther upstream. For these plantings the areas reserved are necessary. The officers of the District are in consultation with the heads of the Ohio State

Bureau of Forestry in reference to this project, as to the best varieties to plant, time and best manner of planting, etc. Willow, cottonwood, osage orange, sycamore and cypress are all under consideration. Several belts of these trees have been proposed, of different varieties, details regarding which will be given at a later date. How this all fits in with the park reservation project, in promoting both beauty and utility, will be evident.

The foregoing naturally leads to the consideration of the trees of the reservation. It is the wooded hillsides, with the lakes and the streams, which will give a variety and beauty to the landscape, such as no other district in Ohio can show, because no other district will have such a combination. Of the wealth of this region in trees, few who inhabit it have an adequate realization. The state of Ohio has 129 varieties of native trees. The Conservancy park reservation, (judging by the occurrence of trees in and about Dayton) has more than 80 distinct species. By contrast, consider the island of Great Britain, which has in all only 29 native species growing wild. France has only 34; Germany, (with a wider area and variety of landscape) had only 65; while the entire continent of Europe can show but 80 species, a less number than the Conservancy Parks alone will have.* An hour and a half's excursion through the Englewood reservation brought to note 45 species in that one tract. There grow about Dayton five species of maple; five of hickory; six of ash; eight

Alps, the Carpathians, the Pyrenees, etc. Driving the trees of the temperate zone before it, with its polar winds and snows, it trapped them between the ice sheet and the mountain ranges, in many cases driving them up to the snow line, so that many species, unable to endure the severe conditions, perished entirely. In America no such mountain barrier interposed; the trees, fleeing before the cold, migrated southward, where they could live, and on the retreat of the glaciers, again returned to their native northern range.

of oak, and nine of haw. All these can doubtless be found in the Conservancy reservations. Considering what has been said, it will be clear that these parks will be a museum for the botanical student such as few of our states can show; if for no other reason than that few of them can show so favorable a habitat, where trees native to both the northern and the southern states can meet on a neutral ground. In this connection these reservations may well offer advantages in connection with the State Forestry Bureau, where studies may be pursued which will be of industrial and commercial advantage to the entire state.

The list below shows the species of trees and shrubs found during a short excursion in the Englewood reservation. For this list, as well as for the information regarding tree distribution herein presented, the writer is indebted to Professor William S. Werthner of the Steele High School, Dayton. The list follows: Apple, blue ash, black ash, prickly ash, white ash, basswood, beech, blue beech, box-elder, buckeye, burning bush, butternut, red cedar,

The following additional species are also known to occur in the Englewood Park: Catalpa, choke cherry, red maple, white mulberry, black oak, persimmon, sassafras, hairy sumach.

It should be noted, as regards the individual parks of the proposed system, that each has features which make it different from the others, and give it an interest of its own. At Germantown the high wooded bank on the south side of the valley will extend for a mile above the dam, with fine trees in great variety. Fig. 116 shows a view of one bit of this bank. The north bank, which has suffered from the cutting off of timber which should have been left standing, will be restored, and in time will be as attractive as the south bank. Between the two there will be a narrow lake a half mile in length, with wooded shores and stocked with black bass and trout, where the fisherman can get back again to the wild. Brooks of spring water, which never run dry, come down from the hill slopes on each side, through copses of red bud, dogwood, haw, wild apple, and other shrubs. In the character indicated—that of a



FIG. 116—CONSERVANCY PARK HILLSIDE AT GERMANTOWN DAM

This is the hill slope rising from the south bank of Twin Creek. The valley bottom here will be occupied by a narrow lake half a mile long, lying between high wooded shores. The waters, fed by brooks heading in perpetual springs, will be stocked with bass and trout. This lake can be made one of the most beautiful spots in Ohio. Taken Jan. 10, 1919.

black cherry, cottonwood, dogwood, American elm, slippery elm, hackberry, black haw, downy haw, pignut hickory, shellbark hickory, yellow bud hickory, hop-tree, ironwood, flowering locust, honey locust, silver maple, sugar maple, red mulberry, bur oak, chestnut oak, red oak, white oak, osage orange, pawpaw, wild plum, redbud, smooth sumach, sycamore, tulip-tree, walnut, black willow.

long, narrow lake between high wooded bluffs—the Germantown park can be made unique, a bit of real "primeval wilderness" hidden among the farms.

At Englewood, as has been said, the lake will be the outstanding feature, with several islands, and the large peninsular headland already mentioned, giving variety to its surface. Here also, on the west shore, between the National Road and the dam,

there is a stretch of the original forest. Above the lake, a strip of park will run along the west bank of the Stillwater north to the Miami County line. Here a tract of about thirty acres, extending west to the Covington Pike, has been purchased, lying along the course of the un-euphonic but picturesque streamlet known as "Pig-Eye Creek." ("Pig-Eye" translated into Iroquois, will no doubt sound as attractive as the little valley itself is). This area is wooded, fed by perpetual springs, and rightly developed, will make one of the prettiest spots in the Miami Valley. A road is planned to be built along the west bank of the Stillwater, extending the entire length of the reservation. This, however, will be left to future authorities to carry out. An old mill and mill race, with a concrete dam, a little below "Pig-Eye," offer further possibilities of development. For a half mile above "Pig-Eye" the stream-side road will run along a high wooded bluff, offering a view across the valley for miles. The rock riffle above the Englewood dam has been already mentioned. The water, foaming down this rock rapids, will make a picturesque addition to the landscape.

At Lockington all the land around the dam which the District now owns will be retained. This includes the wooded bluff to the northwest of the main dam. The park area here is compact, and includes a lake which will be quite small, the borrow pit at Lockington being for the most part on the east valley slope.

At Taylorsville the reservation will include all the land acquired by the Conservancy south of the National Road, a strip nearly two miles in length, (north and south) and a mile in width. This includes several exceptionally fine pieces of forest, especially near the west end of the dam, to the north and the south of it. North of the National Road the reservation continues as a strip bordering the river, along which a road is planned, for a distance of about four miles and a half. The drive here, with vistas of meadow, woodland and valley slope, will be especially attractive. For reasons similar to those at Lockington, the lake at Taylorsville will be small—a few acres lying just south of the dam.

At Huffman the lake will be larger than anywhere else except at Englewood—a broad sheet of water about thirty acres in extent, with its east bank wooded. The fine wooded hilltop at the south end of the dam site is included; also the wooded hillside at the north end; and the woods on the valley bottom through which the river now runs. The Huffman park will thus exhibit the character of a broad, level expanse of wood and meadow, with a lake as its focal "eye," with high, wooded slopes rising

along its borders to the north and south, and enclosed on the west by the green, grassy slope of the dam embankment.

Unique features of the lake park system, as planned, will be the big concrete swimming pools just below the dam embankments. These are the "hydraulic jump pools" of the outlet structures, and are essential features of the flood prevention plans. It may be reckoned a piece of good fortune that these pools can thus be made to contribute to the general scheme of a park and recreation system. At Taylorsville especially the pool will be an imposing affair—a great concrete basin 200 feet wide and 200 feet in length, opening fanwise out of the four tunnels through which the river pours, with high walls at each side, and the great concrete apron of the "spillway," with its massive side walls, rising to the crest of the dam in front. The depth of water at ordinary flow will vary, as one descends the concrete "stairway" leading down from the tunnels to the bottom of the pool, from five feet as a minimum, to a maximum of thirty-one feet. The side walls will furnish a "high dive" of almost any depth and dizziness the swimmer can desire.

The possibility of keeping the lakes at the various dam sites stocked with fish has been already mentioned. By collaboration with the state authorities at Columbus, this should offer no difficulty. The fishing facilities thus provided should prove a source of health and enjoyment to the people of the Valley for all the years to come.

A thoughtful consideration of what has been said will prove convincing, it is believed, as to the high value of the asset which the people of the Valley now possess in the lands about the Conservancy dams, and as to the wisdom of reserving them to future public use. Especially is this true when one considers the unique character of the result, as regards Ohio, in the chain of lakes which will be thus created. Ohio has almost no lakes. It has nowhere a chain of them such as will come into existence with the building of the Conservancy dams. It therefore behooves the commonwealth itself, no less than the Miami Valley, to see to it that the public resource thus brought into being shall be used and developed to the utmost, for the common enjoyment and the common good. As regards what is now proposed by the authorities of the District—the simple reservation of the necessary land to permit the carrying out of such a project by the people of the state and Valley, at such future time as wisdom shall indicate—there appears to be no question whatever, especially since it can be done at only trivial expense, and as an adjunct and "by-product" of the main end of flood prevention.

Notice to the Public

These park lands are now open to the public, except those parts that are occupied by tenants. As the Conservancy District cannot afford to employ caretakers, the people of the Valley should take up-

on themselves the responsibility for keeping the parks free from harm and abuse. Please do not destroy trees or shrubs, and please do not leave papers or lunch boxes behind.

The New Hydraulic "Giant" for Lockington Dam

Our front outside cover page shows the new "155 millimeter" gun just on the point of being shipped to the Lockington "front" for use in the borrow pit excavation there. It is 15 feet in length over all, and

throws a 5-inch jet of water with a "muzzle velocity" of between 140 and 150 feet per second, varying with the head, which will be between 310 and

(Continued on Page 143)

February Progress on the Work

GERMANTOWN

Due to the repair work necessary to place the equipment and the pumping plant in good shape for the coming season's work, the dredge pumps have been forced to remain idle.

The booster station on the dam has been erected and the pump and electrical apparatus installed, so that this unit is in readiness for pumping.

Repair work on the equipment has progressed favorably, and at present is practically completed. The Lidgerwood Class K Dragline has been overhauled, the locomotives have been re-flued and the dump cars repaired. A new concrete floor has been placed in the hog box. In addition to these things there have been a number of minor repairs.

After being down for repairs the Marion dragline is again building the upstream slope of the dam.

The new track along the borrow pit has been laid and is now being installed.

Arthur L. Pauls, Division Engineer.

April 22, 1920.

ENGLEWOOD

During the past month Sump No. 2, for pumping hydraulic fill, has been completed and will be used for placing material in the dam the latter part of this week. Sump No. 3 is well along and should be ready for service by April 1. One of the scows for supporting the supply pumps and motors in the hydraulic pool during the river closure is practically completed. The approach track to Sump No. 3 is about ready for use.

Railroad tracks have been re-ballasted and lines extended. Plant has been overhauled. The electric dragline which constructed Cross Dam No. 1 has been successfully moved across the river preparatory to excavating the temporary spillway.

H. S. R. McCurdy, Division Engineer.

March 15, 1920.

LOCKINGTON

After a long period of idleness, made necessary by the severe winter weather, the dredge pumps resumed operations on March 15. Material for the fill is now being taken from the western part of the borrow pit area. Sluice flumes are being placed in the pit as an improvement over the sluice ditches heretofore used for transporting the material to the dredge pumps. During the winter season a 350 H. P. motor was installed to drive one of the 12-in. pumps in place of a 250 H. P. motor which had been in service. Using this motor with a specially large diameter pump runner, will obviate, it is thought, most of the necessity for a booster pump. While the friction and other power losses in the single high pressure pump will necessarily be considerable, they will be much less than the combined losses in two pumps of less pressure, working in series to accomplish the same result.

The steam dragline is now excavating the cut-off trench east of the outlet works.

Rock surfacing has been continued on the downstream slope of the dam west of the retaining walls.

The impervious blanket covering the old river channel upstream from the dam is being placed by siphoning waste core material out of the core pool.

Barton M. Jones, Division Engineer.

March 23, 1920.

TAYLORSVILLE

The progress of the Lidgerwood Dragline on the inlet channel excavation during the last month was considerably better than for the two previous months.

The loading track on the rock berm on the east edge of the outlet works excavation has been cut off at the north end by the dragline and a connecting track between the two bridges has been laid on the cofferdam levee. This levee will be widened so as to accommodate the Lidgerwood dragline on its trip to the outlet channel after the inlet channel has been finished.

The progress on the concrete has shown considerable improvement with the let-up in the extremely cold weather. The boom on the west derrick has been cut down from 105 feet to 90 feet, which makes it faster and easier to handle. The floor of the stilling pool and the channel be-

low it have been finished from the south end to the north weir. The south weir has been finished and the north weir is 75 per cent finished. The east wall is finished to the north weir and the west wall is finished to within 60 feet of the north weir. Five floor blocks in the hydraulic jump pool have been poured.

O. N. Floyd, Division Engineer.

March 19, 1920.

HUFFMAN

During the past month steel sheet piles have been driven along the axis of the dam, across the old bed of Mad River, in order to stop any tendency for excess seepage of water under the dam at this point.

The steam dragline is leveling and trimming to a true slope the north bank of the outlet channel below the concrete structure.

During the latter part of February, when the hydraulic pumping was shut down on account of cold weather, the 15-in. Morris dredge pump, borrowed from Taylorsville, was dismantled, and a new American Manganese pump installed as a primary unit. With this in operation the placing of embankment in the dam was resumed on March 2, with day and night shifts, the latter running continuously to date, and the day shift to March 15th, when it was necessary to discontinue day pumping on account of starting the delivery of ballast for the relocation of the railroads through the Huffman basin.

It has been found that there is a shortage of core material in the main borrow pit in the valley above the dam. Preparations are being made to sluice sufficient material from the hillside at the north end of the dam to make up this deficiency, as tests show this material contains a much larger percentage of clay and silt than that found in the valley. The upper part of this hillside borrow pit will be washed directly into the dam, and the lower part to a sump at the toe of the dam and then pumped into place. It is expected that this supplementary plant will be in operation soon after the first of April.

C. C. Chambers, Division Engineer.

March 22, 1920.

DAYTON

Erection of Dragline D-15 was completed on the first of March. A new section of work was opened up March 8, when this machine started channel excavation at the north side of Stewart Street Bridge. Dragline D-16 completed the lowering of the gas and water mains at Third Street, completed a fill of 9,000 cubic yards at Sunrise Avenue and has cut across the mouth of Wolf Creek. It is now beginning excavation for the unloading basin opposite the gravel plant. Dragline D-19 has resumed levelling off Herman Avenue spoil bank. Erection of Dragline D-8 has been completed and the machine is now casting gravel into storage on the bank at the end of Chicago Avenue.

On March 15, 1900 cubic yards of concrete had been placed in the Robert Boulevard Wall.

Up to the end of February the gravel plant had sold to outside parties 2075 cubic yards of sand and 4622 cubic yards of gravel.

Channel excavation to date amounts to 690,000 cubic yards. The total pay quantity in spoil bank and levees is 492,000 cubic yards, including 60,000 cubic yards of levee embankment on Contract 41. In accomplishing this work the total yardage handled amounts to 1,214,300 cubic yards. These figures do not include excess excavation from the launching basin and scowing channels, which amounts to 38,700 cubic yards.

C. A. Bock, Division Engineer.

March 23, 1920.

HAMILTON

The work of channel excavation was carried on at a satisfactory rate during the month of February, 53,000 cubic yards of item 9 being taken out by the electric dragline. The total yardage handled to March 1 amounted to 1,152,000. The total of item 9, channel excavation, was 623,700 cubic yards.

The electric dragline is taking out the last cut on the east side of the river between the Columbia bridge and the R. R. bridge, placing most of the material in and back of the levee, and loading the remainder on cars. The

spoil bank for the location of Price Bros.' block plant, has been filled.

The steam dragline has built a levee on the west side of the river from Ross Street to about Arch Street, and has completed the excavation for the wall at the southwest corner of the Main Street bridge. It is now moving into position for the excavation for the wall at the northwest corner of the bridge.

Price Bros. have completed the shed for their concrete block plant and are erecting a derrick to handle the gravel. They also have their pile driving apparatus in shape ready to begin driving on the trestle north of the Columbia bridge.

Concreting has been practically completed at the north-east wall with the exception of the coping.

C. H. Eiffert, Division Engineer.

March 20, 1920.

LOWER RIVER WORK

Owing to the continuance of the conditions as reported last month there has been no work done on this division during February.

F. G. Blackwell, Assistant Engineer.

March 22, 1920.

RAILWAY RELOCATION

Big Four and Erie—The tracklaying on the Big Four and Erie is now complete except for the sidetracks and the connection with the old tracks at Enon and Dayton. These will be attended to when ballasting is completed.

The Walsh Construction Company began ballasting on March 15. All ballast used on these railways will be gravel, excavated from the bed of Mad River at Huffman Dam by the District's large dragline.

The Fairfield Signal Tower is completed and the ground signal work is 60 per cent complete.

The brickwork on Tates Point Signal Tower is 50 per cent complete. The signal gang will begin ground work at this tower April 5.

The Western Union Telegraph Company's gangs have stopped work on the pole line owing to the lack of ma-

terial (cross arms, etc.), but expect to resume work April 1.

Ohio Electric Railway—The tracklaying has been completed from the underpass to Fairfield. This completes the Roberts Brothers tracklaying contract in the Huffman Basin.

The Baltimore & Ohio Railroad—Roberts Brothers are starting up their Poplar Creek camp preparatory to resuming the ballasting of the track. All the ballast has been distributed.

The Baltimore & Ohio Railroad's own forces are raising the tracks south of Needmore Road. This work is now nearly complete.

Albert Larsen, Division Engineer.

March 22, 1920.

RIVER AND WEATHER CONDITIONS

The rainfall in the Miami Valley during the month of February was about two inches less than normal. The rivers were comparatively low during the entire month, although a small rise of from two to five feet was caused by the precipitation of about a half an inch which fell on the 21st.

At the District's stations the total precipitation varied from 0.21 inches at Fort Loramie to 1.36 inches at the Taylorsville Dam. At Dayton the total for the month amounted to 1.13 inches or 2.03 inches less than normal, thus increasing the accumulated deficiency since January 1 to 3.24 inches.

Observations taken by the U. S. Weather Bureau at Dayton show that the mean temperature for the month was 29.8 degrees or 1.0 degree less than normal; that there were 6 clear days, 9 partly cloudy days, 14 cloudy days, and 11 days on which the precipitation amounted to or exceeded 0.01 of an inch; that the average wind velocity was 11.2 miles per hour, the prevailing direction being from the northwest; and that the maximum wind velocity for five minutes was 39 miles per hour from the southwest on the 17th.

Ivan E. Houk, District Forecaster.

March 25, 1920.

Pressure Cells in Conservancy Dam Cores

Earth Pressure Cells, Installed in the Dams on the Core Center Lines and in the Edges of the Gravel Retaining Embankments, Demonstrate a Satisfactory Solidification of Core Material.

Experience has demonstrated that the point most in need of careful attention in a hydraulic fill earth dam, both in design and construction, is the core. The reasons for this are outlined on page 107 in the February Bulletin of 1920. As there shown (See Fig. 91) a hydraulic fill dam consists of three essential features—two parallel embankments of sand and gravel, extending across the valley, and a broad wall of clay and silt "sandwiched" between them, the latter known as the core or core wall. The clay wall makes the dam impervious; the sand and gravel embankments give it massiveness and stability. All three are deposited by water, and it is this fact, as will be seen, which makes the core the critical point in the design and construction—the "ham what am" of the "sandwich."

The reasons for this will be clear on considering the process as described in the article referred to. The clay and silt are deposited in the core as mud settling to the bottom of a pool of water maintained along the center line over the entire length of the embankment. Mixed with the clay and silt are considerable quantities of very fine sand, the entire material being as fine as commercial cement. This core material consolidates very slowly in the bottom of the pool. This is especially the case where the clay forms a large proportion of it. In that case the core may retain its water and remain semi-fluid for

weeks and even months. Clay is the most plastic, the most impervious, and the most absorbent of water of all the materials. Being also the finest, it penetrates the spaces between the other coarser particles, swells up and if sufficient in amount corks every pore, making the material water tight as a dish pan. When it fails thus to drain itself freely, the core will remain semi-fluid for some time. In the Calaveras dam, in California, this condition persisted for more than a year.

The core of the Calaveras dam contained a very large proportion of clay, and to this circumstance, for the reasons noted above, the persistence of the semi-fluid condition is believed to be largely due. Also, at Calaveras, the proportion of core material to the sand and gravel of the two retaining embankments was very large. In both respects, the Conservancy dams offer entirely different conditions. The materials for the core contain but a relatively small proportion of clay, and they constitute but a small proportion of the entire material in the dam—not more than one-fifth to one-sixth. The latter point is secured, when necessary, by careful selection and proportion of the materials; in the main, it is secured by Nature herself, in the fortunate grading of the materials supplied in the "borrow pits." The clay also occurs naturally as a relatively small proportion of the core material, except at Taylors-

ville. There the excess clay is rejected, by permitting it to float out of the core pool with the waste water, the level of the waste pipe, to accomplish this, being lowered a little.

The facts above noted, as to grading and nature of the materials, were ascertained early in the formulation of the Conservancy plans, by securing samples of the material from other hydraulic fill dams, and studying them side by side with materials from the proposed Conservancy borrow pits. Careful study gave assurance that the hydraulic fill method, with the precautions noted in the last paragraph, would be a safe and economical method—was in fact the method which should be adopted. Nevertheless, it was deemed wise to make a further study of the core materials as they were deposited in the process of dam building; to watch, if it were possible, the process of consolidation in the core, so that it might be known absolutely that proper solidification was secured. Such a watch on core materials has never been heretofore kept in a hydraulic fill dam, and no method had ever been devised to do it, save the very crude one (at Calaveras), of sounding the pool with a six-inch cast iron ball, to see how far the ball

would penetrate. Something better was wanted and the Conservancy engineers cast about to find it.

The clue was furnished by the Bureau of Public Roads in the Department of Agriculture at Washington, in its investigations as to the pressures on the concrete floors of bridges when covered over with earth fill, and subjected to loads, like those given by wagons, trucks, etc., the object of the investigations being to furnish figures to be used in bridge design. To ascertain these pressures the Department had originated (through Mr. A. T. Goldbeck) a device which would measure earth pressures in a manner analogous to measurements of steam pressure by a steam gage. It occurred to the Conservancy engineers that by applying this device, called a "pressure cell," to measure the pressures within the cores at various depths, as the dams were built up, it might be possible to arrive at a measure of the solidification of the core materials.

The reasoning in the case is briefly as follows: At any point in a fluid, the pressure of the fluid is the same in all directions. (As is illustrated by the fact that water tapped through the side of a tank will spurt with equal force—up, down or sidewise).



FIG. 117—PRESSURE CELL TOWERS AT THE GERMANTOWN DAM. SEPT. 15, 1919

The pressure cells described on page 140 are suspended from the tops of these towers, at intervals of ten feet for recording horizontal pressures, and at intervals of thirty feet for recording vertical pressures, the cells being imbedded in the earth of which the dam is built. The view is along the dam center line southward, the slope in the background being the south bank of Twin Creek. The core pool is seen in the center, (wider at its south end, which was temporarily separated from the rest by the dike). The gravel beaches, which build up into the retaining embankments of the dam core, are seen at each side. The core is of very fine clay and silt, deposited from the water in the pool. The towers are located near the center of the pool, and in the edges of the gravel beaches, so that the pressures can be obtained both in the core and in the enclosing embankments. (See Bulletin for February, 1920, page 105). The top row of diagrams in Fig. 119 were taken at the center tower; those in the lower row at the tower toward the left. Fig. 118 is a diagram of one of the cells. See pages 140 and 141. Picture taken Sept. 15, 1919.

Within a solid, however, while the downward pressure, as in a liquid, will be equal to the weight of the superincumbent unit column of the material, the sidewise pressure will only equal $\frac{1}{4}$ to $\frac{1}{3}$ of this. If the same material becomes plastic—a stage intermediate between liquid and solid—its sidewise pressure also becomes intermediate between what it was as a solid, and what it would be if completely liquified, while its downward pressure would be the same, whether it were solid, plastic, or liquid. A stiff pudding, for instance, poured into an empty pail with a hole in its side, will “squash” out through the hole, due to the sidewise pressure in the pudding at that point. The thinner the pudding, the faster will be the flow; the stiffer the pudding, the slower the flow; giving proof that the sidewise pressure at the hole is greater the nearer the pudding comes to being a fluid, and less the nearer it comes to being a solid. Thus the ratio of the sidewise pressure in the pudding, at any point, to the downward pressure at the same point, will be a measure of the stiffness; that is, of the degree of solidification, of the pudding.

Now the degree of solidification is just what we wish to learn about our hydraulic fill core, because on this depends the safety against any possible sloughing out, such as may take place if the core is in too fluid a condition at considerable depths. Insert then, a Goldbeck pressure cell in the core at any point, placed in a horizontal position, and another placed in a vertical position, and by means of these cells, measure the vertical and the horizontal pressures in the core at this point. The ratio of the two, as in the case of the pudding, will be a measure of the solidification which at this point the core has attained. Put such cells in the core, as the dam is built up, at regular intervals of depth, and take measurements of the pressures at all these depths, at regular intervals of time—say a month apart—and we shall have a complete history of the process of core solidification, from top to bottom, and throughout the entire period of the construction of the dam.

It was this application of the Goldbeck earth pressure cell which occurred to the Conservancy engineers on reading the experiments carried out by the U. S. Bureau of Public Roads, and they proceeded to get in touch with the Bureau at Washington in reference to securing its co-operation in adapting the cells to use in the Conservancy dam cores.

The response of the Bureau was cordial, and several trips to Washington were made by the Assistant Chief Engineer for the District, Mr. Chas. H. Paul, to perfect the arrangements. Following the plans thus made, the Bureau conducted a preliminary investigation for the District (see *Engineering News-Record*, April 18, 1918) with pressure cells suspended in a 36-inch stand pipe 41 feet high, into which a mixture of clay and water was introduced, under conditions approximating those in the core of a hydraulic fill dam. The rate of deposition and solidification of the clay in the stand pipe bottom was studied, and the feasibility of applying pressure cells to the study of the dam cores themselves was thus demonstrated. The Bureau also sent Mr. Goldbeck, the originator of the cell, to Dayton, to co-operate in the installation of the apparatus in the dams.

The District also interested the U. S. Bureau of Soils at Washington, and secured their co-operation

in an analysis of the core materials at the various Conservancy dams and a comparison between them and the core of the Calaveras dam.

A diagram of the pressure cell itself is shown in Fig. 118, exhibiting all the essential parts, in their relations to each other, more clearly than an actual cross section would do. In principle it is simple. It is to bury in the earth a hollow metallic disc, one

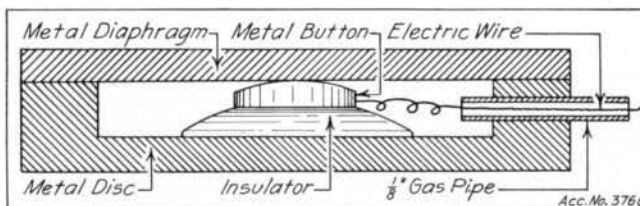


FIG. 118—GOLDBECK EARTH PRESSURE CELL

For greater clearness, this is shown as a diagram rather than as an exact cross section. The parts are indicated by the arrows. The cell is a hollow metallic disc, one face of which (top face above) is an elastic metal diaphragm. The cell is buried in the earth of the dam. The earth pressure keeps the diaphragm pressed against the rounded surface of the metal button, thus closing an electric circuit carried by wires to the top of the dam through a small air pipe, as shown. When a measurement is to be made, air is admitted into the hollow of the cell from a compressed air tank on top of the dam, thus balancing the earth pressure, till, just at equilibrium, the diaphragm is forced outward, breaking the electrical contact with the button. The break is indicated by the going out of a small electric indicator lamp in the circuit. The pressure is then read on an air gage connected with the air pipe line. See page 140.

face of which is a metal diaphragm, and to balance the earth pressure against the outside face of the diaphragm by air pressure against its inside face, the air being introduced into the hollow of the disc by means of a small pipe which is carried down through the earth from a compressed air tank on top of the dam. An air gage, built like a steam gage, and connected with the pipe running to the buried cell, measures the amount of the pressure. The detail of the working is shown in Fig. —.

The method of installation of the cells depends on the type of dam outlet structure. At Lockington, Taylorsville and Huffman, the outlets are carried between heavy retaining walls (the side walls of the spillway), which extend entirely through the earth embankment and up to its full height. At these dams the cells are supported on the back faces of these walls. At Germantown, and Englewood, where the spillway is a separate structure, and no such walls exist, the plan provides for supporting the cells on light wooden towers. Fig. 117 shows these towers at Germantown, there being three of them, one near the center line of the dam core, and one near each of its two faces. These towers are built up section by section as the material in the dam rises during construction. The pipes carrying the air pressure to the cells are suspended vertically from the tops of these towers, with an earth pressure cell at the bottom of each pipe. For the lateral pressures, cells are suspended at intervals of ten feet in depth, as the dam rises; for vertical pressures this interval is thirty feet, experience showing that the lateral (horizontal) pressures are the ones needing most careful watch. The compressed air tank, air gage, etc., are carried on a platform at the top of the tower. To permit a pressure cell to settle with the

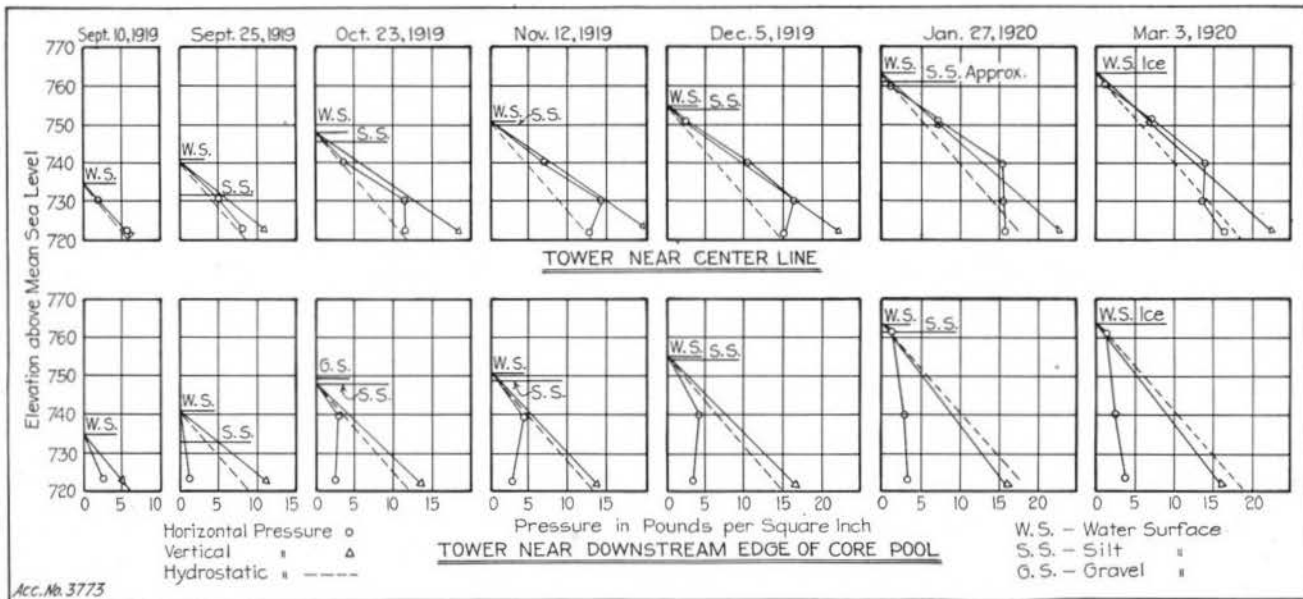


FIG. 119—DIAGRAMS OF EARTH PRESSURES, GERMANTOWN DAM. SEE PAGE 141

material in the core (as the mud in the bottom of the pool is consolidated by the steadily increasing pressure of the added material), each cell with its ascending air pipe is suspended by a wire running over a pulley at the top of the tower, the other end of the wire carrying a counterweight. The air tank and air gage are successively connected to the top of each pipe by a rubber hose and a valve, precisely in the manner of connecting an automobile tire to the air tank in a garage. Thus the pressure measurements for all the cells are rapidly and easily taken. Observations are made at monthly intervals.

For study and comparison the measurements are plotted on diagrams. The upper row of rectangles in Fig. 119 is a series of such diagrams for the cells at the tower near the dam center line at Germantown, the lower row of rectangles showing conditions at the tower in the gravel slope near the downstream edge of the core pool. Each rectangle gives the results of one full set of the monthly observations, the date being noted above the rectangle. Setting the diagrams thus side by side, the behavior of the dam core material, month by month, can be readily studied.

Each small circle and small triangle indicates a measurement on a pressure cell; the circle a horizontal pressure, the triangle a vertical pressure. The amount of the pressure is given by the distance of the circle or triangle from the left edge of the rectangle it is in, the successive vertical lines marking successive increments of five pounds pressure, as indicated by the figures 5, 10, etc., below the rectangle. The distance of the circle or triangle from the bottom of the rectangle indicates the distance of the measuring cell from the bottom of the dam, the successive horizontal lines marking ten-foot vertical intervals. (The figures at the left edge of the left diagrams give the elevation of these lines above sea level—720, 730, etc.) Thus the upper small circle in the left upper rectangle indicates that on September 10, 1919, there was a horizontal pressure of about 2 pounds per square inch in a cell on the center line tower 730 feet above sea level, or 4.5 feet below the

level of the water in the core pool, the latter being given by the short horizontal line on the same diagram marked "W. S." (Short horizontal lines marked "S. S." and "G. S." indicate respectively the level of the silt surface and the gravel surface at the bottom of the core pool). Near the bottom of the upper left rectangle the small circle and the small triangle practically coincide, showing that at the depth in the pool indicated, about 12 feet, the vertical and horizontal pressures were the same (about 6 pounds per square inch). This means that the mud at this point was still so thin that it behaved as a liquid slightly heavier than water.

The next rectangle in the upper row shows the condition at this tower on September 25, 15 days later. The water surface in the pool has risen to elevation 740.5. "S. S.," the silt surface, indicates that a distinct surface of mud at the pool bottom has formed about 9 feet below the water surface. The little triangle indicates a vertical pressure of about 11 pounds at a depth of about 18 feet in the pool, and the lower small circle indicates a lateral pressure of about 8 pounds at the same depth. The difference of three pounds indicates a stiffening of the mud at this depth, since if the mud were still thin enough to act as a liquid, the two pressures, lateral and vertical, would be equal.

The lowest circle and triangle in the next rectangle, showing the conditions a month later, October 23, show a marked and significant change in the core material. The lowest circle is directly below the next lowest, indicating that the additional depth of core deposited during this month, about 7 feet, has not made any addition to the horizontal pressure in the core material at the lowest pressure cell. At the same time the vertical pressure, at the same point, given by the little triangle, has risen from 11 to 18 pounds. The difference between the horizontal and vertical pressures at this point, the measure of the solidification of the materials, has risen there to about $6\frac{1}{2}$ pounds. (Indicated by the horizontal distance between the lowest circle and the lowest triangle). This fits with the significant fact above noted, that the increase in depth of material has not

increased the horizontal pressure at the bottom of the dam (the level of the lowest small circle and small triangle readings). All the later diagrams tell a similar story—that below a depth of twenty to twenty-five feet, the horizontal pressure remains constant, although the depth of core material is steadily increasing, while at the same time the vertical pressure increases. Analysis, which cannot be given here, would seem to indicate that this means a sufficient stiffening of the core material such that if a cube of it were cut, several feet high, it would stand alone, like a piece of cheese. Explorations are in progress to ascertain by examination of the actual materials, whether this is the true state of affairs. If so, it will constitute an additional assurance in this important matter. In any case, there can be no doubt that the pressure cells have already proved their value in action and have indicated a condition of the core materials which is very satisfactory to the engineers in charge.

This is no less true of the materials in the sand and gravel retaining embankments, between which the core lies, as may be seen by an inspection of the lower row of rectangles, showing the conditions just outside the pool margin, where pressure cells have been imbedded in these materials. These embankments, as has been said, give weight and stability to the dam structure. They also, by their open, porous texture, permit free drainage of the water which slowly escapes sidewise and downward from the core. This is an important function, and the lower diagrams show that the porous materials are performing it in a highly satisfactory manner. The small circles show that the horizontal pressure at the bottom of the dam, in these materials, never exceeds $3\frac{1}{2}$ pounds, although the water pressure alone, at the depth reached by the material in the last two diagrams, would be about $19\frac{1}{2}$ pounds, if the water were confined. At the same time, the vertical pressure, as indicated by the small triangle, is

MIAMI CONSERVANCY INEXHAUSTIBLE FARMS FOR SALE

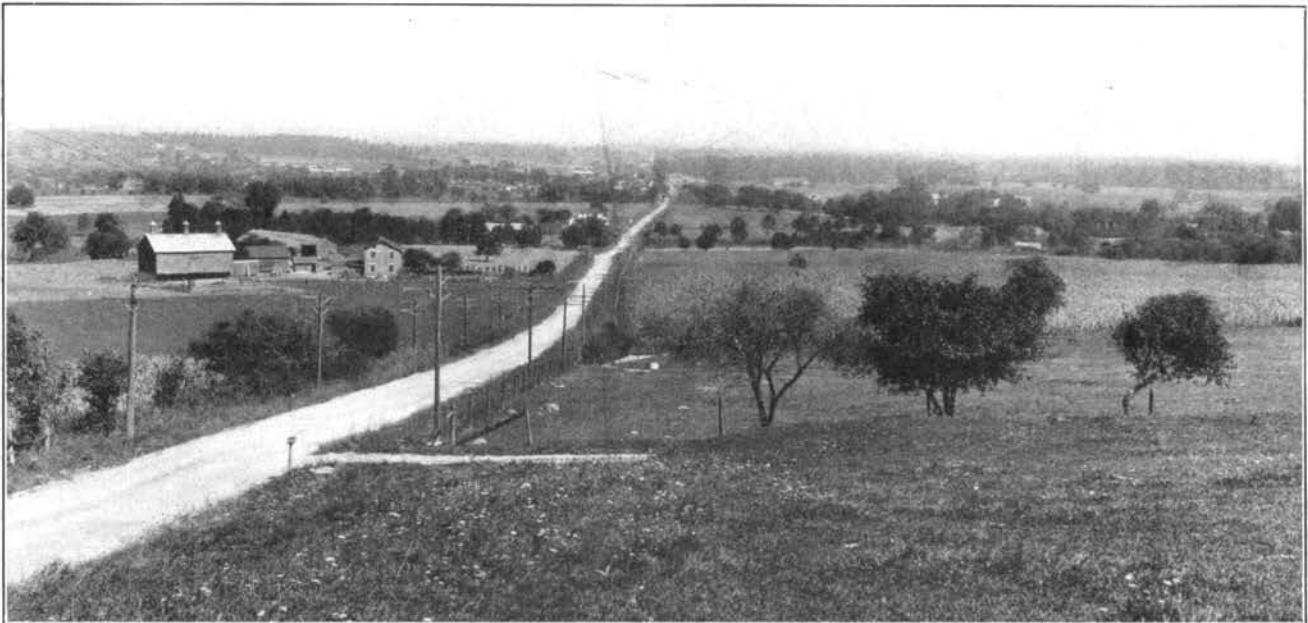


FIG. 120—TYPICAL MIAMI VALLEY FARM LANDS. TAKEN SEPT. 27, 1918

Rich Corn Farms, Kept Perpetually Fertile by Alluvial Deposits.
No Manure or Fertilizer Necessary.
No Pioneering—These Are Well-Improved, Going Farms.
In One of the Richest River Valleys of the Middle West.
Fourteen Steam and Electric Roads Run Through It.
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being transmitted up to 16 pounds intensity. The desired porosity and stability of the sand and gravel next the impervious core are thus indicated.

Both in the core and in the retaining embankment, then, the pressure cells are doing their expected work in a satisfactory manner. This is the more gratifying, since the Conservancy dams are the first in which such cells have ever been applied to such a purpose; the first, in fact, in which any consistent attempt has been made to know, as the work goes on, just what happens to the core materials. With the nature of the results to date thus encouraging, the investigations will be pushed steadily forward, and there is little doubt that they will prove of high value, both to the work of the Conservancy and to all engineers who in the future will be confronted with the problem of the hydraulic fill dam. The cordial co-operation of the United States Government in this connection is especially gratifying, the independent observations of the government engineers giving a weight to the results which the public is certain to appreciate.

Concreting Layout at Taylorsville

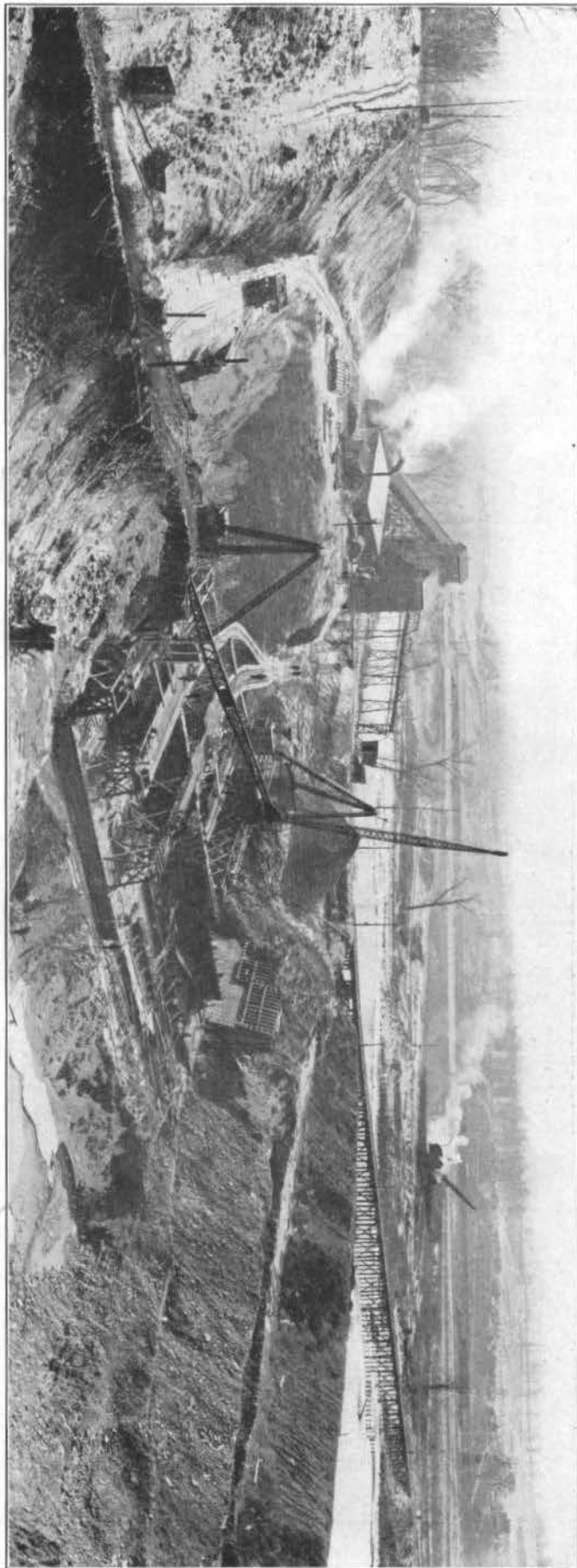
The panorama on this page shows this layout in all its essential features. In the distance at the right is the dragline excavator (a transformed steam shovel), working in the gravel pit. The material, loaded into 12-yard air-dump cars, is brought across the river by 40-ton locomotives (via a switchback), to the gravel washer in the middle distance at the left. (For description of this, see Bulletin for April, 1919). Here the sand and gravel are washed and screened. The concrete mixing is done in the "basement" of the gravel washer, the cement being wheeled in barrows from the cement house seen just this side of the washer. The concrete is brought from the washer to the forms by the two 3-foot gauge tracks seen in the middle foreground, on platform cars drawn by gasoline locomotive, the concrete being held in 1¼-yard bottom dump buckets. These are picked up by one or the other of the two stiffleg derricks in the foreground, and the material dumped in the forms. The derrick booms are 90 feet in length, having been cut down from an original length of 105 feet for quicker speed.

The two concrete walls crossing the excavation are the upper and lower weirs of the stilling pool. The deep excavation in the right foreground is for the hydraulic jump pool.

(Continued from Page 136)

350 feet. (Giving 135 to 150 pounds per square inch). The erosive power of such a stream is very powerful, and results of corresponding efficiency in tearing down the earth in the Lockington borrow pit are expected. A 2½-inch stream has heretofore been used there. Water is supplied by two 10-inch centrifugal pumps "in series," direct-connected to alternating current motors. These pumps will sup-

FIG. 121—CONCRETING LAYOUT AT TAYLORSVILLE DAM. TAKEN FEB. 5, 1920



ply 3500 gallons per minute. The upright post at the left end of the giant carries a beam, pivoted at its middle to the top of the post, and attached at its right-hand end to the stirrup piece shown mid-length of the "gun" barrel; the other end of the beam carrying a counterweight to balance the weight of the barrel and nozzle. These swing in a vertical plane on two bolts (one of which can be seen), to the right of the upright post. Water tightness is provided by a leather gasket riding on the spherical surface seen just to the left of the two flanges. Motion of the nozzle to right and left is provided by a ball bearing at the foot of the post, just above the flanges shown. A flat diaphragm gasket of leather provides water-tightness at this joint, the water pressure being made to force the ring of the gasket into contact with its cast iron seat, so that the greater the pressure, the firmer the ring

seats. Projecting fins within the gun barrel, parallel with the bore, in two sets, three in a set, do the work of the rifling in a cannon to shoot the stream of water straight and true, so that it will emerge in a solid jet and not in a spiral scattering spray, as it otherwise tends to do. The howitzer-like piece, the "deflector," carried at the end of the barrel (on two trunnions at right angles, constituting a universal joint), compels the jet to do the mechanical labor of aiming itself. By turning it to right or left, or up or down, by means of rods running back to the breech, the emerging water jet is made to strike the bore of the deflector, thus forcing the latter in any direction desired. The necessity of some such device will be clear on a consideration of the fact that the total pressure between the "gooseneck" and the "bowl," (at the foot of the vertical post), under working conditions, is about 3,000 pounds.

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FIG. 122—ERIE RAILWAY BRIDGE OVER MAD RIVER

5 Single Track Truss Bridge Spans 136 Feet to 154 Feet.

7 Through Girder Bridge Spans 23 Feet to 100 Feet.

10 Deck Girder Bridge Spans 22 Feet to 45 Feet.

72 I-Beams (15 to 24 inches,) Lengths Up to 20 Feet.

(All the above in use 5 to 15 years on important lines.)

3100 Tons 90-Pound Main-Line Steel Rail. (In use 5 to 12 years.)

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A Large Quantity of Ties, Switches, Special Joints, Angle Bars, Spikes, Track Bolts, Frogs, etc., etc., Used in the Above Track.

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THE MIAMI CONSERVANCY BULLETIN SUPPLEMENT

"The News Letter"

To Promote the Conservancy Spirit on the Work

APRIL 1920

DAYTON

Myron Cornish Gets a Fine Place

Myron Cornish, who left the District not long since to go with the Illinois Lakes to Gulf Canal Project, did not stay there long. He has made an uncommonly favorable arrangement with the firm of H. L. Stevens and Co., hotel builders and operators, of New York and Chicago. They are extending their operations clean across the continent, and Mr. Cornish, we understand, is slated for the management of one of their district centers, either New Orleans or San Francisco. We all join in heartiest congratulations.

Ray Jackson Now in Chicago

Our former Conservancy team mate, Ray Jackson, has written us recently requesting that his Bulletin be sent him at Chicago, where he is now located. He was at Chillicothe on the Illinois River, in charge of topographic surveys for the Illinois Lakes to Gulf Canal Project. He is still with them, under Walter M. Smith, in the Chicago office. Our best wishes to him in the new work.

Visit of Col. F. W. Scheidenhelm

Col. F. W. Scheidenhelm of the firm of Mead and Scheidenhelm, with offices at New York, visited the work of the District on March 31 and April 1. He was the guest of Mr. Matthes, who, for a number of years, was associated with him on water power projects in West Virginia. He also found here an old-time friend in R. M. Riegel.

During the war Col. Scheidenhelm commanded the 26th Engineer Regiment in France. His special task was supplying the First Army with water. That may not sound like much, but in reality it was a big job, carried out on modern hygienic lines, under shell fire. Modern "shell fire," as is well known, is spelled without an "s."

Irish Potatoes, Baled Hay and Turkish Toweling

The above constitute the "fodder" ordered some time since by the Dayton Channel Division for the "Dorothy Jean," the Conservancy tug boat on the Miami River. The order had the Purchasing Division guessing—what should a steam engine boiler do with Irish potatoes, baled hay and Turkish toweling, when plenty of other "feed" in the way of soft coal, engine and cylinder oil had been liberally provided? Bulletin readers are given one guess on each head. Answers printed next month.

A Conservancy Baseball Team

We had some interesting "dope" all written, printed, and locked in the "make ready," on the subject of a Conservancy Baseball Team for the Dayton Saturday Afternoon League, but a last minute meeting of those interested left the matter so badly up in the air that we were reluctantly compelled to "pull" the stuff.

Let's Start an Overall Campaign

By Eldee

Let's start an overall campaign! The price of suits gives us a pain! Eight tenspots for a tweed or twill that fits us like a headache pill!—For weary, dreary hours each day we toil and sweat and peg away in dismal office, shop or trench—with pencil, pick or monkey wrench, and when we draw our hard-earned pay, the profiteers take it away! The robbers soak us right and left till of our senses we're bereft!

Let's start an overall campaign. We need not be so puffed up—vain, that we must always keep flat broke to sport rags that are but a joke, when we can purchase for a song a suit imported from Hong Kong compiled of rich blue ticking stuff, of fibre strong and rough and tough.

Let's start an overall campaign. Then we can face the sun or rain, a drink of home brew or a fight, and still look nifty, out of sight!—and save a few bones for the day when we'll be wrinkled, old and gray, and can no longer plug and sweat to cinch the coin—already yet.

E. W. Lane at New Orleans

A letter from E. W. Lane to the senior editor, dated March 27, at New Orleans, La., enclosed a nice little boutonniere for the Bulletin and requested the February number, with which our postal service somehow failed to connect him. He sent his best wishes to all his team mates on the force, but no personal word about his own work. We hope soon to be able to print something from him about that.



Winners of the Bowling Pennant

Top row, left to right; Vogel, Everhardt, Braun.
Bottom row, left to right; Gleason, Rosenkrantz, Johnson.

"Here's to The Rustlers!"

Too much praise cannot be given to Captain Everhardt and the members of his bowling team for the showing made by them during the season just closed, when they again won the pennant in the M. C. D. bowling league under the name of the "Rustlers."

The team shot very constant ten pins throughout the season, winning 71 out of 75 games played, with a team average of 787.

Captain Everhardt, their lead off man, kept his team going steadily by shooting an average of 159 for the season.

Vogel is an old timer at the game and came through with an average of 163.

Braun, with his little back up ball, finished with an average of 156.

Johnson is a hard worker and helped his team by shooting a 140 average.

Rosenkrantz, shooting in the clean up position, is one of the most promising young bowlers in Dayton, and finished with a fine average of 173.

Gleason, their extra man, showed his class when he rolled a score of 244 which was the high single game for the season.

W. T. S.

Shop--Warehouse--Garage

M. A. Jolley is reported to be heavily interested in the matrimonial market and his fellow employees at the Garage note with interest his progress along this line. For future bulletins, see any employee at job No. 1001.

We wonder what Dave Rike of the Warehouse does with his money, and why he never buys chewing tobacco or cigarettes.

Henry Meyring says that slinging a sledge hammer will put a wollop in your biceps equal to a mule's hind leg, or words to that effect. He has been slinging one of these hammers for some time, and surely ought to know.

The betting was very lively the other morning on the proposed Amos-Hagerman bout, as both parties were gathering their heavy artillery, but during the morning Peggy Ames sprained the ankle of his wooden leg, and Hump began to feel sorry for his actions and sent Peggy an apology, which was read in the presence of the entire shop at the noon hour. Both parties now are the best of friends.

"Harvey Buys a Duck"

Or was it a mud hen? We hear it both ways, and so does Harvey, wherever he goes in these late days. All on account of the natural way in which his new Dodge car takes to the famous mudhole at the Huffman dam. That mud hole, by the way, as described to us, is certainly no place to go to sea in. Where are you, Huffman? Why not fill it up?

McCarthy's New Grand-Daughter A Fine Brown Baby

Taylorville, how did you miss the following item?—Born, Jan. 16, 1920, Winifred Elizabeth, daughter of Mr. and Mrs. Thomas Brown of Taylorville camp. Weight 12 pounds. "Some baby", and clearly Mc's true granddaughter.

THE WOMAN'S CLUB

Death of Miss Bruner's Mother

All her friends of the District extend sympathy to Miss Mary Bruner of the Taxation Department, in the loss of her mother whose death occurred in Hamilton, Ohio, on Tuesday, March 30.

Among the visitors to our fair city over the week end March 27, was Mr. H. Ellis Sibley, Editor-in-chief of the Gallipolis "Times", but formerly head of the Bond Division of the Administrative Department. We understand this is the second visit since our last publication and while there are no sour grapes on our part—Who is she Ellis?

"On Jordan's lovely bank I stand
And cast my wishful eye
On Caanan's fair and happy land,
The land for which I sigh."

We wonder why Miss Schellenbach is so interested in Los Vegas, Nevada.

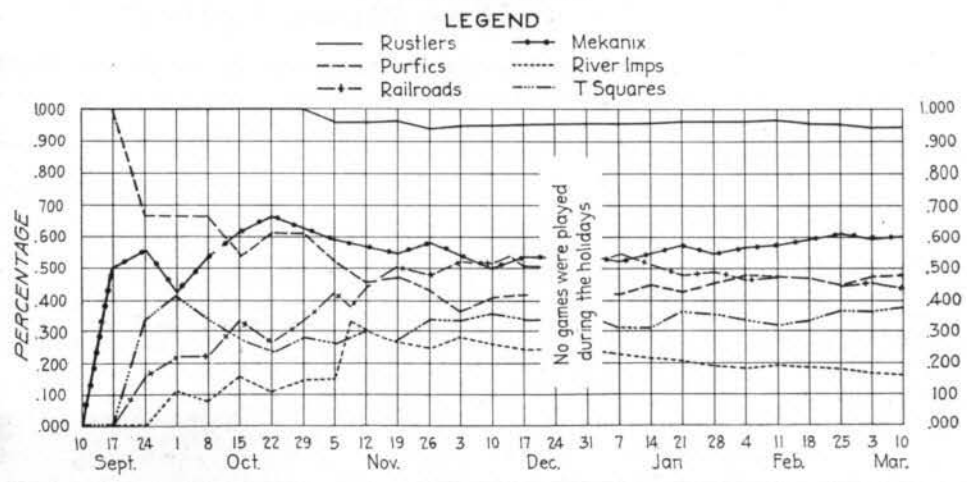
We note with regret the departure of our friend Miss Mary Alexander of the Stenographic Division. She "blew in" again for a few minutes not long afterwards, looking so happy that we accused her of intentions. She denied the allegation, of course—they always do—but we are still awaiting the "official communiqué." Anyway, it made us think of Burns' poem—"Bonnie Lesley:"

"O saw ye bonnie Lesley
As she gaed o'er the border?
She's gane, like Alexander,
To spread her conquests farther!"

Miss Alexander's place in the Stenographic has been taken by Mrs. O. H. Frey of Stearns, Ky., whom we are glad to welcome to "our midst."

CONSERVANCY BOWLING LEAGUE

SEASON 1919-20



Miami Conservancy Bowling League

The bowling league season has ended. Twenty-five weeks of more or less excellent bowling comprised the season's sport. If a determination of the respective merits of the teams had been the only consideration, the season might as well have been ended December 17. Reference to the accompanying chart will make it evident that each team had "struck its stride" by that date, with slight variations. The late games served only to emphasize the results then reached. Noteworthy features of the contest were the scores of the Rustlers and River Imps as shown by the chart. The Rustlers were never in danger of dropping from first place and the only way the River Imps ever succeeded in climbing out of the cellar was by rolling off a postponed match in the middle of the week ending November 12, thereby placing the team ahead of the T Squares for a few days. Congratulations are in order.

The following records were established:

High team average.....	787—Rustlers
High team single game.....	905—Rustlers
High team three game.....	2564—Rustlers
High individual average.....	176—Stockman
High individual single game.....	244—Gleason
High individual three game.....	656—Rosenkranz

Final Standing of Teams

	Won	Lost	Pct.
Rustlers	71	4	.947
Mekanix	45	30	.600
Purfics	36	39	.480
Railroads	33	42	.440
T Squares	28	47	.373
River Imps	12	63	.160

Mekanix represented the Shop.

Purfics represented the Purchasing and Traffic Depts.

Railroads represented the Railroad Division.

River Imps represented the Dayton River Improvement.

Rustlers represented the Warehouse.

Tee Squares represented the Designing Department.

For Sale!

A Ford—with one bum piston ring;
Two cracked leaves in the left rear spring;
Fender missin'; seat a plank;
Eats the gas up; hard to crank;
Carburetor busted through;
Engine missin'—(hits on two);
Age three years, or four come spring;
As for shock absorbers?—Bing!
Runs to beat the Billy be deuce,
On either oil or tobacco juice;
Peach of a car for the shape it's in;
Want it, bo?—inquire within.

Billie Ball

THE MIAMI CONSERVANCY BULLETIN

EDITORIAL

Board of Editors

Germantown	Miss Julia Darnell
Englewood	Albert L. Wald, George Rodgers
Lockington	C. H. Shea
Taylorville	Ben H. Petty, F. E. Floyd
Huffman	Mrs. C. C. Chambers
Hamilton	R. B. McWhorter
The Woman's Club, Dayton, Ohio.....	Miss Mayme McGraw
Dayton Warehouse.....	J. T. Hall

Beautiful Spring

A Rhapsody

You trip blithely forth one fair April morning, assured by the golden sunshine, and the flood of melody pouring from the redbird's throat, that spring has come at last. After dodging the flu for six months and carrying out two hundred tons of ashes you are more than rejoiced to see her. In fact prose is inadequate to express your rapture; you soar into prophetic and poetic realms.

The fragrance of the blossoms sweet,
Is borne upon the balmy breeze;
Violets are nodding in the sun,
The birds are twittering in the—

Here a stiff gale from the north cuts short your rhapsody and twirls your hat over the Callahan Bank building. By the time you have chased for five blocks and rescued it from a mud puddle a brisk shower has set in. You sprint for the Conservancy building now at top speed. Two blocks on the way the brisk shower becomes a steady downpour; one block more, the rain turns to sleet which freezes as it falls, and you skate down Monument Avenue, only to be met at the door by the softly falling snowflakes. Safely inside, you slink to your seat all wet and cold and miserable and spend the morning speculating how your new suit will look after it is pressed. By noon the mercury, which in the morning registered 80, has gone down below Middletown, and at five o'clock you plow your way home through two feet of snow, a wretched remnant of the dapper youth who sallied forth so gayly in the morning. Thus cometh the beautiful spring, tra la la.

E. S.

Taylorville

A Dog— I am a dog. Once my master took me with him hunting. I was almost as big as my master when I stand up.

I started to barking right away when I smelled a wolf's tracks. When I came to the wolf's den, I saw the wolf's shining red eyes. The wolf and I had a fight. It took me about an hour before I killed him.

Then I carried the wolf out of the den and gave it to my master. My master got twentyfive dollars for the fur. I had a good feast of the wolf's bones and flesh. When I had eaten all I wanted I went and layed down in the sun.

Claude Slayback, 4th Grade.

Englewood

Fire! Fire!— The other morning as I was coming to school I was accosted with the great "How do you do," of "Fire! Fire!" I ran around the school building where all the children were gathered. I just caught a glimpse of the honorable chief of our fire department, Glen Gibson, heroically climbing upon the roof of the schoolhouse with a pail of water in one hand. Master Kenneth Swallow was already upon the roof splashing water all over it. Down below, on the ground, the renowned firemen Clarence McKinnon and Chester Patrick stood faithfully hoisting buckets of water upon the roof. However, the smoke soon subsided and all was serene once more. We then asked some men for their opinion of the "smoke." Their answer was, that they thought it to be only steam which was caused by the melting ice on the roof. Of course we want to give these gracious young men their dues. But we only hope they will be as useful in a real calamity.

Mary Williams, 8th Grade

A Popcorn Party— One Friday afternoon in March Mrs. Morgan gave a party for Mary Williams, to the girls in the Domestic Science Class who went after school.

We found a good, warm, roaring fire in the fire-place. Here we popped our corn, after playing such games as "dumbo crambo" and "going to Jerusalem."

After our games we were served a dainty luncheon. Then we walked our mile home feeling we had all had a fine time.

Christine Waddell, 4th Grade.

Huffman

The Garden I Would Like to Have— I would like to have a garden with hedges all around the edge. In the rear of the lot I would have vegetables such as carrots, tomatoes, potatoes, corn, radishes and beans.

In the front yard I would have a rose bush on each side of the house and a ring of tulips in each corner of the front yard.

On the sides of the front yard I would have a row of pansies and sweet williams. On the veranda I would have honeysuckle and clematis and geraniums in the window boxes.

Near the walls I would have peonies and iris and along the walk from the street to the house, a row of poppies on each side.

I think this would make a lovely garden.

Edna Kervin, 6th Grade.

GERMANTOWN

Mr. James Garland was taken to Miami Valley Hospital on March 62, by Dr. Smalley, suffering with the grippe.

Miss Julia Marie Darnell is spending her Easter Vacation in Manchester, Ohio.

Miss Sadie McDonald is making weekly trips to Englewood and has us all guessing as we understand there are quite a few good prospects over there.

On March 18, a farewell party was given for the Misses Florence and Marie Rowan at the school house. A very enjoyable evening was spent by all. These popular young ladies will surely be missed.

We are pleased to welcome in our midst Mr. James Allen and family and Mr. Earl Chrismer and family.

Mr. Wilbert Harnish is on the sick list.

Stub Graham has removed his xmas decorations; also shaved the decoration (discoloration?) from his upper lip.

On February 25, Mrs. R. B. Pilcher gave a surprise sock and handkerchief shower in honor of her husband. It proved a success, the friends coming in on R. B. with a good supply.

Mrs. C. O. Shively and son Dick, are spending the week with her folks in Dayton.

On March 15, Mr. and Mrs. A. L. Pauls gave a six o'clock dinner in honor of Mr. R. E. Reynolds' 50th birthday. Those present were: Mr. and Mrs. P. W. McGinnis and son, John Connard, R. E. Reynolds, and Mr. and Mrs. A. L. Pauls.

Mr. and Mrs. Edward Minor are visiting Mr. and Mrs. Armstrong and Mr. and Mrs. Seward.

Anyone wishing to purchase a pencil sharpener please call on Mr. G. W. Kelley, formerly of Urbana, Champaign County.

Ralph Lehman has a new top and body on his flivver. The next thing he will need is a new engine, as it took him 18 hours to come from Dayton last Sunday.

August Oddie announces he will have the largest and best garden in camp. Orders for vegetables will be promptly filled.

Mrs. Christ Foehr is spending Easter week in Cincinnati.

ENGLEWOOD

What is it "Herb"?—Target Practice?

Heard in the shop about 11:30 every Saturday noon: "Shoot the nickle" "What's your point?"

Flood at Englewood

It was a small matter but it caused a great deal of excitement. Ward, the plumber, (?) forgot to turn off the water before fixing a bursted pipe in the office. The result was a flooded office and Miss Jordan obliged to stand on a chair until the timekeeper plunged bravely through the water and rescued her.

Butch Landis, at the warehouse counter—"Give me a 3/8 ? ? ? ?"

THE MIAMI CONSERVANCY BULLETIN

Popular?—Well Rather

Not only the school children show their appreciation of Mrs. Everdells congenial nature, but even the canine population of the camp have taken a fancy to following her around.

Will Someone Please Put Taylorsville on the Map?

Our post master finds difficulty in delivering letters addressed as follows: M. Whoesit, Taylorsville Dam, Englewood, Ohio.

George Trautman, alias "Wild Bill" and a direct descendant of Ike Walton, has the neighborhood believing that he is getting an early start on his garden. We are wise George, you're after fish-worms and other small game.

N. E. S. and W.

Since attending a formal ball in Cincy about two weeks ago, friend Rogers has been busy distributing the various sections of a dress suit to their owners in Dayton and Cincinnati.

Office Engineer Leaves the District

John Gerecke, former office engineer at Englewood, is now employed on the Indiana Highway Commission. We take this opportunity of extending to Mr. Gerecke our sincere wishes for continued success. A farewell party was held in honor of Mr. Gerecke and his family shortly before their departure.

Would You Call This a Dandy Line?

Oh, blossom, where is thy kick?

Wonder when the old fashioned nickel will again be recognized as a medium of exchange.

Within the last month about fifteen men have been imported into the United States from London, Kentucky, and are working at Englewood.

LOCKINGTON

Mrs. Barton M. Jones and daughter, Alice, are visiting Mrs. Jones' sister in New York City.

Mr. Frank J. Watson, our Master Mechanic, has been transferred to the Dayton Channel job. Before leaving Lockington he was presented with a gold watch chain by the men in his gang.

M. and Mrs. Elmer Argabright have moved into camp. Not to be outdone by W. J. Smith, who jumped into the core pool last fall, Superintendent Warburton took a plunge through the ice a few weeks ago when the temperature was near zero. He pulled himself out with little difficulty and suffered no ill effects. He was alone at the time, so it is impossible to report his exact language but its general purport is pretty well known.

TAYLORSVILLE

Ouija

Nobody goes to Pa nowadays for information. We all "ask Ouija, she knows." Frinstance, A few days ago two boys came to camp in search of a missing dog. Ouija had told them he could be found in Taylorsville. Their search proving in vain we are wondering who can be harboring the missing link.

Hinton and Foster Highway Engineers

N. L. Hinton and O. C. Foster are leaving the employ of the District to engage in road building. Our camp will feel the loss of these families, both of which have been tireless in camp activities. Our good wishes accompany them in their new endeavors.

Introducing Captain Parsons

True merit, unobtrusive though it may be in its manifestations, is bound to be rewarded. Rufus A. Parsons, our efficient office man, has been commissioned captain of infantry on the reserve list. We salute Captain Parsons.

Spring Pruning

The senior "half-editor" of the Camp News Items has lost his nerve and with it some of his chestiness. He has pruned the twigs from his north lip. We wonder whether some beguiling Delilah has made him weaken or whether it is merely the "spring clean-up."

The household goods which escaped the fire that resulted in the death of Julius Schmidt and his wife, were sold at public auction recently. In spite of a bad evening, our enterprising auctioneer, Bob Rogers, cried a successful sale. The clerk, B. H. Petty, reports the proceeds at \$122.95. They have been sent to the son, Clarence.

Community Frolic

The Community Frolic, held in the hall on Friday evening, March 26, was a great success. A large crowd was present to enjoy the antics of Rastus, Isaac, Fritz and Pat. Several vocal selections by Mr. Leonard Vogel proved that Taylorsville possesses real musical talent along with its ability to play base ball. The pie and coffee counter and the well-stocked fishpond attracted a great deal of attention, while the candy and cake raffle was freely patronized. The frolic closed with dancing.

"How Doth the Busy B. B. Bee"

The baseball bee is busily singing honeyed words to our athletes, who can already be seen tossing their heads and smoothing the kinks out of their joints. We are not given to boasting, but we are going to have some ball team.

HUFFMAN

Mrs. Darnell Returns

Mrs. Darnell returned from Memphis, Tennessee, on March 20, where she had been spending several weeks with her sister, who has been seriously ill. During her absence Miss Sara Belle has had a practical lesson in housekeeping. Judging from appearances, this experience will be valuable sometime sooner or later.

Mrs. Dr. Saylor and Mrs. B. V. Chambers attended the State W. C. T. U. Convention at Troy, on the 17th and 18th. Mrs. Chambers favored one session of the convention with a vocal solo.

Mrs. Gena and Mrs. Madigan entertained the Sunshine Circle at the Community Hall the evening of March 10; and Mrs. Zull and Mrs. Hutzleman were hostesses at the latter's home on March 24. These two meetings were no exceptions to the good times and good eats the club meetings are noted for.

We regret to lose the Shertzinger family, who have moved to Columbus. They were one of the early charter families in our camp.

Our sympathy is extended to those who were kept from attending the St. Patrick's dance, for they missed some good music and a jolly good time.

It is vacation time at school during the week, March 27 to April 2. The Misses Darnell are spending the time in Cincinnati and Manchester. This incidentally should give some other job besides Germantown, the advantage of hydraulic advice during the week.

Carrie Beth Chambers invited her Kindergarten classmates and teacher to help eat her birthday dinner on March 17. The candles on the cake were five.

The Burns family visited in Franklin on March 21. This was Fred Jr's. first trip to see Grandpa. How do we know it was his first trip? We saw how Fred Sr. carried the precious bundle.

The Sunday School Music Committee has been furnishing the school with several excellent special musical numbers during the past few Sundays.

Kindergartners Go Through Dangerous Ordeal

The Domestic Science Class recently invited the Kindergarten Class in for experimental purposes. As far as is known, they have all survived and are anxious to try it again.

O Doc! How Could You?

Doc at the punch board places his last dime and wins a box of candy. Then the question is, what to do with it. "If I take it home my wife will know I have been gambling; if I don't, and she finds my money is gone, I may need it." Enter Geneva and the question is answered, as she takes the box of candy and tells dad to punch the board again. Doc's mother is visiting him now and we hope to have a better deportment report for next month.

We welcome Mr. Segore, our new electrician, and family to our camp. If he can drive away the "Lights Out" Hoodoo, he will be doubly welcome.

Later— Poor start, Segore; they have been out four times in the last hour.

Baseball Team Starts Practice

The Huffman baseball team held its first regular practice on Sunday morning, March 28. Although there has been more or less preliminary limbering up for some time, the new uniforms have arrived, and we are ready to entertain any team from the other jobs that would like a good, clean game and will not feel badly if it should lose. We make no brags but our hopes are high.

THE MIAMI CONSERVANCY BULLETIN

MAY 1920



FIG. 123—HYDRAULIC JUMP AT GERMANTOWN DAM OUTLET, APRIL 20, 1920.



FIG. 124—HYDRAULIC JUMP AT GERMANTOWN DAM OUTLET, APRIL 20, 1920.

The dam crest is seen above the outlet, extending from hill to hill, blocking the valley. The flood water is coming through the outlet. In Fig. 123, the water at the highest point in the outlet channel was about six feet above its level at the conduit mouths. See also editorial, page 148.

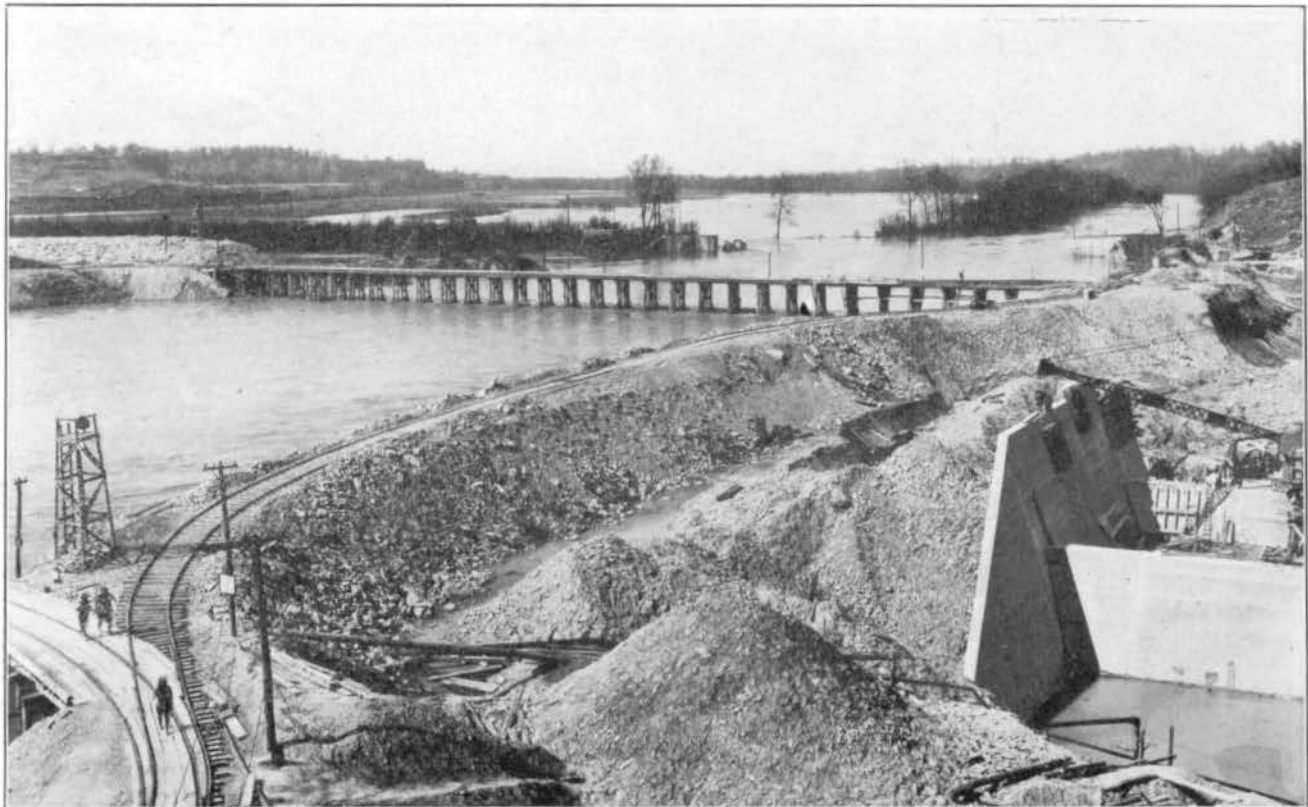


FIG. 125—THE FLOOD AT TAYLORSVILLE, APRIL 21, 1920.

No injury was done here. The old M. & E. canal bridge abutments, seen just beyond the trestle, stood through the 1913 flood, all of which flowed between them, the abutments and the canal embankment, seen also at the left over the trestle, being unsubmerged by the flood. See page 152.

BOARD OF DIRECTORS
Edward A. Deeds, President
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Chas. H. Paul, Asst. Chief Engineer
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THE MIAMI CONSERVANCY BULLETIN

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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 Office Engineer, Miami Conservancy District, Dayton, Ohio. Matter for publication should be sent to G. L. Teeple, Miami Conservancy District, Dayton, Ohio.

The Flood of April 19-21

Interesting and significant aspects of the flood of April 19-21 are treated elsewhere in this issue. One that may well receive further emphasis is the needless and acute state of alarm into which many people of Dayton were thrown during the higher stages of the river. Such fears are quite natural in Dayton. Whoever went through the experience of 1913, when the river rose beyond earlier flood levels, cannot escape the influence. It sunk into many minds an indefinite and fearsome impression of a flood as an incalculable thing, running out of the bounds of all ordinary law and prediction. They think of it as people in parts of Italy think of the earthquake and the volcanic eruption.

The impression needs vigorous combatting. A flood in Dayton is not incalculable. It follows definite and well-known laws. Given rainfall on any part of the Miami Valley watershed, and its effect on the river can be foretold with surprising accuracy. The Conservancy engineers spent five years in studying that watershed, the rainfall which reaches it, and the methods to meet the emergencies of floods the rainfall brings. Thirty-five river and rainfall stations are spotted over the watershed, where sentinels are set to watch and report. Reports in emergency come by telephone to the Conservancy Office. The quantity of rainfall is known. Given this quantity, the amount which will reach the river is known, very closely. And the speed with which the water will run down the valley is also known. Thus the time of arrival of a flood crest can be predicted. River levels are known all up and down the valley. The District Forecaster sits in his office with his finger on the pulse of the river, and the pulse of the river has this advantage over the pulse of a human patient—that the pulse of the river beats

so slowly—travelling downstream—that the Dayton pulse beat can be predicted many hours ahead, and alarm sent out if need for alarm arises. Millions of dollars and years of time have been spent on the Miami Valley project. It is safe to say that no such study of storm rainfall and its effect on a given river has ever before been made. And the study has this immediate value here and now—that the people of Dayton can sit safe in the knowledge that they will be warned when it is time to move out.

What is said above is said without qualification. Scarcely less strong is the point made on page 150, regarding the needlessness for alarm at all during the spring and summer months. Floods are not lawless. All storms which can bring dangerous floods to Dayton sweep across the country in broad orbits, following well known if somewhat variable paths. The effect of the season is also well known, and in the Miami Valley is one of the most marked characteristics brought out by the study of the Conservancy engineers. Rain cannot soak into frozen ground. Practically all that falls runs into the river like rain off a roof. In spring and summer a large percentage soaks in, "drinking a flood up" before it can form. When also the records of the valley are searched, after considering the above, and no record can be found in all its history of a spring or summer flood which would rise within seven feet of the present Dayton levee tops, it will be realized how needless were the fears of those Dayton people who in panic packed their goods and moved upstairs or moved out.

The Hydraulic Jump

The flood of April 16-21, 1920, gave the first opportunity to observe in action the operation of the hydraulic jump, as utilized and adapted in the outlet

works of the District dams. The operation at Germantown is shown in Figs. 123 and 124; at Lockington in Figs. 135 and 136. At Huffman and Englewood the outlet works are completed, but the "jump" did not come into action, at Huffman because Mad River is still flowing through the diversion channel instead of the regular dam outlet, and at Englewood because, the river channel being still open, the flood flow through the conduits did not reach a stage high enough to produce the characteristic action. At Taylorsville the outlet works are not yet built.

Technically the hydraulic jump represents the solution of one of the most formidable problems which the engineers of the District were called upon to face—the quenching of the destructive energies of the swiftly moving masses of water as they come pouring through the dam outlets in seasons of flood. Mountain torrents move rock masses which weigh thousands of pounds. Eddystone lighthouse, built of rock, on rock, was repeatedly destroyed by the battering action of swiftly moving waves. Flood water, at maximum stage for which the dams are built, will pour through the Englewood outlet at a speed of fifty to sixty feet per second—more than 30 miles per hour—hundreds of tons coming through every second. Let loose on the valley below, without restraint, these swiftly moving masses of water would tear up the river bed in a way which might undermine the dam itself. Some device was absolutely necessary to check and destroy the power of the flood water to do such mischief. An adaptation of the hydraulic jump was the solution.

The solution of the problem by this means is unique, the jump, while seen in action at the foot of the apron of every overfall dam, never before having been applied to water issuing from conduits under high heads. It was the result of extended mathematical investigation, and of an exhaustive set of experiments on a working model, corroborating the theoretical study. The hydraulic jump was shown to follow a law as exact and unvarying as that of gravitation, and furnishing as stable a foundation for engineering design. Mechanically the solution was as simple as it was unique. It was due principally to Professor S. M. Woodward, Consulting Engineer of the District, with the assistance of R. M. Riegel, now the District's Designing Engineer, and of J. C. Beebe.

The final design, as built at Lockington, was shown in Figs. 1, 5, 7 and 14, of the Bulletin for August, 1914. It consists essentially of a broad concrete chamber, at the foot of a widening concrete stairway which leads down from the outlet mouths of the conduits, the water flowing down the stairway into the chamber and on over a wall or weir into the river channel downstream. The top of this wall is only a foot below the level of the conduit floor, so that the chamber is always full of flowing water, whether in flood or not.

In full action under high flood, after completion, the water will issue from the conduits in a solid stream and descend the stairway in a widening and thinning and fairly smooth-surfaced sheet, till it plunges into the mass of water which occupies the pool chamber and stairway channel below, forcing this mass part way down the slope ahead of it, and piling the pool water up in a sloping wave front,

beyond which the water flows away almost level with the wave top. The whole mass of water in the pool chamber is lifted in level by the tremendous impact of the descending water, so that the upper portion, next the wave, flows back upstream down the slope of the wave front, in a mass of boiling foam, just as it flows down the front of a shoreward moving breaker on a sea beach. The energy of the descending sheet of water indeed penetrates the entire mass of water in the pool chamber, throwing it into violent agitation, and causing it to lather and foam and eddy in every part of the pool. In these myriad boils and lathering eddies the energy of the water is scattered and dissipated in innumerable collisions between its particles, and its speed as a mass downstream checked. It is as if a charging army were suddenly thrown into complete disorganization, and every man were to start charging in a different direction, at cross purposes with his neighbor.

A word as to the name—hydraulic jump. From one point of view it is apt. The water, descending smoothly the slope from the conduit outlet, seems to take a sudden "jump" and break into foam. But really the name is misleading. The descending water does not "jump." It plunges into the base of the stationary wave, and forces up the water further downstream in the pool chamber. The "jump" is only in seeming. The water where it seems to occur is really flowing down the slope of the wave front, upstream.

In connection with the above, the reader should be warned that Figs. 123 and 124 do not show a true hydraulic jump action, as the conduit floors at Germantown are at present about 12 feet below their true level, in order to increase the conduit capacity while the dam embankment is under construction. This throws the action as described above, quite out of normal, through its adaptation to the temporary circumstances. At Lockington (Figs. 135 and 136) the conduit floors are at their final level (although the sides and arches are not completed), and the true action develops.

Englewood Pumping Record

On April 27 the night crew on the hydraulic fill at Englewood broke its record. In a running time of 9 hours 19 minutes, one of the dredge pumps pumped into the dam a total of 312 cars of earth, equal to 2808 cubic yards. This is at a rate of $33\frac{1}{2}$ cars, or 301 cubic yards, per hour. Last year's record for a single pump was 200 cars during one shift. The pumps are 15-inch pumps, and the material goes into the section of the dam east of the river.

Since then the work on this section has been stopped until the river section can be brought up to a corresponding level. Work on the river section is begun and the above record was in turn broken by one of the pumps on this section, which pumped 435 cars in 8 hours 6 minutes, or at the rate of 395 cubic yards per hour, working against a static head of about 21 feet. It will require nearly a million cubic yards to bring the river section up to the level of that east of the river, and it will take until about October to pump it. Both sets of pumps, four in all, will then take up the task together, the two sections being thrown into one, with a set of pumps serving each half.

The Flood of April 19-22

Effect of Conservancy Work on the Flood

Flood control in the Miami Valley project is effected by two means—by the operation of the dams, and by improving the river channels. At Dayton the principal effect, as between these two, is that of the dams, especially the three immediately above it, the Taylorsville dam on the Miami, the Englewood dam on Stillwater River, and the Huffman dam on Mad River. As the river channel at these points is still necessarily wide open, as a protection to the dam structure itself during construction, the flood at Dayton was reduced in height very little. Moreover, the channel improvement through Dayton is largely levee building, there being comparatively little effect due to widening and deepening the channel itself; which means that what is being done in Dayton is little felt till the higher flood stages are reached—stages higher than the late flood.

An interesting detail of this was the effect on the river stage just above Island Park dam, a low over-fall structure at the junction of the Miami and Stillwater Rivers, near the north city limit. Mad River comes in about seven-eighths of a mile further down, and a little above Main Street. The Main Street gage gave a maximum flood height 1.4 feet higher than in 1916. The Island Park gage showed a reading 0.8 feet lower than in 1916. Naturally people who knew this thought the Conservancy work between the two points had effected a lowering of

the river by 2.2 feet (the sum of 1.4 and 0.8). It was a natural inference, but in fact only about five inches of the difference can be so credited. The Stillwater and the Miami, coming together at Island Park, had a combined flood flow in 1920 which was 2300 cubic feet per second less than in 1916, while Mad River, coming in below, had a flood flow which was 10,700 cubic feet per second greater. What the Island Park gage showed was the effect of the lessened flood flow in 1920 of the two streams coming together right at that point. The increased flow of Mad River came into the Miami too far below Island Park to effect the gage there. Main Street gage, however, just below the mouth of the Mad, felt the full effect of the Mad River increase, and ran up to an increase above 1916 of 1.4 feet, in spite of lessened contribution of the two other streams.

At Hamilton, about 40 miles below Dayton, valley storage above the city, in the long course of the river, would act to a very considerable degree as a retarding basin, even with no dams built. Here, therefore, the channel itself must play a larger share in the work of protection, and for this reason, and also because the work there is largely a job of channel deepening and widening, and so gets in its effect even at lower stages, the work already done at Hamilton effected a very considerable lowering of the flood height, amounting to a little over two feet.



FIG. 126—DRAGLINE EXCAVATOR "AFLOAT" ON THE FLOOD, APRIL 20, 1920.

This machine was engaged in digging earth for the dam embankment, on the valley bottom above the Germantown dam. The water rose into the house, but did no material damage. The electric motors, after their bath, were "rubbed down" and dried out by running a low voltage current through the coils. Flood crest behind the dam was 26 feet above low water, flooding about 250 acres in the valley above, the flats being flooded for about two miles upstream.

The Germantown dam, the only one as yet to effect full closure of its valley, and which is already up to a height to take without injury a flood equal to 1913, did the full work expected of it. The water behind the dam rose about 26 feet; below it about 9 feet; creating thus a difference of level of about 17 feet, and storing some 82,700,00 cubic feet of

water in the retarding basin, reducing thus the flood flow by 3,000 cubic feet per second. This reduced the Twin Creek flood crest by about 9 to 12 inches, below the dam. The main interest at Germantown was in the operation of the conduit outlets (see Figs. 123 and 124), which was entirely satisfactory. (See also page 148.)

Needless Alarm Over the Flood

The maximum stage at Main Street, 16.2 feet above low water, was nearly 3 feet higher than last year, and 1.4 feet higher than in 1916. In Dayton naturally, with a possibility of more rain, this created considerable alarm, the more so that in North Dayton (a part of the city), people on Tuesday had to be taken out of some of the houses, the lower stories being flooded. This fear was heightened by the fact that more rain was coming at the time, continuing steadily all the forenoon, and followed by heavy showers in the night. Many moved into the second story; some even moved out entirely. Telephone inquiries came into the Conservancy office by hundreds. With conditions looking their worst, in the middle of the trouble at midnight Tuesday the telephone service—through no fault, it should be noted, of the Conservancy staff—broke down for several hours, creating still more alarm, naturally not unmixed with anger. The District Forecaster, Ivan E. Houk, was compelled to go to the central telephone office to get in touch with the rain and river reports, coming in from the various observers in the Valley. Acknowledgments should be made in this connection to the electrical staff of the Delco Light Co., who came to the rescue of the disordered telephone service, and in a few hours had it once more in operation.

The alarm mentioned was natural, yet it needs to be emphasized that there was very little ground for it. It should be remembered that the chances for serious flood, in Dayton, after the month of March, are exceedingly remote. The season for such floods is in January, February and March. There is no record of a storm in the 54 years last past, in the spring and summer months, which would have reached within 7 feet of the top of the present Dayton levees. In fact, as far as is known, the 54 years can be extended back through the entire history of the town. No flood in the 54 years, during those months, came anywhere near the present levee height. The nearest fell nearly 7 feet short; all the rest big enough to be worth recording, fell from 7 to 12 feet short.

As to the flooded houses in an outlying section of North Dayton, it only meant that Mad River was up out of its banks. The land is low land, of little value, and for which no protection levees have been planned or built, for the reason that protection would cost more than it would come to. It was a case of annoyance only, no real danger. The same may be said of the flooded cellars and basements in some of the lower parts of the city. In times of high water the storm sewer outlets, where they empty into the river, are shut by gates, and the local storm water which falls subsequently, backs up on the lower ground, except where removed by the city's sewer pumping stations. There is never enough of this to be dangerous. The flooded cellars and basements are in reality the sign that the city officials are on the job, and have shut the gates through which the real enemy might enter. The eliminating of such storm water accumulations is entirely a pumping problem.

Such facts ought to give reassurance. They ought to quiet alarm at such times. Even in the danger period, from January to March, great floods are rare. In the spring and summer months, in the records of Dayton, they are unknown. It may be said, of course, that "you never can tell." Well, of course you can't, absolutely. The sky may fall or the sun collapse. But in the face of the known facts, serious alarm over floods in Dayton during the spring and summer months, must remind one of the little boy who was afraid to go into the woods, as



FIG. 127—DAYTON DRAGLINE, APRIL 20, 1920

he told his mother, "because a tree might fall on him."

For even floods follow a law. They are high in winter because the ground is frozen, and whatever rain falls runs off into the rivers; and they drop to

harmless proportions in spring and summer because the ground is like a sponge and can in large part soak the rain up and hold it for the growing crops. Common sense and the records combine to tell the same story.

The Effect of the Flood on the Conservancy Work and Equipment

While the District Forecaster's office was keeping in close touch with weather and river conditions, and issuing its Bulletins, those in charge of the Conservancy construction work were active in taking the necessary steps to guard the machinery and equipment from flood damage, as well as the work itself. In certain cases little could be done. A dragline excavator out in the middle of a broad valley bottom (as at Huffman—see Fig. 130), loading cars with earth for the dam, is largely at the mercy of the flood. To travel across the valley bottom and climb the higher ground consumes too much money and time to make it practicable. The chances of being caught in the act of escape are too great. And the bigger and more expensive the machine, the less the chance. A small machine on "caterpillar" traction can get away. (As witness the machine at Herman Avenue, which climbed the levee to higher ground). But a big machine, traveling laboriously on its "mats" and rollers, pulling ahead its hundred and forty tons "hand-over-hand" by its bucket and cable, faces a totally different job. One of the still bigger "drags," out in the middle of the Miami River, perched on an island which it has dug and built for itself out of river gravel, and compelled to roll its own two hundred tons, and carry its island with it, bucket by bucket, as it rolls (see Figs. 127 and 128), faces a still more insuperable task. Such big machines are simply "up against it." Caught in a flood, they pretty much have to take it as it comes. The electric motors can be hoisted up a few feet, to a precarious safety, but that is about all. Thus a dragline runner, on such a job, never boasts

that he can carry on "in spite of h-ll and high water." He knows better. Come rain enough, he knows that, barring a boat, he will be marooned in his little "hen coop," like Robinson Crusoe on his island. The draglines in the various pictures in this issue, tell their own tale better than words can.

A few particulars from the various jobs may be interesting. The Stillwater valley saw the least rain of any of the main streams, and for this reason the flood at Englewood gave practically no trouble. A short and inexpensive washout on one of the borrow pit tracks was the main item of damage. The old river channel being still available as well as the dam conduits, which have been many months in use, there was no storage above the dam, and no retarding effect on the flood below. Work was stopped for half a day; some of it for a day and a half. There was no damage to equipment.

Germantown has already been referred to. The dredge pipe bridge across the inlet channel was swept away, unavoidably, and a few pipe lengths carried down stream. At the peak of the flood the north conduit ran completely full, the south one nearly so, and both functioned according to plan. (See page 148). The reservoir came into use for about two miles above the dam, the water rising into the dragline at the borrow pit, and wetting some of the machinery, but doing no damage of consequence.

At Taylorsville, there was no injury whatever, either to equipment or to the work itself. The river here is still running in its usual channel. The old Miami and Erie canal embankment extends from

This dragline excavator, a Class 175 Bucyrus machine, electrically driven, working weight about 200 tons, represents the greatest single item of injury wrought either to work or equipment by the flood. The unfortunate loss of two of the crew shortly before the flood, by drowning, was the probable ultimate cause of the accident to the machine itself, the remainder of the crew rightly giving first attention to the recovery of the lost bodies, with the result that the flood, when it came, found the machine in a position permitting it to be undermined.

The machinery was not materially damaged.



FIG. 128—THE DRAGLINE IN F G. 127, FOUR DAYS LATER.

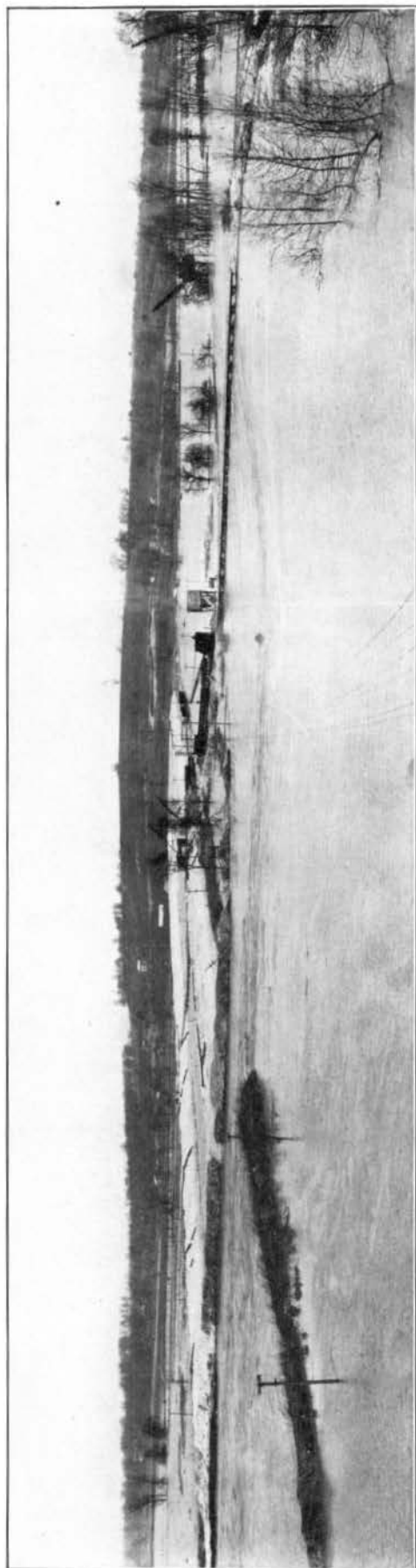


FIG. 129—VALLEY OF MAD RIVER AT HUFFMAN DAM, APRIL 21, 1920.

The section of the dam embankment under construction is seen at the left, only a little above the water. Mad River, running in its temporary diversion channel, flows past the near end of the dam embankment as seen, with the construction trestle crossing it nearly submerged. One bent of this trestle was

washed out and the entire trestle would have gone, if the water had risen a foot higher. The dam embankment, partly blocking the valley, raised the water above it higher than in 1913. The difference in level above and below the dam was about four feet.

the west bank westward across the entire flat, with the built section of the dam embankment running parallel to it a short distance downstream. The canal embankment is high enough to extend above even such a flood as that of 1913 (see also Fig. 125), and thus sheltered the dam embankment from wash. The pump motors had been hoisted out of reach of the flood, and men patrolled the upper trestle clearing away flotsam and drift. The dragline at the gravel pit (see Fig. —) was submerged to the house floor, but came through without damage. The river rose to a level fifty feet above the bottom of the new outlet channel, where concreting is in progress, causing more than usual seepage through the intervening coffer dam due to the unusual pressure, but this was easily kept down by setting an additional pump at work. The concreting was held up three days. An interesting comparison is furnished by the fact that the flood, which was all forced between the M. and E. canal bridge abutments as in 1913 (see again Fig. 125), showed this time no drop in the water at all, as it came through the opening. In 1913 the flood at this point dropped five feet, furnishing the best measurement obtained by the Conservancy engineers of the flood flow.

General flood conditions at Lockington may be inferred from the informal report of the engineer in charge that "a few loads of earth were washed from a camp road, and a few potatoes in the camp garden uncovered." The pumps shut down for about six hours to free the crew for emergency work, but resumed while the flood was at its crest. The chief interest was in the operation of the hydraulic jump at the conduit outlet, the head through the opening being 10.1 feet, sufficient to bring the jump into action. The characteristic phenomenon appeared in accordance with the design. This being the first time that a jump has functioned at any of the dams, it was the object of much interest and satisfaction. For a fuller account of this, see pages 147 and 148.

The flood at Huffman was more severe than at any other dam, due to the higher rainfall on its watershed, and the damage wrought was greater accordingly. One bent of the main trestle across the new (temporary) Mad river channel was washed out. A foot more rise, and the entire trestle would have gone. There was minor damage to the Erie railway tracks and to one of the temporary highways across the borrow pit. Electric motors in the new pump house at the east end of the dam were flooded but suffered no damage except such as cleaning and drying would remedy. The same may be said of two of the smaller electric transformers. The dragline at the borrow pit was marooned, the water rising into the house, but doing no damage. The greatest single money loss was in the washing away of a pile of coal, totalling some 500 tons, about half of which could be salvaged. The total loss at the dam may be estimated at about \$5,000. The dam embankment being up to a considerable height over the greater width of the valley, and the water practically all being forced through the opening in the new diversion channel, the water rose behind the dam about four feet, submerging about 250 acres and storing approximately 33,000,000 cubic feet of water. However, this storage taking place in about 24 hours, meant a saving in flood flow below the dam of only about 386 cubic feet per second. As

the total flood flow at the dam was 16,700 cubic feet per second, the effect on the river at Dayton was negligible (0.05 foot at Main Street bridge.)

Conditions at Dayton have already been referred to. Probably the greatest single loss anywhere along the river was due to the undermining of the big Class 175 Bucyrus dragline excavator. The accident might not have occurred, probably would not, but for the unfortunate loss of the lives of two of the dragline crew a few days before, by drowning. The search for the bodies of these men naturally took precedence over regular work on the part of the rest of the crew, with the result that the flood found the machine in a position which permitted the undermining of one corner of the gravel island on which it rested. (See also Figs. 127 and 128.)

Rainfall and River Records During the Flood

The storm of April 15-20 brought a rise in the Great Miami at Dayton higher than has been recorded since the disaster of 1913, the maximum stage being 16.2 feet above mean low water. The next highest rise in the period was in February, 1916, when the stage was 14.8 feet. The 16.2 stage was really the result of two storms, the U. S. Weather Bureau charts showing two low pressure areas—storm centers—sweeping successively eastward across the country. Each storm was of about two days duration, and the interval between them also about two days, making a six-day storm period.

The first storm began on the night of Thursday-Friday, the 15th and 16th, bringing heavy showers in the upper Miami Valley, and lighter rains below. From Versailles to Bellefontaine these showers brought from one to two inches, causing the streams to begin to rise. Lighter showers continued at intervals on Friday, day and night, and into Saturday, all over the valley, this ending the storm. During this period the low pressure area passed from the western Mississippi Valley almost directly eastward to the region of Virginia, with its center passing a trifle south of the Miami Valley. It brought a total rainfall in the upper valley of from one to $2\frac{3}{4}$ inches, dropping to an inch at Dayton and fading out entirely at Hamilton.

A water level float at Main Street bridge in Dayton is connected electrically with a recording device in the Conservancy office, which makes a continuous chart of the stage of the river. This record (drawn on a sheet of paper with a pencil), shows no effect on the river until 4 p. m. on Friday afternoon, twelve hours or more after the rain began. It then rose sharply, six inches an hour till Saturday morning, and then more slowly, a total of 8 feet, ending at a stage of 9.6, the maximum effect of the first storm, at 7 p. m. Saturday. It then fell steadily until Monday at 4 p. m., to a stage of 6 feet.

Meanwhile the second storm had begun early Monday morning, with light showers all day and into the night, heavy showers on Tuesday morning, a steady rain all Tuesday afternoon, and heavy showers again that night, especially around Urbana and Springfield in the upper valley. This ended the storm, the weather clearing on Wednesday.

The total rainfall for both storms was from 4 to $6\frac{1}{2}$ inches over the entire watershed. By contrast

At Troy there was a slight damage to one of the levees, and a delay to the work of a day or two. At Middletown the finished levee was scarcely affected, but a quantity of earth which had been moved by the dragline part way to its final position was swept away, this being the greatest item of single loss on any of the river work, unless perhaps to the big Dayton dragline machine. (See Figs. — and —). At Miamisburg the north levee west of the river was sandbagged to protect a factory, thus keeping the flood water down about $2\frac{1}{2}$ feet. Heavy seepage, however, counteracted this work to some extent, the water apparently coming in through unlocated under drains. At Franklin the dragline machine lay in a much exposed position, and suffered some injury, not serious, to the house.

the 1916 storm brought 2.89 inches, distributed pretty continuously over five days. In 1913 the March flood fall amounted to 8.9 inches in six days.

The rains of the second storm being light at first, the Dayton gage shows no effect on the river there until 1 a. m. Tuesday, when a rise began, slow at first, but sharpening at 8 a. m. to a foot an hour for five hours, then more slowly again, rising to a crest of 11.8. This marked the effect of the quick "run-off" near Dayton. Then the upper valley water came down, pushing the gage up to its maximum for the storm—16.2, at 8 a. m. Wednesday.

It is interesting to note that for a short period between 4 and 5 a. m. Tuesday, the river at Dayton fell slightly, while all three streams, the Miami, the Stillwater, and the Mad (all meeting at Dayton), were rising only a short distance above, due to the arrival of the first of the upper valley run-off.



FIG. 130—HUFFMAN DRAGLINE IN TROUBLE

This is one of the 140 ton machines referred to on page 151. It was at work in the middle of Mad River Valley, here about a quarter of a mile wide, digging earth for the embankment. (It may be seen at the right in Fig. 129, through the trees). A dragline machine of this size and type (Class 24 Bucyrus) travels on rollers which run on timber mattresses or "mats," which the dragline bucket picks up behind and lays down in front. It then casts out its bucket in front by its cable (fly rod fashion) hooks the bucket teeth into the earth and pulls itself ahead. Such a machine can't very well run away from a flood.

March Progress on the Work

GERMANTOWN

Pumping was started on March 22, and is being carried forward in good fashion. The slopes of the dam have been built up to the second berm across the entire width of the valley to within 50 feet of the top. The total amount of material placed at the end of March was 442,000 cubic yards. This is approximately 56 percent of the total hydraulic embankment to be placed.

By lowering the grade in the open ditch leading from the borrow pit on the hill north of the pumping plant an increase was obtained in the amount of material sluiced. This adds greatly to the amount of core material obtainable.

Surfacing the upstream and downstream slopes of the dam has been started. A portion of the upstream slope is being surfaced with the oversized rock from the pumping plant. The top soil obtained by stripping the damsite is being spread over the downstream slope for the surface dressing.

The contract for the remainder of the excavation in the spillway has been let and it is expected this work will begin about the middle of April.

Arthur L. Pauls, Division Engineer.

April 17, 1920.

ENGLEWOOD

Hydraulic fill was resumed, after the winter shut-down, on March 18. To date this season about 100,000 cubic yards have been pumped, making a total of 1,102,000 cubic yards, or 31½ percent of the entire embankment. During the day shift, April 12, 460 cars of material were pumped. This figure breaks all similar records by a wide margin. The construction of Sump No. 3 and the railroad approaches is practically completed.

The river bottom has been unwatered and inspected, such cleaning as was necessary has been done and the lower portion of the tower erected for the pressure recording cells.

On March 19 one of the large electric draglines began excavating for the temporary spillway, west of the Stillwater River.

A strip of seedlings and cuttings of elm, willow, cottonwood, and osage orange has been planted across the bottom land, east of the river and a mile north of the dam, for the purpose of creating a drift screen to catch floating debris.

The excavation of the temporary spillway has necessitated moving the field shop and warehouse from its present location. New buildings for this purpose are being erected north of the dam, west of the river.

H. S. R. McCurdy, Division Engineer.

April 15, 1920.

LOCKINGTON

The hydraulicking was interrupted on April 5 by a failure at the aqueduct which carries the canal feeder over Plum Creek. As our supply of water for sluicing was thus cut off, prompt repair was necessary. A force of men under Superintendent Warburton's personal direction immediately started the work, with the result that in spite of adverse weather conditions the job was completed and water turned into the feeder a few hours less than one week from the accident. Pumping was resumed April 13. The aqueduct is now in better condition than it has been for some years. The old sides of the flume were rebuilt of new materials, sheet piling was driven at the four corners of the flume, and the banks repaired. One masonry wing wall was relaid.

The dredge pumps are working day and night shifts building that part of the dam lying west of the channel. The fill is now at elevation 913, thirty-seven feet above the old bed of Loramie Creek.

The steam dragline is working day and night shifts excavating the cut-off trench east of the channel. This work is about 90 percent completed.

Placing of the rock surfacing of both the upper and lower slopes of the dam is being continued.

A drift barrier has been started by planting a large number of seedlings above the dam.

On April 20, 5:30 p. m., Loramie Creek reached an 8.9 foot stage, higher than it has been since 1913. It delayed

the hydraulicking only six hours, operations being resumed as soon as the water ceased rising. About 2000 second feet of water crossed the dam site and cut-off trench east of the outlet structure. Seven wagon loads of earth were washed from one of the camp roads, but otherwise no damage was done to the work.

Barton M. Jones, Division Engineer.

April 22, 1920.

TAYLORSVILLE

On March 30 the Lidgerwood dragline was shut down for repairs and a general overhauling, which will keep it out of service for about one month. The rock excavation in the inlet channel is practically finished and the balance of the earth to be excavated, about 100,000 cubic yards, will be cast up on the east bank and sluiced to the dredge pump.

The progress on the concrete last month was very good, the average for the month being about 200 cubic yards per day. The best average for one week was 250 cubic yards per day.

A track is being laid down the tow path of the canal in order to start storing gravel and sand for the main weir.

Some work has been done on the installation of the dredge pumps at the new location, but sluicing cannot be recommenced until the B. & O. R. R. tracks are removed to their new location. This will not be before about June 1.

O. N. Floyd, Division Engineer.

April 21, 1920.

HUFFMAN

The delivery of ballast gravel for the relocation of the railroads has been continued during the past month by the day shift, about 33,000 cubic yards having been put out to date. The dragline is moved ahead each evening and a sufficient area for the next day's work is stripped of clay and dirty gravel, down to the clean gravel, by the night shift. This top material is loaded onto dump car trains and taken to the dredge pump plant, whence it is pumped into the dam embankment.

Sluicing of material from the hillside at the north end of the dam, was started on April 9. This new plant is working very satisfactorily and the material found in the borrow pit is as good or better than had been expected. The sluice water is delivered to the giant at a pressure of 120 pounds per square inch, by two 10-inch pumps set at the foot of the hill. This water tears the material loose from the hillside and washes it through a 15-inch pipe flume directly into the dam.

C. C. Chambers, Division Engineer.

April 19, 1920.

DAYTON

Dragline D-15 is continuing channel excavation between Washington Street and Stewart Street. D-16 and D-8 are excavating for the unloading basin opposite the gravel plant. D-19 is grading the spoil bank between Herman Avenue and Webster Street.

Spring sowing of grass seed and dressing of levee slopes has begun.

About 2500 cubic yards of concrete has been placed in the South Robert Boulevard Wall, the work being now 56 per cent completed.

Sales of sand and gravel from the Sunrise Avenue plant have increased in volume during the past month. 8882 cubic yards of sand and gravel have been issued from the plant to date.

Price Brothers Company, working under contract, have started construction of concrete revetment above Herman Avenue bridge.

Channel excavation to date amounts to 801,000 cubic yards. The total pay quantity in spoil banks and levees is 492,000 cubic yards, including 60,000 cubic yards of levee embankment on Contract No. 41. In accomplishing this work the total yardage handled amounts to 1,325,300 cubic yards. These figures do not include excess excavation from the launching basin and scowing channels, amounting to 58,500 cubic yards.

C. A. Bock, Division Engineer.

April 17, 1920.

HAMILTON

The total yardage taken from the river channel to April 1 by the electric dragline, D-16-18, and the steam dragline, D-16-17, amounted to 1,200,000 cubic yards. The total for item 9 (channel excavation), was 660,900 cubic yards. The difference between the two figures represent mainly the earth excavated from the river bed to create a deep water channel, extending south of the city from Main Street bridge. The channel, by lowering the flow, helps protect the construction tracks from floods. These tracks are laid on the river bed, and carry the dump car trains which remove the earth of the regular channel excavation.

The electric dragline is still working on the last cut on the east side of the river between the Columbia Bridge and the R. R. bridge and is placing the material in the levee and the proposed boulevard east of the river.

The steam dragline has completed the excavation for the wall at the northwest corner of the Main Street bridge and will now drive the piling for this wall.

Price Bros.' concrete block plant has been completed and placed in operation. Price Bros. have also completed driving a 430-foot trestle north of the Columbia bridge, and will begin work on another, opposite the south spoil bank, in the near future.

The northeast wall at the Main Street bridge has been completed and concreting has been started at the southwest wall.

C. H. Eiffert, Division Engineer.

April 19, 1920.

LOWER RIVER WORK

Miamisburg: Jeffrey, Boorhem & Co. have not yet started their dragline machine. The narrow gauge tracks in the borrow pit have been put in shape to use. The camp has been moved to a point south of the Groendyke spur track and on the edge of the highway which parallels the B. & O. R. R. A pipe culvert is being placed under Bear Creek Road just north of the levee.

Franklin: The material for the levee on the west side of the river between the C. N. R. R. and the suspension bridge is practically all in place; dressing and seeding, however, have not been completed. The dragline machine has moved under the suspension bridge and is throwing up material for the levee which extends northward 400 feet from the bridge. The existing wall and the elevation of the ground make it impossible for the machine to place all of the material directly into the levee, but it will throw the material up onto the bank and that which has to be moved a second time will be handled by teams. The machine will then move on up the river and commence building levee along the edge of River Road, about 500 feet north of Lake Avenue.

Middletown: Cole Bros. commenced work on the last day of March, having been shut down two months. They have one thousand feet of levee to build, extending southward from Seventh Street. They have made one throw and are now placing the material in its final location. This work will probably be finished in about three weeks.

F. G. Blackwell, Assistant Engineer.

April 17, 1920.

The Sewerage Systems at the Conservancy Camps

Sanitary Sewers Laid in Camp Streets, Draining to Sedimentation Tanks of a Modified Imhoff Pattern

To make clear the why and how of the simple sewerage systems adopted to serve the Conservancy camps, a very brief review of recent principles and practice of modern sanitary science may be useful.

Water and sewerage questions are of course closely inter-connected. Household, manufacturing and sewage wastes of a modern community corrupt the soil, poison the adjacent ponds and streams, infect them with disease germs, and by thus polluting the sources of water supply, endanger the health of the people and spread communicable diseases. Modern sanitary engineering sets sentinels and guards at both of these main gateways. Its aim is to purify the wastes and sewage, to filter and cleanse the water supply, and by keeping continual watch on both by means of regular tests and inspection,

RAILWAY RELOCATION

Big Four and Erie—The Walsh Construction Company are now ballasting track for the Big Four and Erie. As the low elevation of the present location of the Erie interferes with the construction of the Huffman dam embankment, this road should properly be removed first. This, however, would necessitate operating the Erie across the present Big Four tracks, at Enon and Dayton, which is inadvisable.

The signal work at Fairfield is almost completed as far as this work can be done until the track is completely ballasted. The signal force will start work at Tates Point Interlocking Tower, where the B. & O. crosses the North Dayton cut-off, in a few days. An underpass is being constructed across the Big Four and Erie at Wood Park, near Focke's Point, the work being started on the 8th of April. The right-of-way fence is nearing completion. This work is being done by Funderberg Bros. of Osborn.

The Western Union Telegraph Company have resumed work on their pole line, which was delayed because of the lack of material.

Baltimore and Ohio—Roberts Bros. are finishing the ballasting and should complete their work about the middle of May. The District has a small force of men on this work digging ditches, etc.

The Baltimore and Ohio Railroad are nearly through with their own part of the work, south of Needmore Road. They expect to have it finished in about a month.

Ohio Electric—At the present time there is no construction work being done on the Ohio Electric. The pole line construction will be started in a very short time.

Albert Larsen, Division Engineer.

April 21, 1920.

RIVER AND WEATHER CONDITIONS

The rainfall in the Miami Valley during the month of March was about one-half inch less than normal. The greater part of the precipitation fell during three different storms; on the 4th and 5th, on the 11th and 12th, and on the 16th. Each of these storms caused a crest stage of about 8 feet at the Dayton gaging station. During the latter part of the month the river fell to comparatively low stages.

At the District's stations the total precipitation varied from 2.28 inches at the Lockington Dam to 4.18 inches at the Germantown Dam. At Dayton the total for the month amounted to 2.78 inches or 0.67 inches less than normal, thus increasing the accumulated deficiency since January 1st to 3.91 inches.

Observations taken by the U. S. Weather Bureau at Dayton show that the mean temperature for the month was 42.6 degrees or 2.2 degrees above normal; that there were 12 clear days, 9 partly cloudy days, 10 cloudy days and 12 days on which .01 inch or more of precipitation occurred; that the average wind velocity was 16.1 miles per hour, the prevailing direction being from the southwest; and that the maximum wind velocity for five minutes was 60 miles per hour from the south on the 28th.

Ivan E. Houk, District Forecaster.

May 4, 1920.

potations. He was not interested, perhaps, in liquor out of which the "kick" had been taken.

Modern practice, however, is based on the belief that sewage purification carried to the length referred to is wasting money. As a guard to the water supply, a dollar at the water works will go much farther than a dollar at the sewage plant. The main work of the latter is to prevent a nuisance, not to filter the city's water. Especially in small and less crowded communities like the Conservancy camps is this true.

Fresh sewage, carried through underground pipes in modern sewerage systems, is so highly diluted with water that it has little odor and is not particularly offensive. The organic substances which by their decomposition render it offensive do not constitute more than one part in 1200 or 1600 (in small rural communities), and not much more in most cities. They occur both as solids and in solution. It is the accumulation and decomposition of these at the sewer outlet, where it discharges, as it usually does, into some lake or stream, that produces the offense. The problem of sewage disposal is to break up these objectionable substances in the disposal plant, in such a way that the discharge from the plant is inoffensive and harmless. In most modern sewage plants this is accomplished by bacterial action.

The fact is interesting. Most of us think of bacilli or bacteria as dangerous "monsters," sources of disease and spreaders of pestilence. We picture them by millions and myriads, in the air and water, carrying death in an invisible cloud. We are told, of course, that like human beings they are both "good" and "bad," but we do not realize it. The sanitary engineer does. To him they are indispensable. They are his principal ally. They are the prize scavengers of the world, and as such he marshals them by armies and sets them at work.

For the suspended solids of the sewage, the principal bacterial work room is the "sludge chamber" in some form of sedimentation tank. The form used at the Conservancy camps consists of three rectangular concrete chambers side by side. See Figs. 131 and 132. The fresh liquid, bearing the solids, mostly in a finely divided state, flows through the two outside chambers, "TT," Fig. 132, in a very slow stream, the chambers being very large in proportion to the pipes which bring the sewage. The bottom of these side chambers is sloping. The solids sink to the bottom and slide on down the slope through a wide slot into the central chamber "SS," where they collect and remain in a mass at the bottom. It is here that they are "attacked" by the bacteria.

The word "attack" is somewhat misleading, though often used. A bacterium is not an animal. It is a plant, so small that each particle of suspended sludge in the chamber is as a separate field, on which the bacteria grow, thick as grass in a pasture. Unlike the grass, however, they consume a large part of the sustaining soil. But as fresh sludge is continually sliding down the sloping bottom of the "sedimentation chamber" into the sludge chamber, "fresh fields and pastures new" are continually supplied to the microscopic vegetation. Thus it is pleasanter—and truer—to think of such a "sludge chamber" not as a battle ground for "attack," but rather as an unusual kind of garden, the object of

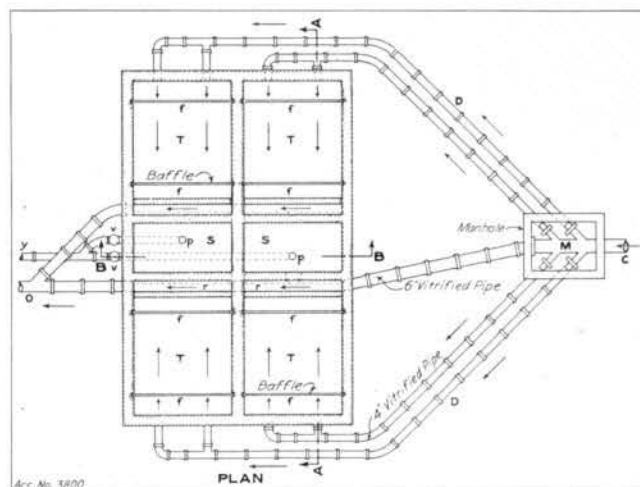


FIG. 131—SEDIMENTATION TANK PLAN

whose maintenance is to purify the garden soil.

On Imhoff sludge chamber, when first started in a new sewage plant, is said to "ripen," the required period being about four weeks. This means that it takes that time to "mobilize" the full quota of the bacterial army, or get the "garden" fully stocked with bacterial vegetation, and the purification process in full swing. The purified sludge accumulates at the bottom of the chamber, while the active bacterial growth is carried on in the upper layers, on the newly arriving sludge.

The sludge chamber being filled with liquid (practically all water, which enters with the first indraught of sewage), the ripened sludge is diluted with this water. The mixed ripe-sludge-and-water are drawn off periodically through pipes and valves, (pp. and vv. in Figs. 131 and 132) opening through the bottom of the sludge chamber, the water constituting 75 to 85 per cent of the mass. In many disposal plants this sludge is run onto a horizontal bed of sand, through which the water drains away, leaving the sludge, after several days' drying, in a condition resembling very porous or fibrous garden soil, and having no odor, or with an inoffensive odor resembling tar.

It is this inoffensiveness of the sludge discharge which constitutes one superiority of such a type of tank as that described (the Imhoff type), and which has rendered it the most generally accepted one in recent American practice. The sludge, after drying on the sand bed, can be removed and piled on waste land such as lies adjacent to most sewage disposal plants, where it lies inert, creating no nuisance whatever.

The liquid sewage in the side chambers of the Conservancy sedimentation tanks, "TT," after the removal of the solid particles as described, flows on, passing under the "scum boards" "ff" and then over the side wall of the trough "rr" into that trough, thence along the trough to the outlet pipe "O." In the ordinary system, this discharges directly to a stream or lake, or to some form of bed for further treatment, as conditions require.

The second outstanding characteristic of a tank of the Imhoff type, is that the liquid sewage, when discharged, is still "fresh;" that is, has sustained practically no decomposition. This is brought about by the practically complete separa-

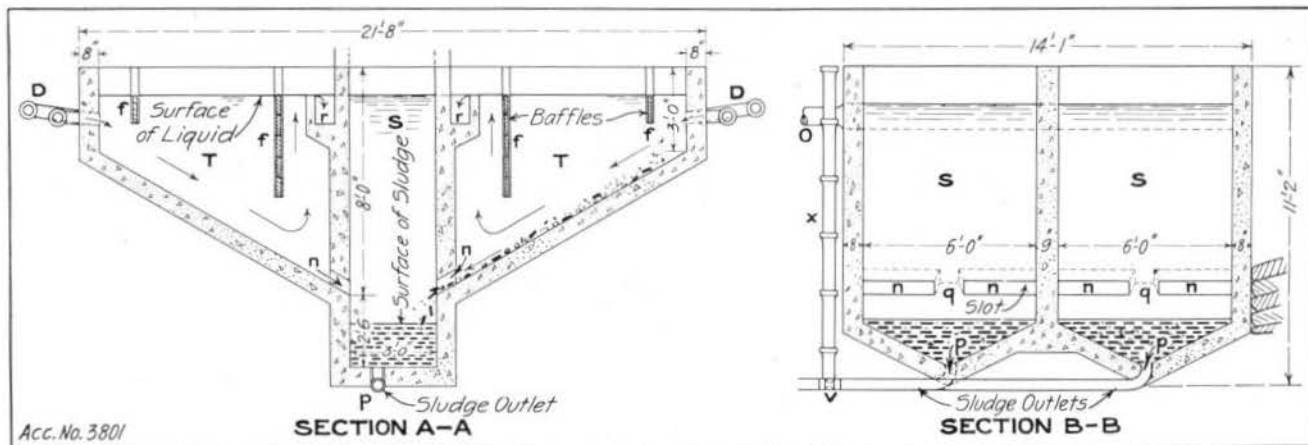


FIG. 132—SEDIMENTATION TANK SECTIONS

tion of the sludge tank, "SS," in which decomposition is in continual progress, from the sedimentation chambers, TT." It is here that the Imhoff system makes a decided step in advance of the old "septic tank," so much in vogue some years ago. There the sludge and sedimentation chambers were in one, the sewage flowing slowly through a single wide rectangular tank, enclosed above, in which the bacterial action on the sludge went on in the presence of the fresh incoming sewage. The out-flowing liquid from the septic tank was thus tainted with the products of this sludge decomposition, and on that account was much more liable to become offensive. Imhoff liquid "effluent," discharged still fresh into the receiving lake or stream, is so diluted, and in addition, so widely open to purifying bacterial action after this dilution, that it gives no offense. When not discharged into some body of water, the "effluent" from an Imhoff tank must receive further treatment, by passing it through a "trickling filter," or a "contact bed," where further bacterial action can occur on the liquid, breaking up the organic substances in solution, and reducing them to other chemical compounds which are harmless and inoffensive.

Thus both the solid and the dissolved organic substances which render sewage offensive and dangerous to health are removed in the main, whether in trickling filters or contact beds, or in lakes or running streams, by the action of beneficial bacteria. How little use is made of chemical treatment, by comparison, ap-

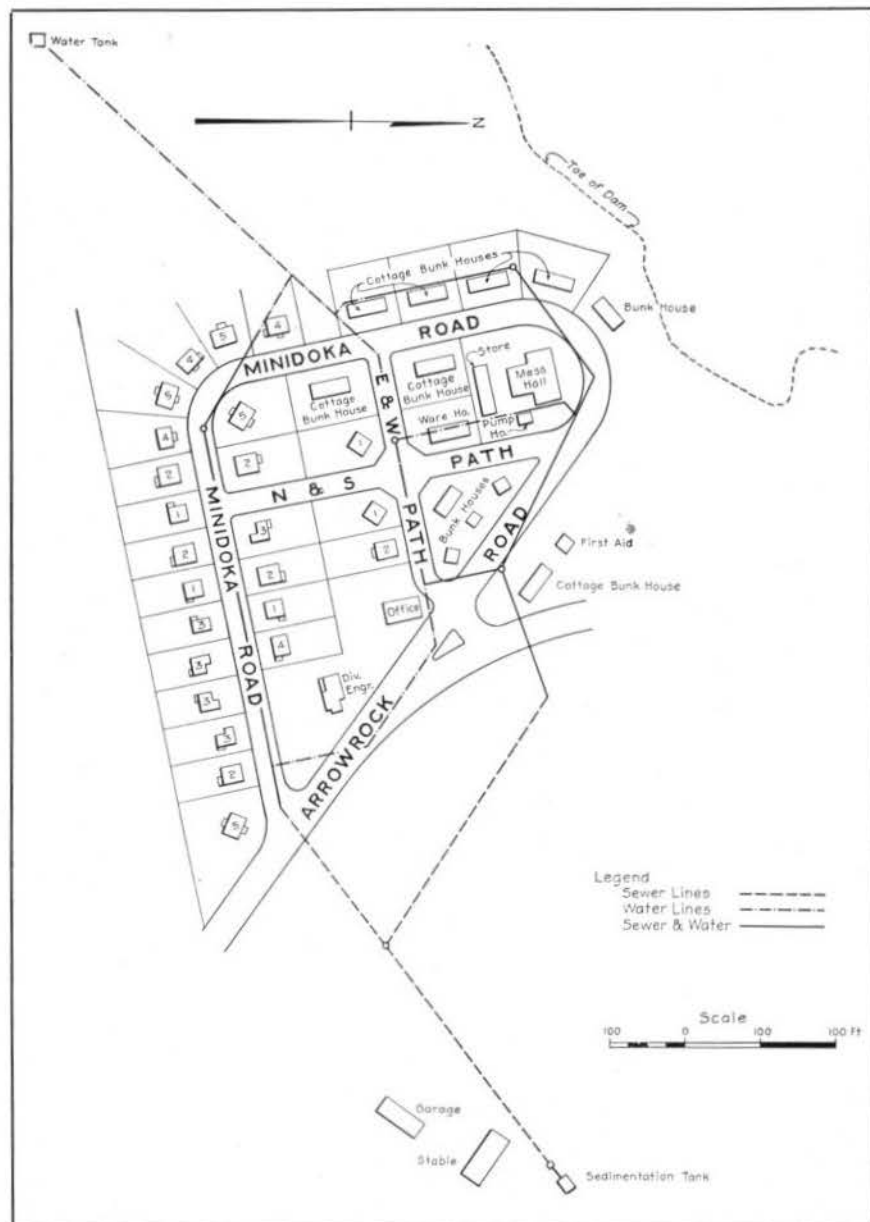


FIG. 133—WATER AND SEWERAGE PIPE LAYOUT, GERMANTOWN

This is the most compact camp layout. The camp accommodates about 300 people. Water and sewer pipes in the same trench are indicated by solid lines. Sewer pipe lines by dotted lines. Water pipes by dot-and-dash lines. All houses are provided with electric, water and sewerage facilities.

pears in the fact that in a modern treatise on sewage disposal, the subject of chemical treatment occupies only two chapters out of twenty. It is an interesting observation that the same microscopic organisms which modern medicine has shown to be in certain species the principal sources of disease, modern sanitation makes use of in other species to smother pestilence and promote health. The thread of good-and-evil runs intertwined through Nature.

The application of a system of sewage treatment to the needs of the Conservancy camps naturally required special adaptation. The camps are small, the two largest built to accommodate a total maximum camp population of about 500. For Conservancy use they would be operated about four years, after which the whole camp plant would have to be disposed of. The sites are all several miles from the nearest town or city, but in all cases except one are near railway or electric railway lines. Under such circumstances it was considered best to so design the camps that they could become permanent villages after the Conservancy work was done. The buildings are inexpensive one or two story structures of the summer cottage type, with water, electric and sewerage service provided.

The sewerage service in such a case must be simple and inexpensive. It must be simple because after the Conservancy work is done, skilled attendance is out of the question. It must be inexpensive obviously, both for Conservancy use and for later recoupment of cost in the sale of the cottages.

At the indoor end, the plumbing is of modern standard design with open plumbing, and sufficient to allow for free use of the village water and proper disposal of all household waste. Connection to the pipe lines in the streets is by 4-inch standard sewer pipe. All equipment, of course, passed the Ohio Board of Health inspection.

The street pipes are six or eight inches in size, and take only the house sewage, storm water from the streets being excluded. To include the latter would have required so large pipes as to make the cost prohibitive. The lines were so located that wherever possible the same trenches would serve both water and sewer pipes, thus saving expense. The sewers were laid on a minimum grade of about 9½ inches in 100 feet, this being the least slope at which the flow is swift enough to keep them clean.

For sewage treatment a standard pattern of Imhoff tank would cost too much, largely on account of the depth necessary, approximating thirty feet. Rock occurring near the ground surface, this would require expensive excavation, since the tanks must be below street sewer level, in order to receive the sewage by gravity flow. It was for this reason that the design indicated in Fig. 132 and described above, was adopted. By locating the greater part of the sludge chamber, between the two sedimentation chambers, instead of below them, a great saving in depth was obtained, while at the same time the sludge decomposition was completely separated from the fresh liquid sewage, as the best results require.

It is interesting, in this connection, to compare the Conservancy tanks with the sedimentation tanks at Orange, Cal. These were originally the old-fashioned septic tanks, and were a nuisance on account of the odor. They were of concrete and were transformed to a modified Imhoff pattern by build-

ing inside of them redwood partitions and sloping floors. They were not deepened in the process, however, the depth from the bottom to the surface of the liquid after the change being only 7 feet 9 inches, as against three or more times that dimension in the standard Imhoff design. Nevertheless, the transformation greatly improved the conditions, the sludge after the change being "typical dark-brown Imhoff tank sludge" drying readily after its removal from the tanks. The Conservancy tanks show a depth below the surface of the liquid of 9 feet, 6 inches, as against the 7 feet, 9 inches at Orange, and after being in use more than a year, create no perceptible odor even in the near neighborhood.

The usual discharge of a sewage plant, it has been said, is into some lake or stream, which dilutes it still more, and also gives further opportunity for bacterial action by the micro-organisms which infest practically all natural waters. A lake has certain advantages over a running stream in that the purifying bacterial action takes place more freely in quiet water. On the other hand, the running stream gives much greater and quicker dilution, if of sufficient size. The latter point is, of course, important. Nevertheless, the smallness of the stream flow which will take the sewage of a town, without any preliminary tankage or treatment whatever, and dispose of it without offense, is surprising. Seven cubic feet per second is reckoned ample to take care of a thousand people. A brook seven feet wide and a foot deep, running at an ordinary rate of the Miami River in summer at Main Street bridge, will supply this amount of water. A brook half as large (giving 3½ "second feet"), will be sufficient for such a population in most cases, but is too near the line of possible offense to be desirable.

The point has application in considering the disposal of the sewage effluents at the various Conservancy camps. At Germantown the discharge is into Twin Creek, at Englewood into the Stillwater River, at Lockington into Loramie Creek, at Taylorsville into the Miami, and at Huffman into Mad River. The minimum known flow of these streams, taken in most cases in the summer of 1914, an exceptionally dry season, is shown in the following table. (The flow is in cubic feet per second.)

Minimum Flow of Miami Valley Streams.

Twin Creek	10
Stillwater River (at West Milton).....	25
Loramie Creek (In 1918)	9
Miami River (at Tadmor).....	70
Mad River (at Springfield)	155
Mad River (at Wilbur Wright Field, 1918).....	200

The maximum number of men to be provided for at Englewood and Taylorsville, the two largest camps, may be reckoned at 300. With their families, most of them not being married, this might make a total camp population in each of these cases, of 500. At seven cubic feet per second per thousand people, the Stillwater at Englewood (below West Milton), would take care of a population of 3500, seven times the maximum camp population. This, with no sewage treatment whatever. Similarly at Taylorsville, the Miami would take care of 10,000 people; Mad River at Huffman, of 28,000 people; Loramie Creek of 1286, and Twin Creek of 1428. With the known conditions, the danger of creating a nuisance is remote.

USED STEEL BRIDGES FOR SALE

5 Single Track Truss Bridge Spans 136 Feet to 154 Feet.
7 Through Girder Bridge Spans 23 Feet to 100 Feet.
10 Deck Girder Bridge Spans 22 Feet to 45 Feet.
72 I-Beams (15 to 24 inches,) Lengths Up to 20 Feet.
(All the above in use 12 years on important lines.)

Address Dept. "X" Miami Conservancy District, Dayton, Ohio

MIAMI CONSERVANCY INEXHAUSTIBLE FARMS FOR SALE



FIG. 134—CONSERVANCY CORN LAND, OCT. 1, 1918.

Rich Corn Farms, Kept Perpetually Fertile by Alluvial Deposits.
No Manure or Fertilizer Necessary.
No Pioneering—These Are Well-Improved, Going Farms.
In One of the Richest River Valleys of the Middle West.
Fourteen Steam and Electric Roads Run Through It.
Nine Flourishing Cities (Populations from 4,000 to 153,000), Fur-
nishing Near-by Markets.

Address Office "F"—Miami Conservancy District. Dayton, Ohio

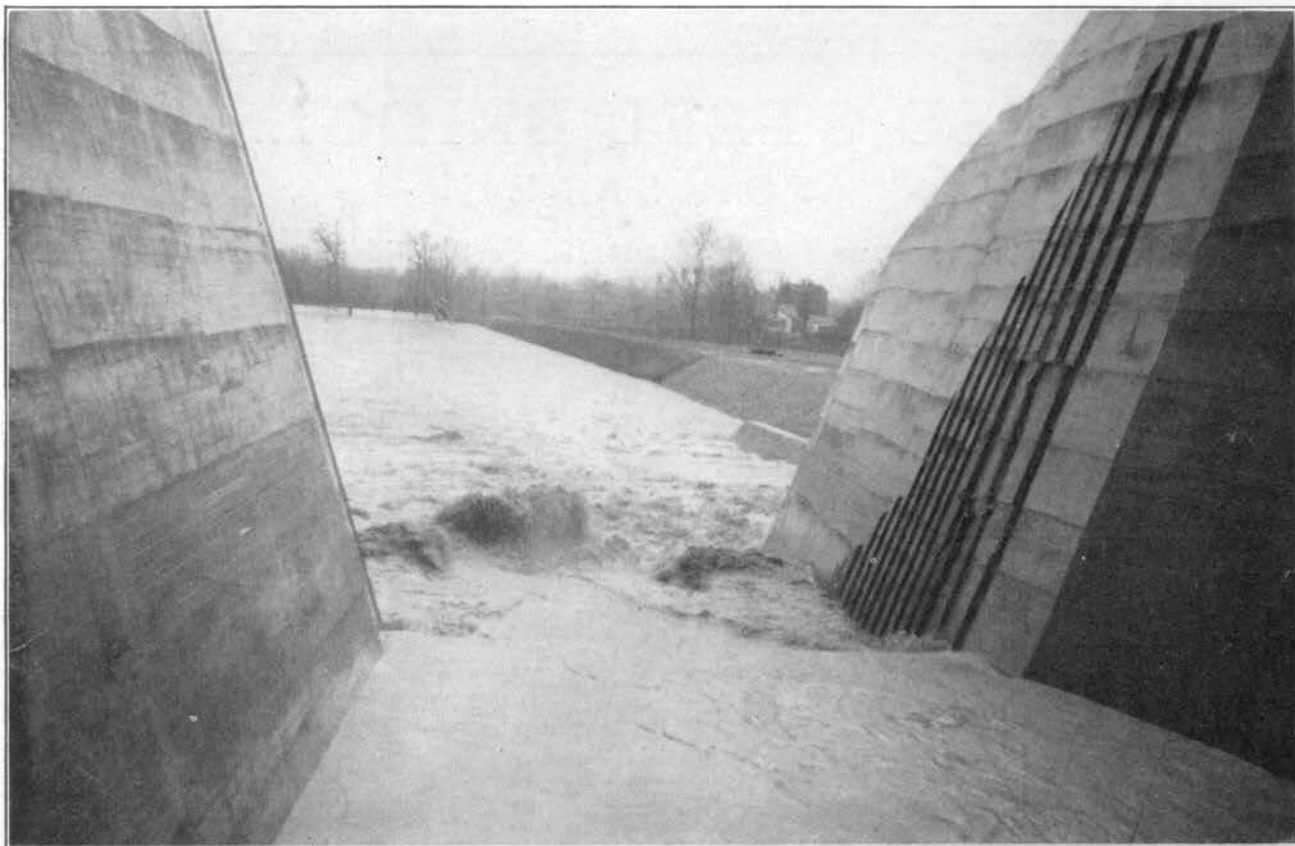


FIG. 135—HYDRAULIC JUMP AT LOCKINGTON DAM, APRIL 20, 1920, LOOKING DOWNSTREAM



FIG. 135—HYDRAULIC JUMP AT LOCKINGTON DAM, APRIL 20, 1920, LOOKING UPSTREAM

The floor of the outlet works at Lockington is completed to grade throughout; hence the flood (under 10.1 feet head), developed a true hydraulic jump (although a small one), despite the fact that the spillway wall, and the conduits which pierce it, have not been completed. The hydraulic jump at Germantown, shown in Figs. 123 and 124, is not a true "jump," owing to the double depth of the conduits, in their present uncompleted condition, throwing the conduit floor below the true grade. See pages 147 and 148. The pictures showing the condition under a flow due to 10 feet head, some idea may be gained of the condition under maximum flood head (54 feet). To protect the channel below from the destructive energy of the flood water, was one of the most formidable problems of the job.

THE MIAMI CONSERVANCY BULLETIN SUPPLEMENT "The News Letter"

To Promote the Conservancy Spirit on the Work

MAY, 1920

ENGLEWOOD

Recreation Club Activities

The Recreation Club is going to supply the camp hospital with comforts for the sick, such as hot water bottles, bed pans, thermometer and all other necessary things. Mrs. Bjorgum was kind enough to donate \$1.00 for a thermometer. They also have bought a supply of dishes to use for dances and entertainments. The hospital comforts may be used by any family in camp in case of sickness.

Mrs. Alpers, Sec'y and Treas.

Douthit Engaged

We take great pleasure in announcing the engagement of George R. Douthit to Miss Ruth Beck of Sioux Falls, South Dakota.

Heard at the Shop

Laborer: "Is Mr. Byers around?"

Herb: "No, can't you see that Pete is smoking a cigarette?"



GOLF VS. GARDEN

The above illustration shows the inclination of our Division Engineer as regards gardens and golf this spring. Strongly in favor of the latter:

Timekeeper: "What's the matter, Wald; you look worried?"

Wald: "I'm afraid my dog is going to die. The other day I took it to the doctor and he told me to give the dog a pill two nights running and skip the third. Well, the first two nights were all right, but darned if I could make the dog skip around last night when he was taking the third pill."

Englewood may stay out of the baseball league this year so as to give Taylorsville a chance.

George Rodgers is indeed an entertaining chap. It is said that quite a number of Cincinnati's charming young ladies, also students of the University, have finally discovered a very befitting and appropriate name for friend Rodgers. He is now known as "Playful." This is the way it happened. While passing the residence of one of George's favorite dames the other evening, several of his classmates noticed George in the parlor engaged in an exciting pillow throwing contest. Deftly dodging to the right and left, George would wait for his opportunity; yes, he threw them real hard, too. Quite playful, we would say, is this denizen of the parlor and sofa.

Pipeman: "Why are they making two new hog boxes?"
Al Hawkins: "That is one of our efficiency methods. If we are using one hog box and the Dayton Power and Light shut off the power, we can turn on the other hog box."

Pipeman: "Oh."

Mrs. Mulheron's father is visiting in camp for a few days. Esther Hook spent Easter week end visiting her mother in Middle Point, Ohio.

Mr. and Mrs. Armstrong were visiting in camp Sunday, April 11.

Marshall Whorley of Shippensburg, Pa., has been visiting Mr. and Mrs. McCurdy for several days.

Sickness has invaded camp. Wald's dog has an acute attack of stomach trouble.

TAYLORSVILLE

It Auto Be Done

It is rumored that the commissioners of Taylorsville are seriously considering the advisability of placing a traffic cop at the intersection of Coldwater and Cedar Roads, to handle the ever increasing automobile traffic.

At the present time there are about thirty privately owned autos and Fords in camp, with bright prospects for the addition of six or eight more before the panic arrives.

Also, rumor No. 2 has it that Messrs. Hölahan and Cole are planning to bring a damage suit against the nearby auto dealers for interfering with their lucrative "jitney" business.

It's a Girl

Since the last issue of the Bulletin, Taylorsville's population has been increased by the arrival of a baby girl in the Charley Chandler home. Congratulations!

Sounds Fishy

The latest business incorporated in camp is, "Farmer & Crampton, Fish Dealers." About three weeks ago these enterprising members of the field party solicited orders for about \$15 worth of high quality fish to be delivered one day after being caught in Lake Erie. To date nothing has been seen of either the fish or the money. At present writing both members of the firm are busily engaged in seining the numerous pools of water left by the recent flood, and it is thought that they are planning to fill their orders with carp instead of the high quality perch, cat and white fish.

Raring To Go

At a recent meeting of the baseball enthusiasts, Mr. W. D. Rogers was elected manager, and plans were made for turning out a winning team this season. Several have turned out for practice and some very promising players are in evidence. The "winter stars" are rapidly being eliminated and in the very near future Taylorsville will be ready to take on all comers—the Warehouse team preferred.

Easter Program

A splendid Easter program was executed by the Taylorsville Sunday School in Community Hall, April 4th. The program consisted of recitations, songs and dialogues, with practically all the children taking some part. The final event was a very effective tableau depicting "Mary at the Tomb." Credit for the success of the program goes to Miss Margaret McCarthy, who trained and directed those taking part. There were fifty-four people present in spite of the rain. The collection of \$10.11 was turned over to the Dayton Community Chest.

THE MIAMI CONSERVANCY BULLETIN

Commissary Men Banquet

The Commissary men recently partook of a fine banquet, prepared entirely in their own establishment. We did not attend, but the menu, published below, would indicate that the "cats" were prepared by "some chef." The Blue Room was reserved for this occasion.

Menu

Soup	Chicken	Okra
Blue Points on Half Shell, with Burnt Whiskey		
Spanish Gallentine of Chicken		Royal Sauce
Potatoes a la Gray	Asparagus au Buerre	
Stuffed Eggs au Kingston		
Lobster Salad	Royal Danish Layer Cake	
Fruit Supremed	Ice Cream (Demitasse)	
Champagne Bordere		

LOCKINGTON

The news of the death of Frank J. Watson came as a great shock to everyone at Lockington. Mr. Watson had been Master Mechanic here from March, 1919, until this spring, when he was transferred to the Dayton work. He was very highly esteemed because of his thoroughness in his work, his leadership, and his genial nature. The job feels his loss very deeply and extends its sincere sympathy to Mrs. Watson and the family.

Mr. and Mrs. L. J. McWilliams are the proud parents of a boy, Robert Lawrence, born March 23, at Newark, Ohio. Mac reports that both mother and baby are getting along fine and that he will soon have them home with him.

Mrs. Barton M. Jones and daughter Alice have returned from a visit to New York City.

Mr. and Mrs. Stanley Stewart of Lockington are the proud parents of a son, born April 27.

Erroneous ideas in regard to the construction and function of the dam were evident in remarks by visitors during the recent high water. Some who are accustomed to use expletives when speaking of the District, seemed disappointed when they saw that our dam means something. Certain people in Piqua who had not visited us were surprised that no damage was done, either to the dam or equipment. As the men were needed for other work, one pump crew was held up for about six hours, but resumed while the flood was at its crest. A few wagon loads of earth were washed from a road through the camp, and a few potatoes in the new garden were uncovered.

HUFFMAN

For instructions for serving baked "track-jack" duck, see Secore.

The ladies of the camp gave an indoor picnic supper at the Community Hall April 14th. Several pie-ous husbands were present, and all pie-eating records were broken. The championship changed hands several times during the evening.

Mrs. Roy Hutzelman, who has been ill, is much improved and is spending a few days with her parents near Springfield.

Mr. and Mrs. Tom Nagle have moved to Hamilton, where Mr. Nagle has accepted a position as superintendent for Fred R. Jones Co., contractors.

We were all glad to welcome Mr. and Mrs. O. K. Guthrie to camp for a few days' visit this week. Several dinner parties were given for them.

The card party which was given at the Community Hall Monday evening was greatly enjoyed by all present. Mrs. Secore and Mr. Dye carried off the prizes.

All who attended the dance Saturday night reported a fine time, even though the punch was minus the kick. It seemed like old times to have the Guthries with us.

Mr. and Mrs. Verne Clawson and Dorothy spent Easter Sunday with the Pauls at Germantown.

Mrs. Jack Cook and little Jack have returned from Utica, N. Y., where they visited several weeks.

Miss Sara Bell Darnell and mother were hostesses to the Sunshine Club at their home on South Edgewood avenue, April 7. After games and needlework a buffet luncheon was served.

Mesdames Saylor and Schuler entertained the club at the home of the former on April 21. At this meeting the members had the pleasure of guessing each other's baby picture, which pastime proved quite interesting indeed. Mrs. B. V. Chambers favored the club with some vocal selections, while delicious refreshments were served.

GERMANTOWN

On March 29th, Mr. and Mrs. Longfellow entertained the members of the camp at their home in Germantown. The camp people enjoyed every moment of the evening. Most of the time was spent in playing cards, after which a delicious lunch was served.

Mrs. Hancock, Mrs. Spaid, Mrs. Trowbridge, Mrs. Winkle, Mrs. Miley and Mrs. Bailey from Middletown gave a surprise dinner party for Mrs. Hancock on March 26th. The ladies brought with them a delicious dinner, including a beautiful birthday cake.

Mrs. Foehr had the pleasure of a week's visit from her mother, Mrs. Espel, and sister, Mrs. Bliss, both of Cincinnati.

Mrs. Wehrly and Mrs. Stewart were hostesses at the last card party of the season, the members having decided to postpone the next meeting until autumn.

Mr. and Mrs. Arthur A. Pauls entertained on Sunday, April 11th, Mr. and Mrs. Chas. H. Paul of Dayton and Mr. and Mrs. V. B. Clawson and daughter Dorothy of Huffman.

On April 6th, Miss Rhea Wilke of Germantown was hostess to the card club. Beautiful prizes were given, after which the guests enjoyed dainty refreshments and music.

Mr. and Mrs. Armstrong have as their guests Mr. and Mrs. Minor.

Mrs. C. O. Shively and little son Richard are spending the week with relatives and friends in Dayton.

Mrs. Pauley and children of Pontiac, Mich., are guests of Mr. and Mrs. Rowan.

Mrs. Z. J. Line of Dayton moved into camp this week.

We are glad to hear that Mrs. Somers is recovering and hope that she will soon be able to return home.

HAMILTON

Owing to the fact that Hamilton did not mark in the April News Letter we are somewhat late in reporting two important additions to our population. Mr. Eiffert is the father of a fine son, Robert John, born March 5th, while Major Watson, formerly a Conservancy man and still associated closely with us, is the proud father of David Warren, born Feb. 28th.

Mr. and Mrs. A. Frederick Griffin removed to Troy, Ohio, April 19, Mr. Griffin having been transferred to the Conservancy work there. Mr. and Mrs. Griffin made many friends in Hamilton and we all regretted to see them leave. However, we are glad they are still in the big family of Conservancy people.

Edward Cook, truck driver, has left the employ of the District to accept work at the Ford plant.

Frank E. Davis, who has been employed here as draftsman for over a year, left April 21st to accept an engineering position in South America. We miss him, referring both to work and association, and hope to hear from him frequently. Mrs. Davis and Esther will spend some time at Seneca Castle, New York, before going to South America.

Mrs. W. T. Rains entertained April 16th for Mrs. Griffin and Mrs. Davis, both of whom were to leave Hamilton soon thereafter.

Miss Annie Campbell, of Courtland, Alabama, is the guest of Mr. and Mrs. R. B. McWhorter.

W. S. Conklin has succeeded Mr. Griffin as Chief of Party on the local survey work.

Gordon Cheyne and Hub Rowlands have invested in a "Cole 8."

Stanley Roush reports that Charlie has been doing some mysterious Romeo and Juliet stunts here of late.

Timekeeper Harry V. Waer has sold his country home, live stock, etc., and has bought a home in Lindenwald.

I. P., B. H. and T. T.

Irish Potatoes, Baled Hay and Turkish Toweling, referred to in our last issue, have their use in connection with Miami River fluid when used as feed water in Dorothy Jean's boiler. Baled hay and Turkish toweling strain the "goo" and sediment out of the stuff. Irish potatoes aid subsequent digestion of the scale that otherwise would crust the boiler's interior. Boiler scale, be it known, can be some bugbear. The editor has seen it in a coat three-quarters of an inch thick, as hard as rock.

THE MIAMI CONSERVANCY BULLETIN

EDITORIAL

Board of Editors

Germantown	Miss Julia Darnell
Englewood	Albert L. Wald, George Rodgers
Lockington	C. H. Shea
Taylorsville	Ben H. Petty, F. E. Floyd
Huffman	Mrs. C. C. Chambers
Hamilton	R. B. McWhorter
The Woman's Club, Dayton, Ohio	Miss Mayme McGraw
Dayton Warehouse	J. T. Hall

We give the post of editorial honor this month to Miss Edna Kervin, of the Huffman School, whose poem, "If I Were Teacher," strikes us as unusually clever.

Honorable mention must also be made of Norwood Bondurant and Alvin Slayback; also of the unknown author of the electric ray story, who failed to attach his name.

OUR JUNIOR EDITORS

Huffman

If I Were a Teacher

If I were the teacher of our class,
The kids would never fail, but pass;
I'd have cooking every day;
Our motto'd be, "Less work, more play."
We'd start at ten and quit at one,
Have two hours for dinner, and a lot of fun.
Vacation couldn't come too soon,
It's awful long to wait till June.
If I only had my way
I'd have it on the first of May;
And here's a fact you must remember,
School wouldn't start until December;
And one more thing I have to say,
We'd only have school on a rainy day.

Edna Kervin, Sixth Grade.

Our Indoor Picnic. On Wednesday evening the ladies of the "Sunshine Sewing Club" gave for their families a delicious supper consisting of baked beans, salad, sandwiches, pickles, olives, pie and coffee. As the men had just returned from work they were very hungry and it didn't take long for the food to disappear.

After supper the tables were taken away and everyone enjoyed the movie. A piece of canvas was hung and a lamp was placed on a table behind it. The picture of anyone sitting between the lamp and the screen could be seen on it.

Then a group of people stood on the other side and guessed who it was.

We were entertained by some solos and everyone enjoyed a good chat.

All returned home at ten, thinking they had had a delightful time.

Geneva Saylor, Eighth Grade.

Taylorsville

The Three Pumpkins. Three pumpkins were growing on a vine. They were no bigger than the baby's fist. One said, "I am going to be a prize pumpkin and all the people will come and look at me." The second pumpkin said, "I will be as big as the moon and I will light the whole world." The third pumpkin kept still. A toad came by. The pumpkin said, "What use is a pumpkin in this world?" Mr. Toad said, "You can be made into pies and a little girl shall eat you."

Motto.—The people who do not boast are oftentimes the ones who do the most in the world.

Catherine Brock, Third Grade.
Columbia River,

Washington, April 16, 1920.

Dear Boy:

You have been trying to catch me for your dinner, but I always get away. I have made you mad because I dodge around your hook. Wednesday, you very nearly had me for your dinner, but you let me slip out of your hands and get away. I am now a full grown salmon. I have a large

family of 101 children. There are 102 in the whole family. I live all over the Columbia River. I am now leaving the Columbia River to go to the Pacific Ocean for the winter.

Your Slick Friend,
Lolypop Salmon and Her Family.
Harry Heckman, Sixth Grade.

Germantown

The Scare. On Tuesday just after school was out we had been home and heard the engine whistle from the dam. We thought it was a blast at first, then we thought it was a fire in the big dragline. We found out that it was not, after some people had climbed to the top of the hill to see the fire. What they saw was one of Mr. Conley's mules standing in the middle of the track. The engine whistle was tooting furiously at the mule, but it refused to move. Such excitement as that mule caused!

Elizabeth Stewart, Sixth Grade.

Flowers and Birds. We are having a flower and bird contest in our school this year. A booklet has been made for both the flowers and birds seen. There is a place for the name of the flowers or birds, the pupil's name, and the date.

The flowers which have been seen are as follows: Dandelion, Pussy Willow, Hepatica, Spring Beauty, Crowfoot, Violet, Blood Root, and Sale and Pepper flower. These flowers have been found in March and the first few days of April.

The birds are as follows: Hairy Woodpecker, Red Headed Woodpecker, Flicker, Goldfinch, Crow, Cardinal, Chickadee, Tufted Titmouse, and Kiltdeer. The children are out in the woods every day to look for more birds and flowers.

Martha Hancock, Seventh Grade.

DAYTON

Condition of Mr. Morgan's Father More Serious

The Bulletin announces with regret that Mr. Morgan has once more been called to St. Cloud, Minn., to the bedside of his father. The health of the latter, some time since, became such that the son felt it advisable to go to him. A second journey is now felt to be necessary. It is to be hoped the outcome of the visit may be fortunate and that Mr. Morgan, Senior, may be again restored to full health.

E. N. Floyd Scores as a Fire Fighter

A note from E. N. Floyd, formerly in charge of the Conservancy Railway Division and now Superintendent of Fire Prevention with the Big Rour Railroad, gives some interesting information. A chart comparing number of fires on the Big Four in 1918, and in 1919, under Mr. Floyd's direction, shows a total reduction from 225 fires in 1918 to 144 in 1919. Fire losses in 1919, measured in dollars, were less by about 34% than the average for the preceding five years; and so far in 1920, including the three worst months—January, February and March—are dropping at a rate to cut off another third. This by systematic, steady attention to heretofore neglected things. It is an object lesson on the effect of our Assistant Chief's favorite motto, "Use your head," and his follow-up motto, "Keep on using your head."

Baseball at Huffman

The Huffman baseball team, after a hard luck season last year, their score being absolutely no index of their form, started in this season by waking up the Taylorsville team from its winter nap. Never mind the score. They did the job up brown. Paul, pitcher for Huffman, struck out 15 men, walked one, and allowed one hit. On the other hand, every Huffman batsman "pasted the pill" one or more times. Herrold, Barnes and Paul got three each. It was certainly Paul's day. Herrold showed his speed at third whenever given a chance. Horton, the new outfielder in the center position, and Cullen, the new first sackman, both are "comers." Dye at the plate backs up his pitcher as he did last year. A stunt catch by Barnes, at second base, was, with Paul's pitching, the feature of the game. Englewood, take warning.

The Conservancy Payroll

The number of men on the Big Job has been climbing steadily since February 10. The present number is 1504, a gain of 338 since the earlier date. For so big a job that

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is a small force. One of the striking things about our work is the extent to which powerful machinery has taken the place of men and teams.

Death of Mr. Fred Bock

The Bulletin regrets to announce the death at West Side, Iowa, on Saturday, May 8, of Mr. Fred Bock, father of C. A. Bock, Division Engineer in charge of the Dayton Channel work. Mr. Bock, who was about 92 years of age, had spent the winter here in Dayton with his son. He was infirm in health, although suffering from no particular disease, and increased in feebleness until it seemed best to take him to his own home in Iowa. His death took place two days after his arrival. To the son and his family all their friends of the Conservancy District extend sympathy in their loss. To go over the Great Divide, so quietly and so full of years, seemed as happy an ending as one could wish for this life.

Death of Frank J. Watson

The death of Frank J. Watson on April 12, at the Miami Valley Hospital, is severely felt by his associates of the Miami Conservancy District. His work was in the Construction Department, under Construction Manager Chas. H. Locher, with whom he had been associated on similar jobs for sixteen years, first on the well known Neebish Channel of the Sault Ste. Marie Canal, then on the Livingston Channel of the Detroit River, then on the New York Barge Canal, and finally with the Miami Conservancy District. The long association on important work tells its own story. He was Master Mechanic at Lockington Dam, on first coming to the District, in January, 1919, being transferred to be Superintendent of the gravel plant in Dayton only a few days before his death. His outstanding trait was his power of winning the strong personal friendship of his associates, the men who worked under him, and the men under whom he worked. He received the highest tribute men pay each other, the tribute of personal loyalty. It is this sense of personal loss, as well as the professional loss to the Conservancy work, which makes his death so peculiarly felt by those who worked with him.

Mr. Watson was thirty-nine years of age. He leaves behind him a wife, Mrs. Mabel E. Watson, and three children, a boy and two girls, of ages ranging from four to fifteen years. The burial will be at Detroit, Mich., where Mr. Watson has a mother and sister still living.

SHOP, WAREHOUSE AND GARAGE

Fire Protection

Talk about fire protection; the shop has some real firemen in "Webb Jones," "Quit Cold and Come Back Gerber," and "Funny Face Swaney." A fire started under the local warehouse from the sparks of a welding outfit and these boys put it out in just three minutes, and they never had any drilling, either.

Raisin Jack

Why is Heine Meyring so afraid of snakes? Some say it is because he sees them in his sleep.

Some Ball Team

The boys in the shop are getting up a ball club in order to play Mr. Everhart's team, and I understand the line-up is as follows:

Long, pitcher; Lahey, catcher; Neubauer, 1st base; Dad Lumby, 2nd base; Humpy Hagerman, shortstop; Peggy Ames, 3rd base; Dominic Marino, left field; Gerber, center field; Tucker, right field.

We are betting our money on the shop boys.

A Case for the Game Warden

Talk about getting rabbits out of season. The "Flying Squadron" of the Electrical Department say they just have to kick and kill rabbits when they are out on the job in order to get them out of the way, so they can work—going some, we would say. They claim they are in a habit of catching bass in their rubber boots for pastime during lunch hour. Some fish story, eh?

Can't Get Anything on Harvey

Huffman officials gave Harvey the laugh some time ago when they looked out across the fields and saw him in his new Dodge swimming around in a vain endeavor to reach their camp. Harvey says he went to Huffman the other day and there he saw almost the entire camp swimming around in a vain endeavor to land anywhere they could—there was a dragline leisurely floating around, occasionally getting bumped by a large transformer, etc. He who laughs first gets the laugh last.

Superintendent Clawson Loses Car

Superintendent Clawson at Huffman, who bought a fine new car not a year ago, had the misfortune not long since to lose it. Up to date all efforts to locate the car have proved unavailing.

Jewels in the Miami Valley

Our colleague, Eldee Dubois, during a recent inspection trip to Taylorsville found a moonstone in the rock dump at the toe of the dam. He has had it cut and polished and set in a ring as an M. C. D. souvenir. As luck would have it, the gem is also Eldee's birthstone—August being the month. Eldee should celebrate in a sonnet.

E. L. Stapleton, wheelhorse of the Conservancy, who later became Captain Stapleton, U. S. A., is now with Borden's Condensed Milk Co., at 108 Hudson street, New York. His home is in Laurelton, L. I. So he tells his old friend Eldee, in a letter full of the evidences, that going up against life he finds it good. He sends his best wishes to all his old friends.

The Bulletin is glad to be able to say that Miss Edda Sullivan, who has been on the sick list for some time with scarlet fever, is able to be about again, and it is hoped can soon be able to resume her regular work. Her work, meantime, is being carried on by her sister, Miss Florence Sullivan.

The contribution of "E. S." in the last Bulletin received much favorable comment as an uncommonly clever piece of writing, to which the senior editor cordially agrees. We all hope "E. S." (Miss Shellenbach of the Taxation Department) will "keep again."

"The Miami Conservancy Distillery"

A letter came recently to Mr. Fowler Smith, head of the Purchasing Division, directed to the "Miami Conservancy Distillery." The question was raised at once,—why did they pick a Presbyterian elder like F. S.? The matter has an unfortunate flavor of mystery, moonshine and raisin jack.

Mr. J. A. Callan, formerly forestry expert with the Farm Division of the District, paid his old friends a brief visit on April 22. He is now with the Advertising Department of the Kilbourne-Jacobs Manufacturing Company of Columbus, who make mine and dump cars of both wood and metal.

Use Found at Last for French Heels

We refer to their use as stilts to cross flooded areas in times of high water. Ask Mrs. T. of the Stenographic Division. Privately, and not slamming anybody, the editor would whisper that this is the only proof of value, aesthetic or practical, which he has ever heard of in connection with these abominations.

Howard Balentine Reed

The Bulletin apologizes to this young gentleman for somehow failing to find him a high chair in the April issue. He was born at the Miami Valley Hospital, on March 29, to Mr. and Mrs. Samuel Reed. We wish happiness to youngster and parents. Mr. Reed (in spite of his name) is one of the pillars in the Accounting Division.

High Cost of Living

(Not Slamming the Big Packers)

In fact, we throw them a bouquet. They are public educators. Whether or not we know where we are going, we are on the way, and they help teach us how to get there. We have on our table a neat, not to say artistic little booklet, entitled "Wilson's Meat Cookery." It is by Miss Eleanor Lee Wright, "Director of the Domestic Science Department, Wilson & Co." Wilson & Co. are the W. K. Chicago Meat Packers. The booklet tells how to save money buying and cooking meats,—especially the cheaper cuts of meats. There are excellent illustrations, showing all manner of cuts—beef cuts, pork cuts, veal cuts, mutton cuts and lamb cuts; as well as whole critters, arranged, assorted and labeled. There are also recipes, dozens of them, and sound advice on buying, cooking and serving, to save money. The booklet can be got for nothing by sending to Wilson & Co., Chicago, Ill., and asking for it. That's the way we got ours, and albeit we are naturally from Missouri, it strikes us as well worth anybody's time who has a family to feed. Hence this free ad.

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FIG. 137—AIRPLANE VIEW OF FLOOD AT DAYTON, APRIL 21, 1920.



FIG. 138—FLOOD AT DAYTON, APRIL 21, 1920, TAKEN AT 12,000 FEET ALTITUDE.

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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.

Improved Design for Dredge Pump Sump

The attention of engineers is called to the leading article in this issue, by Mr. H. S. R. McCurdy, the Division Engineer at the Englewood Dam, on the new sump design for the dredge pumps, recently put in operation on the work at that place. As he points out, the matter of efficiency, the securing of minimum operating costs, in dredge pump layouts, does not appear to have received the attention it deserves. Where millions of cubic yards of materials must be pumped through such a layout, as at the Conservancy dams, large savings can be made by reducing the various losses, due to friction, drops in velocity, and time lost in shut-downs due to "plugs" in the pipe lines. The Englewood design cuts losses in velocity head. It reduces shutdowns due to plugs, partly by the simple device of putting the pump below water level, partly by the close tab on pipe line pressures given by the simple water level indicator attached to the sump. The simplicity of the design is in fact one of its chief merits. The results attained speak for themselves and are sure to gain the attention of the profession. They give proof that the design marks a distinct advance in dredge pump layouts.

The Flood of April 21, 1920, From an Airplane

The pictures shown in Figs. 137, 138 and 148, in this issue, are of unusual interest. They show how the flood of April 21, 1920, looked as seen from an airplane. They were taken by the photographic staff connected with the United States Army Aviation Station at McCook Field, Dayton, in connection with their regular work in the photographic survey of this vicinity. Fig. 138, on the opposite page, was taken from an altitude of 12,000 feet, and

is a part of a map taken during the period of maximum flood, beginning at Osborne, on the Mad River, following that stream to its junction with the Miami at Dayton, and thence following the Miami down to Miamisburg, a total flight of above ten miles. Fig. 138 shows the junction of the Mad and Miami, and the course of the Miami through Dayton from Island Park, in the upper left-hand corner of the picture, down to the Stewart Street bridge, near its lower margin. The arrow at the upper left shows the north point, the picture appearing in the usual orientation of a map. The Mad comes in at the northeast corner. The junction of the Stillwater River with the Miami appears in sketch in the extreme northwest corner. The junction of Wolf Creek with the Miami is seen in sketch at the middle of the western edge. The picture thus brings out vividly the fact of the convergence of floods from these four streams within the limits of Dayton, to which is due the city's peculiar necessities in the way of flood protection. It may help also to show the particularly close dependence of Dayton upon three of the five dams—the Englewood dam on the Stillwater, seven miles to the northwest, Taylorsville dam on the Miami, eight miles to the north, and Huffman dam on the Mad, five miles to the northeast. It shows also the part of the Miami on which much the greater part of the channel improvement is being done. This improvement is nearly completed as far south as Main Street bridge (the first bridge downstream from the junction of the Mad and the Miami.)

An interesting point, which the picture shows clearly, is the method of piecing together the several sections of the map. The photographs were taken in a series of separate, over-lapping shots, in one

flight of the plane down the two rivers. Prints were then taken of the several shots, and pasted together with corresponding parts adjoining, on a roll of detail paper, making thus one continuous chart of the country covered by the flight. The original roll is over ten feet long. The picture is that part of it showing the focus of interest in Dayton. By keeping a constant altitude during the flight (in this case 12,000 feet), the scale of the several photographs remains the same, so that they will fit truly when pasted up. Five separate sections can be distinguished in the picture, the two lower lines of junction being curved to secure closer fitting of the sections to each other. The scale of the picture is about 1530 feet to the inch. Practically, in such photographic surveys, the scale, which is of course determined by the altitude of the flight and the focal length of the camera lens, is more exactly checked by means of monuments which are placed at known points by actual survey on the ground. These monuments appear as white points in the photographs, and, of course, provide an accurate scale if the altitude of flight is maintained uniform. None of the monuments referred to can be pointed out in Fig. 138.

Fig. 137 and Fig. 148 are taken at a much lower altitude than Fig. 138, the elevation in these two pictures being 1200 to 1500 feet. They are single shots, taken with the camera pointing diagonally downward instead of vertically downward as in Fig. 138.

Fig. 137 is taken from a point directly over the Miami River, and looking downstream, with the junction of the Mad and Miami Rivers in the distance. Webster Street bridge over Mad River is at the left, and Herman Avenue bridge over the Miami in the foreground. The smoothness and uniformity of the levee curves, and the smooth junction of the Mad River with the Miami River levee curves at the junction, is perhaps the distinguishing feature of the picture, as related to the Conservancy work. This smoothness and uniformity is to secure corresponding smoothness and uniformity in the flood flow of the rivers, thus preventing the deposition of sediment, and the tendency to ravel the banks where they are irregular. The projecting bank of gravel, showing white just over the left-hand end of Herman Avenue bridge in the foreground, encloses a harbor of refuge provided for scows, etc., in case of just such floods as the picture shows. The steam tug Dorothy Jean, built by the Conservancy forces, and incidentally the only steamer that ever ran on the Miami River, may be seen in the harbor, where she rested safe during the flood. The dark spot just beyond it is a small dragline excavator, which climbed the levee on its caterpillar traction, and thus reached safety above flood level.

Fig. 148 shows Island Park, the principal pleasure park of Dayton, as it was during the flood, with the houses partly submerged. The land here is too extensive and too low to make levee protection worth its cost. Such conditions as are seen occur at long intervals and must be taken as they come. The junction of the Stillwater and the Miami Rivers is in the foreground.

The pictures are published through the courtesy and co-operation of Captain A. W. Stevens, photographic observer, and Lieutenant Lewis McSpaden,

pilot, who made the flight when Fig. 138 was taken, and to Lieutenant Goddard, who took the pictures in Figs. 137 and 148, all three officers being in the United States Army Service at McCook Field.

The Flood at Louth

The people of the Miami Valley can understand better than most others what the feelings of the inhabitants of Louth, in Lincolnshire, England, must have been during the sudden and disastrous flood which swept the town on May 31. As reported in the daily press, it was more sudden than our own flood, the river and drainage area being apparently much smaller, permitting swifter concentration of the water. It was this feature that resulted in the high death toll. People were trapped and drowned in their homes, the sudden weight of water acting to block the doors, so that they could not be opened. Fifty people were reported drowned, most of them in the first few moments of the flood. The disaster should bring home to the people of the District a renewed sense of the value and necessity of our own flood prevention project.

April, 1920, Rainfall Breaks Record

In connection with the flood of April 20-23, it is of interest to note the fact, pointed out by Mr. Ivan E. Houk, the District's Forecaster, in his monthly weather report, that the rainfall over the Miami Valley for the month of April last exceeded by a large percentage the rainfall of any preceding April back to 1893. The maximum prior to 1920, was in the April of 1909, and amounted to 4.62 inches. The total for April, 1920, was about 6 inches, as an average over the Valley. This is nearly twice the average for April during the period, 1893-1920. Most of it fell during the period April 16-21, and it was to this concentration that the crest stage of 16.2 feet in the Miami at Dayton was due, the highest since 1913. The maximum rainfall during the storm period referred to was 6.46 inches, at Bellefontaine. The high April figures for the Valley is the more notable, since April as a rule is a drier month than either March or May.

Drying Out of Flooded Electric Motors

What was said in the last Bulletin about drying out electric motors submerged during the recent flood has attracted some notice, and although the method is not new, a few details may not be amiss.

The two main motors of the wrecked Dayton dragline (see page 174) are of 250 H. P. and 125 H. P. respectively, taking alternating current at 440 volts from a transformer tapped from 2200 volt mains. In wet condition, 440 volts is a somewhat dangerous pressure for the motor coils. Instead, 110 volts are used. To get this pressure, two transformers are interposed between the motors and the 440 secondary; one steps the voltage back to 2200; the other steps it down again to 110, the motors, connected "in cataract," tapping into the 110 volt secondary. The use of two additional transformers in this way is a matter of convenience, the secondary 440 volt cables being right on the ground at the dragline. The current obtained through the motors is about 75 per cent of full amperage, and heats them to 80° or 90°C. The transformers at Huffman were dried in a similar way.

Improved Dredge Pump Layout at the Englewood Dam

Pumps Below Sump Water Level; Suction Pipe in Same Horizontal Line With Return Supply Pipe from Core Pool, With Enlarged Conduit Between, Into Open Top of Which Material Drops from Hogbox.

By H. S. R. McCurdy, Division Engineer

The improved layout can be best understood after a brief description of of Sump No. 1. This was the first of the Conservancy dredge pump installations. In working out its design an attempt was made to incorporate in the layout the best features of existing plants elsewhere. While the general assembly of the plant presented some new features, the various factors in its make-up were in more or less common use. It is shown in Fig. 139.

It has been common practice to set the dredge pump some distance above the level of the water in the sump and to use for priming purposes some form of device which would exhaust the air in the pump chamber, automatically filling it by drawing water through the suction pipe. In sump No. 1 this practice was followed.

It was recognized that bends in either suction or discharge pipe were objectionable, both on account of the increased friction induced by causing the material being pumped to change direction and also owing to the increased wear on the pipes at the bends. To reduce these objections, the suction pipe was fitted from pump to sump with an angle of 45 degrees, rather than with the customary 90 degree elbow. The intake end was cut square; no attempt was made to so shape it as to facilitate the entrance of the material. The discharge pipe left the sump horizontally and contained a 25 degree elbow at the point where it started up the slope of the dam.

The sump consisted of a concrete well, 8 feet square and 10 feet deep, with a flat bottom. An attempt was made to assist the material in flowing to the suction pipe by building wooden sides in the bottom of the well sloping toward the end of the pipe, roughly in the form of an inverted pyramid.

All stones larger than 6 or 7 inches in diameter are liable to lodge in the pump runner, hence must be screened out before the material enters the sump. The first plan for doing this was to pass the material in its course from the hog box to the sump over grizzlies or screens made of steel bars set in 7-in. squares. The services of several men were required to keep the screens from clogging and to assist the oversize rock over the screens and into the bottom dump buckets set at their lower edge.

The installation at Sump No. 1 did all that could have been expected of it. It probably did at least as much work and as good work as dredge pumps in general had been in the habit of doing. But a close study of its operation, with a particular view to power consumption, output and all features entering into the rate of progress and cost of work revealed various possibilities for improvement.

In the first place the sump, or intake well, was not well adapted for passing the material to the suction pipe of the pump. The gravel, sand and clay fell into an inert mass at the bottom of the well and had to be sucked up by the water entering the suction. The materials had a habit of piling up until the mass became so great that a large portion of it

would slide down and bury the end of the suction, throwing a sudden throatful of "pudding" into the pump, overloading it, and making a plug in the pipe lines imminent.

Then again the suction was not efficient. The pumps in Sump No. 1 had suction lengths of 18 feet and the center of the suction as it entered the pump was 7 ft. above the water level in the sump. The pump, while operating, showed 16 inches of vacuum, equivalent to 18 ft. of head. The loss of head in the suction pipe was, therefore, about 11 feet. This was due in part to velocity head, and in part to the friction in the pipe, due to its length and curvature and to the shape of its intake end. The net result of this type of sump well and of suction pipe was that unnecessary power was used, progress was limited and plugs in the pipe line were not infrequent. The latter were a particular annoyance, necessitating, as they did, an entire shut-down of the hydraulic fill operations while the pipe line was disconnected and cleared, an operation frequently involving several hours.

Another objection to the first installation was the necessity of priming the pump before starting again, after every shut-down. While ordinarily this was not a difficult operation, occasionally sand would collect in the injector, which would have to be cleaned out. In the aggregate, delays from priming amounted to a considerable loss of time.

As the embankment of the dam reached higher elevations and the length of discharge pipe materially increased, the additional pressures required at the dredge pumps to move the material became strikingly apparent. These high pressures were found to be due, not only to the increased head, but to the

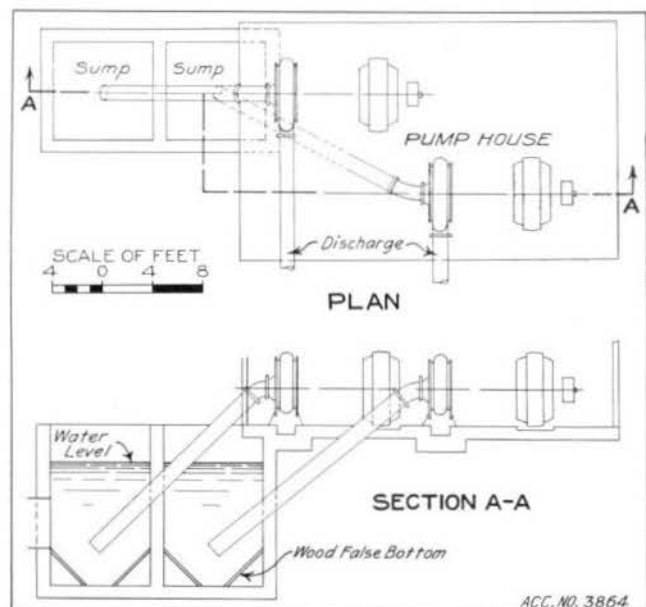


FIG. 139—FIRST SUMP LAYOUT, ENGLEWOOD.

coarseness and gritty character of the material from the borrow pits, which while rendering it excellent from the viewpoint of building a safe dam, gave a very high friction factor and greatly increased the resistance to pumping through long pipe lines. It became apparent, therefore, that it would be expedient to construct additional plants located at higher elevations and closer to the particular portion of the dam each would be called upon to build. With the decision to construct additional pumping installations came the opportunity to incorporate in them such improvements as had suggested themselves in studying the behavior of Sump No. 1. Sumps Nos. 2 and 3 have now been constructed and operated and, as the latter is the latest model, this description will be confined to that layout. It is shown in Fig. 141.

The first radical change, however, came during the operation of Sump No. 1 and consisted of abandoning the use of flat, sloping screens to eliminate the oversize rock and substituting for them cylindrical revolving screens. These screens are 12 ft. long, 4 ft. in diameter, are pierced with 7 in. circular holes and set to a pitch of $\frac{1}{2}$ in. to the foot. They are revolved at a rate of $7\frac{1}{2}$ R. P. M. by $7\frac{1}{2}$ H. P. electric motors. The material enters from the hog box at the upper end of the grizzly, the acceptable sizes fall directly into the sump and the oversize passes to the lower end, from which it drops into a standard 12 yd. dump car to be hauled away. To reach out over the car a 6-ft. extension, flaring to 5 ft. diameter, was put on the lower end of the grizzly.

The position of the dredge pumps was also changed in the later installations. In the original layout the pumps were set 7 feet above the water level in the sump and had suctions 18 ft. long. In the new layout the pump was set 8 ft. below water level. The result is that the pump is always primed ready for operation. The pump suction pipe is straight and horizontal, 5 feet, 6 inches long. At

the sump end the entrance to it is given a bellmouth shape to eliminate contraction of the entering jet. The supply pipe bringing the return water from the core pool (the circulation in the pumping layout being a closed system, pumps to pool and back again), is in a direct line with the pump suction. Thus the flow is straight from the return supply into the pump suction. Between the two is a short open topped conduit in line with both, into which the material from the hog box is dropped, as detailed in the next paragraph. Loss of energy at the pump suction is by these means materially reduced, tests showing a loss of head of about 3 feet as against 11 feet in the old sump, a saving of 8 feet. Stated otherwise, and applied to our particular problem here, this means that the millions of cubic yards of mixture of earth materials and water remaining to be pumped will require to be pumped through 8 feet less height.

Another modification of the original plant, in Sump No. 3, was in the design of the sump. In general, the sump is in the shape of an inverted pyramid, collecting the material as it drops from the revolving screen and concentrating it at the bottom. The bottom of the sump is fashioned into the shape of a horizontal circular conduit, 21 inches in diameter, open at the top. One end of this conduit receives the water from the supply pipe and the other end discharges into the steel bellmouth leading to the suction of the dredge pump. It is in its passage through this conduit that the water picks up its load of earth materials. The effect is of dumping sand, gravel, and clay into a swiftly-moving stream of water. The advantage of this method over that originally in use is at once apparent. It will be remembered that in Sump No. 1 the earth materials came to rest in the bottom of the sump and that the suction from the pump was called upon to create sufficient velocity from still water to move this material up into the pipe. And that material had to enter a square-cut pipe end, with all its at-

Details of this are shown in Fig. 142. The part of the discharge which drops nearly vertically from the pipe is sand, which flows in a thin "pudding" along the bottom of the pipe. Larger stones and pebbles which came through are shown piled in a heap in front of the discharge. The discharge at the moment is rather sluggish. A few moments after the picture was taken the pipe "cleared its throat" of the accumulation of sand was shot out two or three times as far as it appears in the picture, knocking the heap of stones down and washing them away down the slope of the gravel beach toward the pool which is seen beyond.



FIG. 140—DISCHARGE END OF DREDGE PIPE LINE AT ENGLEWOOD DAM, APRIL 7, 1920.

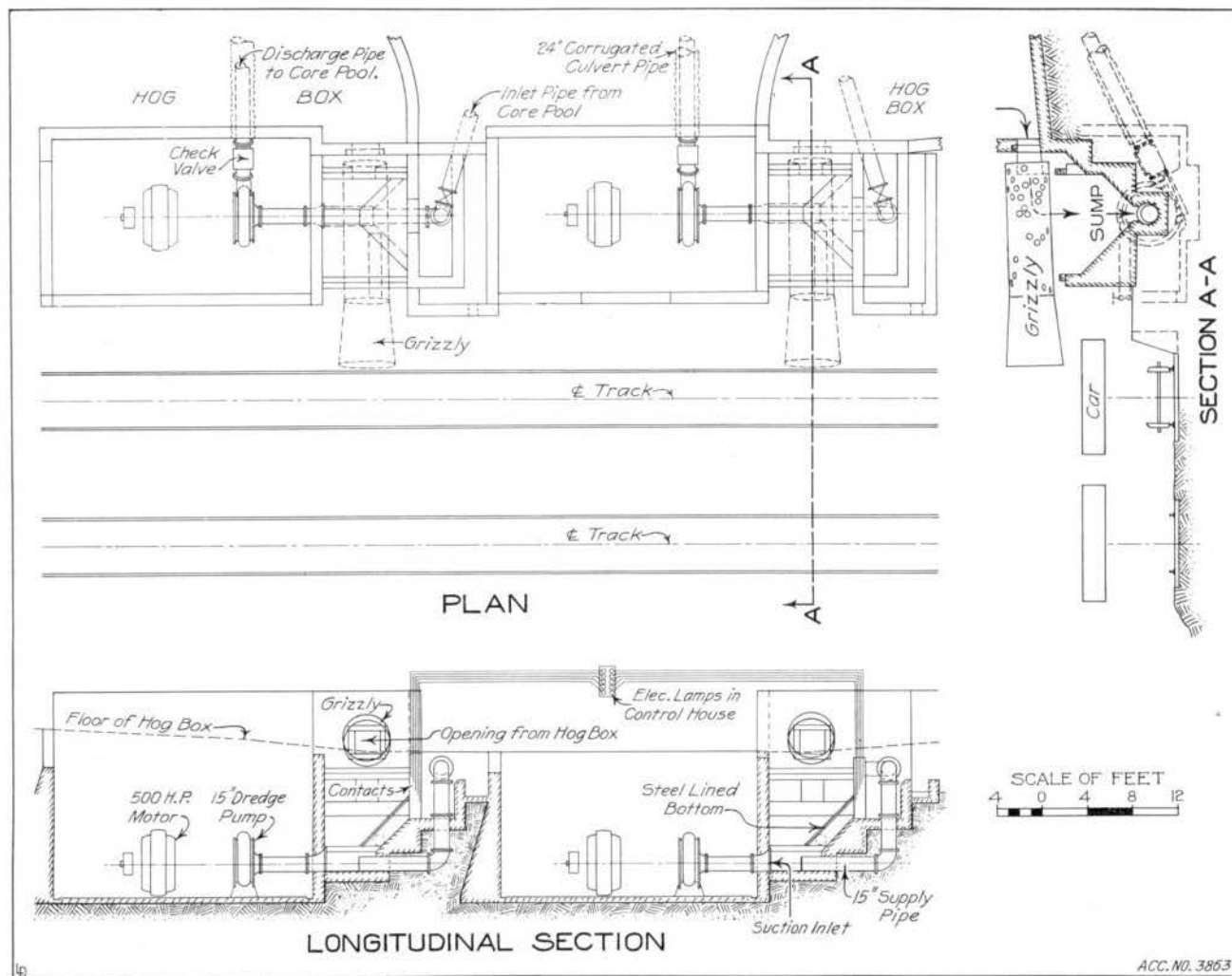


FIG. 141—IMPROVED DREDGE PUMP LAYOUT AT ENGLEWOOD DAM.

tendant contraction losses of the jet. In the new type of sump, however, the supply water enters from the return pipe with a velocity of 10 or 12 feet per second. This velocity is largely conserved in the conduit forming the bottom of the sump, thereby giving the pump just that much of a boost.

In the old layout the discharge pipe left the pump horizontally, necessitating a bend up the slope of the dam. In the new design the pump was set at an angle of 27 degrees with the horizontal, enabling the discharge pipe to be laid without bends. In this arrangement of suction and discharge the only deviation from a straight line occurring in the course of the pumped material from the sump up to the side of the dam takes place in the pump itself, incidental to the centrifugal pumping operation, consequently frictional resistances and wear are reduced to a minimum.

In the operation of a dredge pump discharging through long pipe lines it is of the utmost importance that the pump operator be continually informed as to the conditions of flow in the suction and discharge, with particular reference to the load of suspended materials being carried. Standard pressure and vacuum gages can be relied upon to a certain extent, coupled with an ammeter for electrical consumption, to indicate conditions. The vacuum gage will tell when the suction is becoming clogged.

The pressure gage gives warning of heavy loads in the discharge line. But these indicators alone were not sufficient to prevent plugs in the pipe line, as proved time and again by bitter experience. To solve this problem the indicating device described in the caption to Fig. 142 was tried, and proved to be a distinct advance over anything heretofore used. Its operation was very satisfactory, but it involved long electrical circuits running to the ends of the pipe lines, and required removal and resetting for each new length of pipe added. Moreover, it had very little range, indicating only that the actual flow was equal to or greater than a particular discharge for which it was set. How much it exceeded this, or by how much it fell short could not be told at the pumps. At Sump No. 3, however, a device has been put into service which meets the objections to the former indicator and, in addition, gives full information as to conditions at all working stages of flow. It indicates the water level in the sump, and thus the working conditions in the pump line, as follows:

In the design of the plant the size of sump was made such that the water level responds readily to the demands of the pump. In operation, the valve in the return pipe from the core pool is opened to the point giving the proper flow as determined by trial. With an equal feed of solids from the hog box a speeding up of the pump causes a correspond-

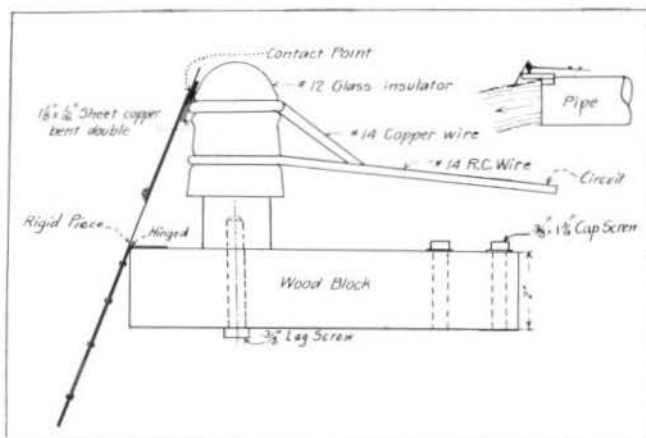


FIG. 142—ELECTRICAL INDICATOR FOR DREDGE PIPE.

Diagrammatic sketch of its attachment to the pipe, but not showing the clamps, is shown in the upper right-hand corner. See also Fig. 140, where the device appears turned end for end as compared with this cut. The wood block above is screwed to an iron plate bent to the curve of the pipe end and clamping to it as in Fig. 140. The working piece is the thin diagonal metal plate at the left, hinged to the top edge of the block. The lower part of this dips into the stream discharging from the pipe, as shown in the upper right-hand corner. The force of the stream keeps the upper part of the hinged plate in electrical contact with a metal point attached to the glass insulator. When the discharge slackens the lower part of the plate drops by its own weight and the contact is broken. An electric lamp in the pump house, which is in the electrical circuit, then goes out, warning the pump man that the discharge has slackened to the danger point, indicating an incipient "plug" or stoppage of the dredge pipe by the suspended earth materials which it carries. The pump man then throws more power into his dredge pump motor, breaking up the incipient plug and driving it on to the discharge outlet. This device worked well, but did not indicate how near the critical point of "plugging" had been reached. See page 167. The new system, there described, corrects these shortcomings.

ing lowering of the water level in the sump. Conversely, decreasing the speed of the pump causes the level of the water in the sump to rise. With a constant speed of pump, increased feed of solids from the hog box causes the water in the sump to rise and decreased feed allows it to lower.

In actual practice the pump operator knows that if the water in the sump rises and the pressure gage shows increased pressure, at the same time that the ammeter shows decreased electrical current, his discharge line is being heavily loaded. If, on the other hand, the water level in the sump lowers while the pressure gage shows decreased pressure and the

ammeter indicates increased power consumption, then he knows that the pump is handling less solid material. It is upon these phenomena that the warning device is based. It is necessary only to keep the pump man continually informed of the fluctuations of the water level in the sump and, with his gages, he can tell for a certainty what is taking place. The immediate warning comes from the water level in the sump; the gages simply explain the cause of the fluctuation.

It was found by trial that the fluctuations of the water level in the sump for ordinary working conditions were confined to the top two feet. When the sump was full, danger of a plug was impending; when the water level was two feet down from the top the pump was not handling all the solids of which it was capable, and it was up to the monitor men to sluice in more muck. (In practice the monitor men have instructions to flush the material into the sump as fast as they can unless warned off by the pumpman). It was decided that indications of the water level should be shown to the pumpman at 6-inch intervals. To do this 6 gage solid copper wires, 5/16" diam. were suspended vertically, the bottom of one being at the level of the top of the sump, the bottom of another being two feet below the top of the sump, and three others ranged equally between. These wires were connected in circuit with incandescent bulbs in sockets on the control board in the pump house, one above another in the same relative positions as the terminals to which they were attached. To protect the eyes of the pump runner from the glare of the lamps the whole are incased in a box with a ground glass front, the top compartment being red to indicate the danger warning. The top circuit is also connected to a lamp on the giant to give the monitor man warning when the sump is full and feed should be slackened. The arrangement of this device is shown in Fig. 141.

As to the efficiency of the new installation of dredge pumps a few figures may be cited. Last year, from Sump No. 1, the maximum output from one pump in a ten-hour shift was 259 twelve-yard cars and from two pumps in the same time 383 cars. This season, 510 cars have been pumped with one pump in one shift to date, totalling 4,590 cubic yards. The rate of pumping was 58 cars, or 522 cubic yards, per hour, the actual running time being 8 hours, 48 minutes. The amount was limited only by what the draglines could excavate. How much the pumps can handle is not known, excepting that on May 17 one pump operated for 4 hours and 51 minutes at the rate of 64 cars per hour, when the supply of material gave out.

April Progress on the Work

GERMANTOWN

Good progress has been made on the hydraulic embankment during April, except for the delay caused by the high water. During the month 57,150 cubic yards were placed, making a total to date of 499,200 cubic yards. This is approximately 63 per cent of the total hydraulic embankment to be placed.

On April 20, due to heavy rains in the early morning, the creek began to rise very rapidly. By noon the pump houses were practically submerged. The creek continued to rise all afternoon and by night the water stood a foot below the inlet headwall. At the outlet works a very decided hydraulic jump occurred. The total height of the jump was approximately 7 feet. The bridge carrying the

dredge pipe across the inlet channel was washed out and considerable drift was deposited about the pump house. The flood delayed pumping operations for five days.

The contract for grading and graveling Road No. 1 was let to Mr. Conley. Work was begun April 24 on that portion of the road south of the dam.

Work was begun by Mr. Daniels on April 26 on the remainder of the excavation in the spillway. This work is progressing satisfactorily.

Riprap is being placed on the upstream slope of the dam above the first berm. The oversize rock from the pumping plant is used for this purpose.

Arthur L. Pauls, Division Engineer.

May 18, 1920.

ENGLEWOOD

Hydraulic fill was continued in the easterly portion of the dam, using Sump No. 2, until May 3. On that date the pumping operations were transferred to Sump No. 3. On May 6 work on the easterly portion of the embankment was suspended and the filling of the old river channel begun. Sump No. 3 has successively broken all previous pumping records. The best performance to date was on May 14, when, with one pump only in operation, 4000 cubic yards of embankment were placed in 8 hours, 48 minutes, a rate of 455 cubic yards per hour. This output is 170 per cent of the best one-pump performance of last year and exceeds last year's best record for two pumps by 15 per cent.

The excavation for the temporary spillway west of the river has progressed favorably. The material is being excavated by a large electric dragline and passed over for use in the center portion of Cross Dam No. 2, along the west bank.

A portion of the covering of clayey earth over and around the arches of the conduits has been placed.

Ten thousand additional seedling trees have been planted in connection with the scheme for reforesting the basin area.

H. S. R. McCurdy, Division Engineer.

May 15, 1920.

LOCKINGTON

On May 8 the fill east of the outlet structure was started by one dredge pump outfit. Since May 18 both units have been discharging continuously onto the east side and good progress is being made.

During the month a pump was put into service for returning to the upper end of the sluice ditch the overflow of the dredge pump sumps, with the ground water from the pit, thus circulating a large volume of water in the sluice ditch. This large flow enables a greater yardage of material to be transported through the sluice than was possible with the smaller stream. The slopes of the sluice ditches have been materially lessened, as a consequence, giving a higher working face, or bank, for obtaining material.

A booster pump has been installed on the monitor pipe line in order to furnish higher pressure when the nozzle is working in those parts of the pit where hard clay banks have to be worked.

The Lidgerwood Class B dragline has finished excavating the cut-off trench of the dam and has been moved into the borrow pit. There it will dig material, principally gravel, which lies below reach of the sluicing operations and place it in a large windrow at a higher elevation, where it can be sluiced to the dredge pumps.

The surfacing of the slopes of the dam with oversize rock, or waste, has kept pace with the fill.

Barton M. Jones, Division Engineer.

May 25, 1920.

TAYLORSVILLE

The dredge pump for the sluicing has been installed at its new location and a booster pump has been added so that sluicing may be started as soon as the B. & O. railroad moves to its new roadway.

The Lidgerwood dragline has been thoroughly overhauled and is moving to the upper end of the inlet channel so that excavation from the inlet channel may be started as soon as sluicing starts. The material dug by the dragline will be cast on the bank to the east and sluiced to the dredge pump.

During the last month the concreting in the outlet works has been moving at slightly better than our scheduled rate. The gravel plant is able to wash and screen the sand and gravel faster than needed for the concrete and the surplus is being stored for use in the main spillway wier, which will be constructed after the gravel plant has been taken down.

The new B. & O. depot at Taylorsville Dam is nearing completion.

Mr. Crampton has started on the construction of the highway from the east end of the dam to the National Road. The present valley crossing of the National Road will be abandoned, the road following the new highway to and across the top of the dam, after the latter is completed.

O. N. Floyd, Division Engineer.

May 25, 1920.

HUFFMAN

A concrete block revetment is being placed along the bank of the outlet channel for a distance of 100 feet below the lower end of the river wall of the concrete outlet structure. This revetment is to protect the bank from wash in time of floods. The blocks used are of solid concrete 1½ ft. by 3 ft. and 1 ft. thick. They are precast at the top of the bank and after sufficient hardening are placed in rows along the bank in brick fashion. The first or bottom row was laid on a solid rock foundation.

The sluicing of material from the hill at the north end of the dam is progressing very satisfactorily. The increase of core material and the resulting decreases in seepage water from the pool have been quite noticeable, since this plant has been in operation.

About 80,000 cubic yards of ballast gravel have been delivered for the railroad relocation work in the Huffman Basin. This ballast gravel is excavated during the day shift and the first half of the night shift. The second half of the night shift is spent in stripping the top soil, this material being pumped into the dam.

C. C. Chambers, Division Engineer.

May 25, 1920.

DAYTON

As noted in the May issue of the "Bulletin," dragline D-15 was damaged and partly submerged during the high water of April 21. The machine will be ready for operation again in a few days. D-16 and D-8 have continued working with scows on the channel excavation above Third Street. D-19 has assisted in the work of repairs to D-15.

The South Robert Boulevard retaining wall is about 67 per cent completed, 2950 cubic yards of concrete having been placed.

To date, 15,080 cubic yards of sand and gravel have been issued from the gravel plant.

Good progress is being made on the revetment construction by Price Brothers Company. The work is now being carried downstream along the easterly bank of Miami River below Herman Avenue.

Channel excavation to date amounts to 802,600 cubic yards. The total pay quantity in spoil banks is 434,000 cubic yards. Levee embankment amounts to 75,500 cubic yards, including 60,000 cubic yards on Contract No. 41. In accomplishing this work, the total yardage handled amounts to 1,380,000 cubic yards. These figures do not include excess excavation for the launching basin and scowing canals which amounts to 77,000 cubic yards.

C. A. Bock, Division Engineer.

May 24, 1920.

HAMILTON

The work was delayed somewhat by the high water of April 19-22. No damage was done to equipment and very little to the completed work.

The electric dragline D-16-18 has passed under the railroad bridge and has started excavating north of same.

The total amount of channel excavation, item 9, to May 1, was 675,300 cubic yards.

Dragline D-16-17 completed the driving of the piling for the northwest wall, then moved to the east side of the river, where it backfilled the northeast wall at the Main Street bridge, and is at present on its way to Black Street.

Concreting is progressing at both the northwest and the southwest walls at the Main Street bridge.

Dragline D-16-20 is building a railroad embankment to connect with the trestle recently completed by Price Bros. Price Bros. have started driving the trestle at Station 110. This work is to provide a track for trains carrying excavated materials from river to spoil bank.

C. H. Eiffert, Division Engineer.

May 20, 1920.

TROY

The spring opening of the work at Troy occurred on March 29, when the dragline commenced excavating again. Frank McGillicuddy & Company arrived on March 23 to open camp and get the dragline in shape for work.

Until April 28 the dragline excavated material from the west side of the cut-off channel and placed it in the levee embankment. On the 28th the dragline rounded the north end of the channel cut and started on a return trip to the down-stream end, excavating the east side of the channel as it goes. Up to date 1150 feet of channel has been completed.

The channel excavation to date amounts to 55,600 cubic yards, 25,250 cubic yards having been placed in levee embankment, of which 2100 feet has been made. The balance of the excavated material has been wasted along the east side of the channel, and on the west side, below the south end of the levee embankment.

The culverts for the two storm water outlets were about two-thirds completed last fall, and the laying of pipe for the same outlets was 50 per cent completed. The culverts are being built by force account, and work on them will be started in the near future.

A. F. Griffin, Assistant Engineer.

May 17, 1920.

LOWER RIVER WORK

Miamisburg—The contractor has not started work with his dragline machine and train outfit, but will probably begin in a few days. He is at present building a trestle along Bear Creek Road at two places where the road will be raised to extend up over the levee.

Franklin—The 400 feet of levee on the west side of the river extending northerly from the suspension bridge is near the point where the levee will cross the River Road and extend westward toward the C. N. R. R. The machine stood on low ground on the river side of the wall just above the suspension bridge during the high water of April 21 and the water rose to within about 3 feet of the roof of the house, but the machine was only slightly damaged.

Middletown—Cole Bros. are completing the levee between Seventh and Eighth streets with the dragline machine. When this is done they will build a trestle along the site of the levee between Fifth and Sixth streets and this levee will be constructed by use of dinkie trains, the cars being loaded with the dragline machine, the material being obtained just below the end of Sixth street and west of the present borrow pit.

The high water of April 21 carried away about 3500 cubic yards of levee material, some of which was in place but not in completed levee.

The C. & C. Haulage Company is making the gravel fill inside the south bank of the hydraulic canal which will widen Hydraulic Street and make room for a wall to be constructed later, thus completing the work between North Main street and the bridge over the M. & E. Canal. They are hauling from the Patterson gravel pit on Poast-town Road, using from two to four trucks, each with a capacity of about five cubic yards loaded by a $\frac{5}{8}$ yard steam shovel. The gravel fill is now about 35 per cent complete.

F. G. Blackwell, Assistant Engineer.

May 17, 1920.

A Practical Test of the Concrete Revetment

Revetment Edge Drops Eight Feet to Cover Slope of Newly Eroded Channel, the Fabric Remaining Intact.

An important part of the work of the Miami River improvement has been the protection of the banks and levees, at especially vulnerable points, against the scouring action of strong currents during floods, by the use of concrete revetments as an armor covering the earth materials of which the banks and levees are made. The general scheme was described in the Bulletin for August, 1919, page 13, in the article on the River Problem Through Hamilton; the concrete blocks and their manufacture being described in the article immediately following. A cross section of the revetment was shown in the next Bulletin, on page 28. Since those articles were written a considerable frontage of revetment in the city of Dayton, has been put in place, and has been subjected, especially at one particularly vulnerable point, to the action of a flood reaching the 16-foot stage—the highest since the disaster of 1913. An account of what the flood did to the revetment is therefore of considerable interest.

RAILWAY RELOCATION

Big Four and Erie—Ballasting on the Big Four and Erie is about fifty per cent complete, the work being done by the Walsh Construction Company. Traffic over the Big Four will be diverted to the new line first, which will take place some time in July.

The signal work is being done by the Big Four forces and they are now working at Tate's Point installing the interlocking system of the B. & O. crossing with the Erie and Big Four Railways.

The right-of-way fence, built by Funderburg Bros. of Fairfield, is practically complete.

The Western Union have the poles all erected and are now stringing the wires.

After the above work is completed there still remains the construction of a station at Fairfield, Ohio.

Baltimore & Ohio Railroad—The Baltimore & Ohio Railroad will probably be operating on the new relocated line when the June Bulletin is published.

Ohio Electric—The District forces are constructing the pole line for the trolley system, the work being about ninety per cent complete.

Albert Larsen, Division Engineer.

May 25, 1920.

RIVER AND WEATHER CONDITIONS

The rainfall over the drainage area of the Miami River during the month of April was greater than during any other April on record, as determined by studies covering the period from 1893 to date. The total for April, 1920, amounted to about 6 inches, or to about twice the average for the period from 1893 to 1919. The maximum for April, prior to 1920, occurred in 1909, amounting to 4.62 inches. Ordinarily the rainfall during April is less than during either March or May. The unusual amount this year was produced by the storm of April 16 to 21, which caused the greatest floods in the valley on record for the month of April, the stage at Dayton reaching 16.2 feet or 1.4 feet higher than any other flood since March, 1913. Rainfall and flood conditions were more severe in the Mad River and Seven Mile Creek valleys than in other parts of the Miami River drainage area.

Observations taken by the U. S. Weather Bureau at Dayton show that the mean temperature for the month was 46.9 degrees or 4.7 degrees less than normal; that there were 3 clear days, 10 partly cloudy days, 17 cloudy days, and 21 days on which the precipitation amounted to 0.01 of an inch or more; that the average wind velocity was 14.1 miles per hour, the prevailing direction being from the southwest; and that the maximum wind velocity for five minutes was 44 miles per hour from the northwest on the 9th.

Ivan E. Houk, District Forecaster.

June 1, 1920.

It may be worth while to note that "flexible revetment" as a protection against shore wash is a very old device, woven mattresses of willow withes loaded with basaltic trap rock, and sunk along the shore line, having been used in Holland for a hundred years or more, with excellent results. Similar mattresses, 80 or more feet in width and 500 to 600 feet long, of willow, and similarly loaded and sunk, are used in the standard practice of the United States Government work along the Mississippi and Missouri Rivers. The use of a woven flexible structure of concrete blocks and steel cable or wire, as a substitute in special cases, was a natural development of the other, and seems to have begun about a dozen years ago. It is an interesting point that some of the first as well as most striking and effective work of this kind seems to be due to the Japanese. (See Engineering News, May 16, 1912, and March 13, 1913). Especially on the Ishikari River, where the outer edge of the mattress reached

a depth nearly 40 feet below low water level, this was the case. The behavior of this revetment was noteworthy, as showing the reliability of a flexible concrete revetment under severe conditions.

As explained in the August, 1919 Bulletin the Conservancy revetment is in two main parts—a strip of concrete slabs occupying the lower part of the levee slope, and a strip of smaller concrete blocks laid along the edge of the river channel adjoining the slabs and anchored to them. These blocks are 24" by 12" by 5" in size, and are laid flatwise, and loose, breaking joints like brick in a wall. Steel cable is strung horizontally through holes in the blocks, weaving them into a continuous fabric which is quite flexible, there being no connection between adjacent blocks except the steel cable. The cable is run at right angles to the river bank, and is anchored in the concrete of the slabs on the levee slope, and to heavier, longer blocks which stiffen and strengthen the river edge of the fabric like a garment's hem. At the foot of the levee slope a row of wooden piles is driven, their tops clasped by a low concrete wall built integral with the levee slabs, and to which the flexible fabric is anchored by two cables through every block.

In flood seasons, such a surface of concrete protects the earth under it, but along the river edge, the scouring action of a swift current tends to undermine it. When this happens, the fabric, being flexible, simply drops to cover the shore side of the excavation made by the current, and thus protect it from further direct action. The result is seen in Fig. 144 and Fig. 145.

The action indicated in these pictures took place at a particularly vulnerable place, just below the Island Park dam, in Dayton. At its east end, this dam abuts upon the levee some distance up the slab slope, as shown in the pictures. The dam crest being level, the result is that at all stages of the river, water at the east end of the dam is pouring in a sheet, thicker or thinner, upon the levee slabs, thence down their slope and across the flexible floor, which also has a slight slope, till it reaches the unprotected river bed, at the lower edge of the mattress. In its rush down the levee slope, it acquires high speed, and strikes the unprotected river gravel like a liquid excavator, or modified "hydraulic monitor," excavating a channel for itself along the edge of the re-



FIG. 143—FINISHED SECTION OF CONCRETE REVETMENT, MAY 26, 1920.

Shows the left bank of the Miami River, in Dayton, below Herman Avenue bridge. Solid concrete slabs 8 feet wide occupy the slope. The flexible mattress of 12 in. by 24 in. concrete blocks, woven together by $\frac{1}{2}$ steel cable, lines the edge of the river bed. See also Figs. 144 and 145.

vetment for a considerable distance downstream. (See Fig. 144). The gravel beneath the revetment edge sloughs off into this channel, permitting the lower part of the flexible floor to sink gradually beneath the water surface, and cover the excavated slope.

It is notable that this action, once it has sufficiently deepened the channel next the revetment edge, is self-curing, the water of the deepened channel forming a liquid cushion which stops further destructive erosion of the gravel bottom. The deepest erosion is in fact due to the downstream rush of the water a little further below, for which the action just referred to seems to give an opening wedge. The same cushioning action, however, takes place here also, and the eroded layer rapidly thins out downstream.

Looked at broadly, the function of the concrete revetment, both in its solid slab and its flexible block sections, is like the belt of thickened armor along the water line of a battleship. It protects the vitals of the ship. The top of the levee does not need so expensive a cover. It is protected by grassing, and in case of a threatened breach, is easily reinforced by sandbags and earth. The concrete revetment guards the base of the levee, the foundation of the structure, the vital point, which in case of severe flood will be far below the water surface. Covering this, it takes the stitch in time which saves the more than nine; which mends the incipient breach, closing the wound as soon as formed and presenting a fresh unbroken front just where and when it is needed.

The extent of the erosion which can occur at the

The action of the Island Park dam, seen in the distance at the left, makes this a peculiarly vulnerable place. The water pouring over the end of the dam upon the slab slope, rushes down the latter at high speed, and across the flexible mattress till it strikes the exposed gravel of the channel at the mattress edge, acting upon it as a powerful liquid excavator, undermining the mattress till the latter sinks under the water surface. The channel seen here next to the mattress was thus formed, until it attained sufficient depth to protect the

(Continued below)



FIG. 144—THE FLEXIBLE REVETMENT IN ACTION. MARCH 25, 1920.

gravel bottom against further erosion by forming a liquid cushion to take the impact of the water rushing down the slope. The flexible mattress sank here a maximum of seven feet below its original position, its steel cables keeping its structure intact, to a new position where it now protects the shore slope of the eroded channel from further scouring action. The "hump" in the foreground is caused by heavy boulders which protected the gravel at that point from erosion. It illustrates the flexibility of the mattress in adapting itself to an uneven bottom. This picture was taken before the flood of April 20. Fig. 145 shows what the flood did to the revetment.

edge of the revetment and still be mended will vary somewhat with the nature of the material eroded. In the gravel, which constitutes the bed of the Miami River, the shore slope assumed by the excavation is steep, as is plain from the pictures. Measurement showed that in Fig. 144, the river edge of the revetment had dropped about 7 feet. Following this drop, came the flood of April 20, and it is gratifying to note that under these severe conditions the additional erosion was only about a foot. The width

of revetment provided is sufficient to permit a considerable drop further without danger, the erosion ceasing before the full adaptability of the revetment is exhausted. The stability of the Miami River gravel, together with the ample factor of safety provided for in the design, gives strong assurance of the protection of the levees under maximum flood.

It is believed that at the point where the test occurred the conditions are more severe than anywhere else along the length of the revetment, on ac-

Compare Fig. 144 showing condition previous to that flood. The "hump" referred to persists, but is considerably reduced. Note the slight additional erosion due to the flood. At the right the revetment edge still remains in its original position, although the gravel next to it has been somewhat cut down. The flood reached a stage of 16.1 feet, the highest since 1913. Under the circumstances, and considering the peculiar vulnerability of the levee slope at this point, due to the action of the dam described on page 171, the behavior of the flexible mattress is gratifying to the engineers who designed it, and affords strong reassurance as to its efficiency.



FIG. 145—FLEXIBLE REVETMENT AFTER APRIL FLOOD. MAY 26, 1920.

count of the proximity of the dam creating here a peculiar vulnerability, as explained. The revetment is therefore carried at this point to the full height of the levee. Soundings of the river, after the 1913 flood, established the fact that there is no tendency to the formation of deep eroded pockets along the banks, beyond the now demonstrated ability of the revetment to mend. The worst places are along the west bank just above and below the Dayton View bridge, and at this point the level of the revetment has been lowered in the design to meet these special conditions. It is to be further and especially noted also that at this point, even if undue erosion should occur, it could only do unimportant damage

to the immediate bank, for the reason that the shore here is at the foot of a hill. There is no levee at this point, but a steep natural bank.

Nothing has been said so far about the additional factor of protection afforded by the cross-walls. These are of interlocked steel sheet piling, to be driven every 300 feet in the length of the revetment, running crosswise, from the foot of the concrete slab slope half way to the river edge of the flexible block structure, and anchored both to the slabs and to the blocks. This affords additional assurance against any possible undercutting of the levee.

White Iron Centrifugal Pump Shells

Very Heavy Shell of Hard White Iron Expected to Give a Pumping Duty of 40,000 Cubic Yards.

The picture shown in Fig. 150 marks an interesting advance in pumping equipment at the Conservancy dams. In pumping material which contains as much sand and gravel as that placed in the dam embankments, the wear due to attrition of the interior of the pump shells is uncommonly high. A steady stream of sharp particles of quartz and other hard minerals is thrown by the revolving pump runner at high velocities against the interior surface of the shell, causing rapid erosion of the metal. Especially is this true where the metal is ordinary cast iron. For this reason harder compositions have been proposed, and in some cases used, either for the entire shell, or as an interior lining to take the wear.

The first pumps used on the Conservancy work were of cast iron, and showed rapid wear, the pump shell going on the scrap heap after pumping some 160,000 cubic yards of earth. Manganese steel gave improved service, the life of this material in the Englewood dredge pump shells being from 134,000 to 182,000 cubic yards of gritty material pumped. The metal being rather expensive—26 to 27 cents per pound—Mr. Fowler S. Smith, the District's Purchasing Agent, suggested the use of white iron, which is very much cheaper, is at the same time exceedingly hard, and on account of less contraction, can be cast in thicker sections than manganese steel. It seemed to him also that the ability to get replacements of parts in Dayton, where certain firms specialize in white iron castings, would again effect a large saving in shipping charges and expense due to shipping delays. Mr. A. S. Robinson, the District's Mechanical Engineer, and Mr. William McIntosh, its Master Mechanic, had been planning at the same time an improved design giving added life by increasing the shell thickness beyond that possible when manganese steel is used.

One other special feature was made a part of the new pump which, on consideration of all the features mentioned, it was determined to build in the District's own shop. This was the radial reinforcing ribs which show so prominently in Fig. 150. These were originally wrought iron clamps, slipped over the shell to hold the two halves together after they had split in two with excessive wear, the split occurring on the mid line of the steel casting, at its extreme outside rim. By casting the clamps on as ribs to the original casting, they would hold the

halves together until the interior wear had gone to such a point as to reach and make holes through the shell rim. Thus the entire thickness of the shell could be utilized before the casting would be discarded.

The patterns were made in the Conservancy shop, on Mr. Robinson's design, the casting being placed in the hands of the Advance Foundry Co. of Dayton, which makes a specialty of white iron castings, in cases where high wearing quality is desired, as in pug mills for clay working, etc.

The first of the resulting pump shells is shown in the figure. The weight of the ribs and flanges may appear excessive in places, but was necessary in order to avoid shrinkage stresses in cooling, which might result in weakness and breakage. The thickness of the shell varies somewhat, being greatest at the rim, where the wear is a maximum, and least on the faces. Imagining the shell seen as a clock face, the extreme thickness, at "6 o'clock," is $5\frac{1}{4}$ inches. At 8 o'clock it is 5 inches; at 10 o'clock, $4\frac{1}{2}$ inches; at 2 o'clock about 4 inches. On the faces it is about $1\frac{1}{2}$ inches. The pump is a 15-inch pump, absorbing at maximum head 500 horse power and capable of pumping 7,000 gallons per minute at 150 feet maximum head. The flange on the near face is a separate piece, bolted on. The shell proper is machined in only four places—being faced in a lathe on its two faces (to receive the face flanges), on its top (to receive a priming connection) and at the outlet flange face as seen below at the right. (In the picture a reducer connection is shown bolted to the flange.)

The performance of the pump shell to date has been highly satisfactory to those concerned. The pump is installed at the Germantown dam, where it acts as a "booster" in the regular dredge pipe line to the dam top, now 60 feet above the old creek bed. In this capacity, where the wear should be about the same as in the lower pump, it has pumped to date 110,000 cubic yards, wearing away in the performance $\frac{1}{4}$ inch of shell. Taking into account that the skin of the casting is likely to be somewhat harder than its interior, the builders estimate a probable total pumping duty of about 400,000 cubic yards. This should be contrasted with the 160,000 cubic yards of the gray cast iron shell at Taylorsville dam, and with the 134,000 to 182,000 cubic yards of the manganese steel shells at Englewood. The manganese steel shell at "6 o'clock" was orig-

inally about $2\frac{1}{2}$ inches thick. The cost of the machined white iron casting was 18 cents per pound, as against 26 to 27 cents for the manganese steel, as stated. This relative cost could be reduced in later

castings, although market conditions at present would make the actual cost nearer 19 cents for the white cast iron. Further improvements in reducing cost of pump shell wear are in contemplation.

Injured Dayton Dragline Excavator Again at Work

The big Class 175 Bucyrus electric dragline excavator, partially wrecked in the Miami River at Dayton during the flood of April 20, and pictures of which were shown in the last issue of the Bulletin, has been righted, the injured parts restored, and is again at work, none the worse for the experience. The machine is the largest size regularly built by the makers, weighing about 200 tons in working trim. For good reasons, given last month, the flood found the machine a little distance out from the

east shore of the river, on its way across, and perched on a built bank of gravel elevated a few feet above low water, in accordance with the method of progression described under Fig. 149. (The machine in Fig. 149 is smaller but of the same general build and appearance as the one wrecked). The river undermined one corner of the machine, swung its revolving frame through nearly 180 degrees, wrecked the 125 foot steel boom by bending it double, and washed some of the mats from under

it, leaving it as seen in Fig. 146. About fifty tons of counterweight load the rear end of the frame, to balance the overhang of the boom. Several tons of this counterweight are excess, to balance the pull of the hoist cable, and it is probable that it was the throwing of this excess counterweight into unstable equilibrium as the revolving frame canted under the wash of the current, and its quickening swing to regain equilibrium after passing its high point, that caused the peculiar wrecking of the boom. The position of the wrecked parts indicates this, since the rear (counterweight) end of the frame, which before the flood was downstream, is seen in both pictures pointing upstream, and the wrecked boom, which was pointed upstream, clearly swung downstream and inshore, and apparently broke when the end struck the river bottom. The energy of 80 to 85 tons of metal, revolving on a wide arc, is the only available force which would seem adequate to account for the peculiar damage to the boom.

The pictures indicate the method of righting and repair. Both are taken from the east



FIG. 146—WRECKED DAYTON DRAGLINE EXCAVATOR, MAY 12, 1920.



FIG. 147—WRECKED DAYTON DRAGLINE EXCAVATOR, MAY 27, 1920.



FIG. 148—AIRPLANE VIEW OF FLOOD AT ISLAND PARK, DAYTON, APRIL 21, 1920.

bank of the river. In both pictures parts of a smaller dragline appear used in the work. The wrecked dragline is seen enclosed by an embankment of earth built around it from the east bank by the smaller machine. The water in the enclosure was then pumped out, the pipe at the right in Fig. 146, hanging by chains, being the suction pipe of the centrifugal pump which did this work. The chains hang from the dragline bucket, the small machine acting as a wrecking crane as well as an excavator. In Fig. 147 the little machine is removing the pieces of the wrecked boom, which were taken to the Conservancy shop on 7-ton trucks, and there repaired. The wrecked dragline was righted by digging away the river bed from beneath the high corner (using the small excavator for this purpose), and then building up under the low corner with timber work as seen in Fig. 147, the lifting being done by powerful jacks.

The fifty tons of counterweight were, of course, removed before the raising, and replaced after the wheel trucks on which the machine rolls were once more in position on their rails and "mats." The chief injury, next to the broken boom, was the breakage of the large propelling shaft under the middle of the revolving frame. A spare shaft was in readiness, so that there was no delay on this account. The electric motors, which supply all motive power, were under water during the flood. They were wiped clean, and dried by running a low voltage current through the coils, the heat generated by the current being quite sufficient for this purpose. The connections for accomplishing this, which may interest the electrical fraternity, are given in the editorial column.

The machine was again in working order, and began "digging itself out" on June 3.

MIAMI CONSERVANCY INEXHAUSTIBLE FARMS FOR SALE

Address Office "F"—Miami Conservancy District, Dayton, Ohio



FIG. 149—DRAGLINE EXCAVATOR CROSSING STILLWATER RIVER AT ENGLEWOOD. MARCH 3, 1920.

The crossing began at the farther shore by building out a peninsula of river gravel for the dragline to roll forward on, this work being done by the excavator bucket. The machine then rolled onto the peninsula, and made an island of it by cutting off its "neck," placing the excavated material on ahead. Carrying thus its island with it, by picking it up in the rear and placing the material in front, it crossed the stream, the island ultimately becoming once more a peninsula by joining the nearer shore. The picture is taken at this stage of the proceedings. On reaching shore, the dragline began its work of excavating a temporary spillway parallel to the river, preparatory to building the river section of the dam embankment.



FIG. 150—HEAVY WHITE IRON CENTRIFUGAL PUMP SHELL. FEBRUARY 28, 1920.

THE MIAMI CONSERVANCY BULLETIN SUPPLEMENT

"The News Letter"

To Promote the Conservancy Spirit on the Work

JUNE 1920

OF GENERAL INTEREST

Mr. John D. Morgan

Born December 31, 1844—Died May 23, 1920.

Mr. John D. Morgan, the father of our Chief Engineer, whose severe illness was referred to in the last Bulletin, died at his home in St. Cloud, Minn., on Sunday, May 23, in the seventy-sixth year of his age. He was born—and the fact has a peculiar interest in the light of the work in which we are now engaged, and which his son was called upon to lead—at Bright, Ind., near the mouth of the Miami River, about twenty miles from Cincinnati. The swift rises of the river under flood, and the incident dangers, were well known to him, and through him well known to the son long before the latter was called in to study them in detail.

As a youth and young man he went to school and taught alternately for several years, his studies being at the Academy at Lebanon, Ohio, then well known. His father, uncles and grandfather were "millwrights"—the forerunners of the modern mechanical engineer—and similar tastes led him to adopt the profession of surveyor and civil engineer, which he followed all his life.

An interesting incident of his early life was his capture during the Civil War by Morgan, the famous Confederate cavalryman, on his well-known raid into Ohio and Indiana from Kentucky. The similarity of the name led to his being taken before the leader, who on inquiry mounted him on a mule and released him to find his way back home. On the way he was captured in turn by Union cavalry, where his name this time got him into trouble, to the extent that he was near to be strung up at a rope's end, till he was able to establish his identity, and again get free.

His life work was largely in the State of Minnesota, where he went in 1866, becoming County Surveyor of Pope County a year later. In 1879 he removed to St. Cloud, Minnesota, where he resided to the time of his death. For a time he was City Engineer of St. Cloud. He was County Surveyor of Stearns County for fourteen years. Later his work carried him over a considerable part of the state. In 1905 he was elected Vice President of the Minnesota Society of Surveyors and Civil Engineers.

He was married in 1869 to Miss Anna F. Wiley of Wakefield, Mass., who survives him. Their children are Miss Jessie E. Morgan, of St. Cloud, and Mr. Arthur E. Morgan, of Dayton, Ohio.

He was a natural student, following the problems of the civil engineering profession with interest all of his life. Naturally he kept in close touch with the work of the Miami Conservancy, located as it is in the region so familiar to him in his youth, and especially since the solution of its problems devolved upon his own son. His diary showed that during the last few weeks of his life he had secured several books, and had begun the study of a number of new problems in civil engineering.

The outstanding trait of his character was perhaps his love of truth, coupled with which, as always, was as strong a hatred of shams. This was also the basis of his dislike of sentimentality, because sentimentality, as he well recognized, is a counterfeit emotion. He hated "bunk," in all its degrees and varieties. Along with this trait went loyalty,—integrity in carrying out any piece of work he was doing and in his relations toward all who were associated with him in it.

Mr. Morgan suffered the last two years of his life from hardening of the arteries, leading in the end to his death. The funeral services were conducted by the same minister who had officiated at the marriage service in 1869. The burial was in St. Cloud.

Picnic for the Conservancy Camp Youngsters

Superintendent A. A. Hauck of the Conservancy schools, better known as "Daddy" Hauck, for obvious excellent reasons, has planned a special Picnic and High Old Time for the "kids" at the various camps. It will come off on Friday, June 18, at the Community Club Grounds in Dayton, where all the facilities for such an affair—camp kitchens, swings, wading pool, base ball, tennis, ice cream, pop, cracker-jack, etc., etc.—are liberally provided, free, or in return for a nominal wherewithal. The camps will themselves do part of it, providing various "eats," and the means of getting the children into town. Headquarters Office people are shelling out a few necessary additional shekels for their share; and Dayton friends of the children will see that they get an automobile ride back to camp—happy, and just full enough and tired enough to make the "hay" a sweet place to "hit" when they get home. If you have a kid, expect to have one, or ever really were one, this affair ought to find a warm spot in you, in camp, or out of it, so that there will be no need to ask you twice to help in any way you can. Come if you can, and let the youngsters show you what a High Old Time looks like.

"Slim" Hahs Goes to Hospital

We regret to note that "Slim" (Ray) Hahs, of the Lower River Channel Field Party, has been obliged to take a vacation in the Irene Byron Sanitarium in Fort Wayne, Ind., for trouble contracted in France during his service with the A. E. F., affecting heart and lungs. Mr. Hahs is one of the longest in service of the Conservancy employees, having come to the work with Mr. Morgan in 1913. He was with the 29th Engineers in France, and was overseas about eighteen months, returning in August of 1919. We hope he will have a speedy recovery from his trouble.

Once More—Swat the Fly!

We publish below a little verse by Elldee, whose moral is obvious. The pest is again with us. Worse than a pest, he is a menace, a bringer of filth and disease. He breeds in the garbage can and similar resorts. He wallows in all manner of filthy conversation, and then he comes to your table. Once he was supposed to "purify the air." Now we know he pollutes it. He breeds in swarms. One fly now means a thousand in the later summer. Swat him accordingly—a thousand of the vermin at a swat.

Do Likewise

By Elldee.

Soft-footed, loathesome—on he crept!—
A bloated fearful thing;
With hairy legs—distended eyes—
Death lurking in his sting.
And horror-struck, I shrank in fear—
Recovered from the shock;
And got old last year's swatter out
And cracked his filthy block!

Some Ways We Can Improve the Camps

We have received a little write-up on the above subject which strikes us as so well put that we are printing it. It is by Albert L. Proteau, of Grade Six, Taylorsville school.

We can improve this camp in many ways, some of which I will relate.

We can plant grass, flowers, trees and gardens.

We should not throw paper rags, peeling and junk out to blow about the camp, but we should pick up paper and rags and burn them, because they look bad and they are not healthful.

THE MIAMI CONSERVANCY BULLETIN

We can put tile or pipe where the ditch is, thus eliminating the danger of mosquitoes and flies breeding in it.

Do not leave old barrels, boxes, dry weeds, chips and pieces of wood lay around in your yard.

Throw all garbage into the garbage can instead of out in the yard.

Empty dish water into the sink instead of out in the yard or in the garbage can.

We could put a water line down to the garden, so in case of drought we could water the garden.

We should build bird houses and encourage the birds to nest in them.

We should try to protect our friends, the birds, by trying to keep cats from catching them and by reporting all cruelty to birds by boys, girls and some cruel men and women to the nearest Humane Society.

We should try to kill all rats.

DAYTON

E. W. Lane Returns from Government Service

Our old friend and associate, E. W. Lane, Assistant Engineer with the District, who was released some time since for temporary service with the U. S. Department of Rural Engineering, to help in taking a census of drainage work in the south, finished that work the latter part of May. He is planning a vacation automobile trip through the east, visiting engineering works of note, following which he will return to his work with the District. For a few days before the trip, he is visiting his friends in Dayton, who are all glad to welcome him back.

We congratulate Superintendent Clawson on being once more reunited to his long lost car. Albert Larsen of the Railway Relocation delivered him the news, of the find, which he at first refused to believe—it looked too good to be true, after the long search.

Kramer and Bailey Take Agency for Auto-Tipster

Messrs. Kramer and Bailey are advertising an Auto-Tipster, which Bailey claims is worth anybody's money. The price is a dollar a throw. When level-headed, conservative chaps like those two take hold of anything, it's worth looking into. Order by mail or telephone.

The Woman's Club

Miss Theobald, our next door neighbor through the glass, and the Chief Pillar of the Purchasing Department, has returned to her work after her vacation.

Miss Mary Nealon, of the Purchasing Department, was married at 8 o'clock a. m. on June 2, the fortunate man being Mr. Paul Wilhelm, who is employed in the offices of the General Motors Co. Miss Nealon won the respect and liking of the Conservancy people whom she met during her service in the Headquarters Office, and they wish her a long and happy married life.

We hear it rumored that another Conservancy girl is all but under the orange blossoms, and hope to give the particulars at a later date.

Shop, Warehouse and Garage

We are glad to advise that Chas. Eby has finally found himself a place to live. He has moved into the Hungarian Colony in order to be close to his work. He says he will feel more at home there.

Henry Meyring says the price of clothing is outrageous. Henry started three months ago to buy a suit and he is still buying it.

The boys in the shop are figuring on buying a wheel chair for "Sid" so Domenic can push him around the shop in order that he can keep the place cleaner and have more time to wash windows and desks.

We are glad to see our old friend George Booher back at his old job, and we hope he will stay with us this time.

A rather amusing accident happened at the Warehouse the other day, when the Hamilton truck was being loaded. Mr. Stoner and Al Neubauer were trying to lift a big package onto the truck, which they thought was engine parts, when Wiseman came along and asked them, "Who told you to put my lunch on that truck?" "Some lunch!"

Mr. Murphy, the new timekeeper for the garage, has joined the "Overall Brigade," but why the blue puttees?

Red Jordan is very popular with the North Dayton ladies on account of his perpetual smile. Red is not flirting; he just can't help it.

Bill Shriver has his semi-weekly siesta riding in his Paige hack tied onto the end of a rope. The downtown garage now looks forward to his telephone call from all

parts of the county and their salesmen think they have a live prospective buyer, but we know better. Bill says he would rather pay a towing charge twice a week than to buy a new Paige.

Anyone who is planning on a nice trip over the Fourth of July should get in touch with Mr. Nill of the Warehouse before concluding arrangements. Nill had a most wonderful trip over Decoration day which took him and his family to Mammoth Cave, Ky. Nill packed up a few things and started out in a lame auto on Saturday evening, expecting to return June 1. However, he said to the Bulletin reporter that he only had 47 blow-outs and 7 punctures. Twice he had to walk two miles to get a pint of gasoline. He said he saw mud for the first time, but the rain had made it so soft he could hardly keep it out of his eyes long enough to see if he was still in Kentucky. When he arrived at the Cave, Nill was not surprised at the hole. He said here is where they got all that mud for the road down there. At this point of interview Nill asked to be excused so he could get some sleep, which he was badly in need of. Nill has resolved to spend his vacation at the "Soldiers Home."

OUR JUNIOR EDITORS

This is the last installment of junior editorial work before the awarding of the prizes to those who have sent in to the Bulletin the best work in written English during the year. The prizes will be awarded at the School Picnic noticed in another column. The work of reading these little compositions has been a real pleasure to the senior editor. He believes also, from the evidence, that the writing of them has been a real gain to the competitors. He hopes to start a similar contest with the opening of the next school year.

The Englewood contribution this month is, as we understand, a bit of verbal reporting of an actual occurrence, as given to the Englewood school. It is printed verbatim, just as Griscom gave it when he "spoke his piece."

Englewood

The Little Woodchuck. I saw one little woodchuck wink his eye. I was down at the old bridge and I saw a tiny little woodchuck jumping all round me and playing round me and then he started away. I thought he was going away surely and I felt very badly for that cute little creature to go away for sure. Then he stopped and I wondered why he stopped. He played round me a lot more. This happened a lot of times, and I thought I'd look at him. He stopped and took a good look at me and made a little noise and disappeared. He was a cute little chap, and he had a sweet little nose. He was such a cunning little chap. I'd have liked to have him for a pet for sure. I touched his fur and it was warm. Good-bye, this is the end of the tiny woodchuck.

Griscom Morgan, Third Grade.

Taylorville

Elizabeth Ford

I was made in the U. S. A.
On the third day of May,
In Detroit, Michigan,
By a man named Pat Bishigan.
The driver of my first trip
Said I sure was a pip
Of a little Lizzie Ford,
And capable of earning my board.
I was sold to a farmer yap
Who was so green that out of him ran sap.
When he drove me to his home,
He introduced me to his son "Rome,"
Who drove me every day
With many a load of hay,
I am now in the garage,
And look like I've been through a barrage.
This is the sad ending of Lizzie,
The fliver that was always busy.

Albert L. Proteau, Grade Six.

Huffman

An All Day Picnic. The children of Fairfield enjoyed an all-day picnic on the last day of school, inviting their parents to come and bring well-filled baskets of "eats."

Before dinner everyone enjoyed the program given by the children of the township schools; then we ate dinner on the school lawn.

THE MIAMI CONSERVANCY BULLETIN

EDITORIAL

Board of Editors

Germantown	Miss Julia Darnell
Englewood	Albert L. Wald, George Rodgers
Lockington	C. H. Shea
Taylorville	Ben H. Petty, F. E. Floyd
Huffman	Mrs. C. C. Chambers
Hamilton	R. B. McWhorter
The Woman's Club, Dayton, Ohio.....	Miss Mayme McGraw
Dayton Warehouse.....	J. T. Hall

"Live in a Camp and Raise Kids and Chickens"

That was the slogan we recently heard raised by one of the officers of the District. And he raised it with all the enthusiasm inspired by the swift rise in rents and the w. k. H. C. L. He lives in a "high class" suburb, sometimes known as "Mortgageville," where his neighbors are among "our best people;" where to the editor's own knowledge the price of a certain corner house and lot went inside of a year from \$6,500 to over \$9,000—not price asked, but the cold cash in hand paid—and which jumped almost at once, following the second transfer, to over \$10,000; and where rents, of course, play leapfrog with the upward jumps in prices. Hence the warm, convinced tone of our friend's slogan—"Live in a Camp—a Conservancy Camp—and raise kids and chickens!"—it was as fervid as the chorus of a camp meeting hymn.

And our mind ran back instantly to that mournful morning when all our esteemed local contemporaries, the Dayton dailies, came out—almost in tears, and with black borders round their blessed pages—with many interviews, condolences and recommendations from many citizens—it having just been discovered that the population of Dayton was not the dreamed of 185 or 175 or even 165 thousand, but only a wretched 153 thousand.

The lamentation was genuine, we believe. Our esteemed contemporaries really thought it was a misfortune. And yet, to our mind, there was connection between our friend's enthusiasm for getting out of Dayton, and the condolences in question. Because, although they do not seem to see that slant of it, what our newspaper friends were really lamenting was that Dayton is not more crowded than it actually is, that therefore houses are not scarcer, prices of corner and other lots still higher, and the cost of rent yet nearer the blue empyrean than is now the case. Because, the greater the population, the higher up the ladder goes the price per front foot, carrying rent upon its back, and the more enthusiastic becomes our desire to get out of Dayton into a Conservancy Camp, where the kids can roll round in blue overalls, the chickens can scratch round in the garden, and we can spend the calm evenings with a hook and line down by the banks of the Miami or the Stillwater.

We speak truth, not treason. Why, looked at calmly, this heated pursuit of population? Why should Dayton desire to swell up to be a second Chicago, another Windy City of unwholesome size, breeding Bolshevik slums and other pestilential problems? How illogical also this hurrah for size? Because in the very next editorial, the esteemed contemporary will admonish us solemnly to get back to the land, and help solve the food problem. And how can we get back to the land without getting out of Dayton—which if we do, the price of rents and corner lots will drop—which God forbid!

Are people in Chicago happier, wiser or better than they are in Dayton? That is a real question. We know they are not. Our editorial mates of the Dayton dailies would be the first to voiciferously deny any such proposition. Yet we chase the population bubble. It is a grand illusion.

Exhibits of sewing, cooking, spelling and clever booklets from all the schools of the township filled the wall.

After dinner the graduation of the eighth grade pupils took place. All felt very proud as they received their diplomas.

There were races and many interesting games after this, and last the ball game between Fairfield and Beaver which was very exciting.

Geneva Saylor, Eighth Grade.

You Can't Stop That Warehouse Bunch

F. A. Everhardt, Warehouse Superintendent, organized a ball team of Conservancy employees and a few outsiders, and entered it in the Saturday Afternoon League under the name of Standard Registers, and to date they have been going great guns, having won all four games played. They won from McCooks 2 to 1, Tellings 7 to 6, N. C. R. 7 to 3, and the Dayton Steel 9 to 2. They have a good team, and any Conservancy people who wish to see a good game should go to McKinley Park, where they play the majority of their games. The team is made up of the following players: W. Jones and Kuboski, pitchers; Reussenzehn and Gleason, catchers; Unger, first base; Kelly, second base; Shanks, short-stop; Bordewisch, third base; Gerlaugh, left field; Rike, center field; Keefer, right field, and Neibaur, Rohrer and Rosenkranz, utility men.

In W. Jones and Kuboski they have two of the best pitchers to be found in the city, and the team backs them up with good fielding and hitting.

The team has a large bunch of rooters who are regular attendants. Among them you will find the following Conservancy men: Manning, Braun, Dad Hall, Johnson, Frank Swift, Hanneval, Peggy Ames and many others, but the above are the chief rooters and make the most noise.

June 12 they play the Durirons at McKinley Park and they are out to make it five in a row, as the Durirons are they only ones they have not met, and they want to make a clean sweep of the first round. The schedule calls for four rounds of five games each, with the winner playing the winner of the Sunday League for the City Championship and the cup which was given by ex-Manager Waite.

ENGLEWOOD

Englewood Rivals Newport

Within the past month Englewood has had the pleasure of entertaining several prominent organizations.

On May 27 about fifty members of the Troy Rotary Club took supper in the Mess Hall with Mr. Allen. The balance of the evening was spent in viewing the work in progress.

The Industrial Relations Association spent the evening of June 3 at Englewood. The members of this organization consist mostly of Employment and Welfare men representing the larger industries of Dayton and vicinity. After their supper in the Mess Hall they were taken over the work, showing keen interest in methods and machines employed in building the dam.

Engineers' Club Picnic at Englewood Dam, May 28

On May 28 the Engineers' Club of Dayton held their regular Friday home night for members and families in the form of a picnic at the Englewood Dam. It was the desire to combine a social evening with an inspection of the construction work. To facilitate this, and also to introduce an element of novelty, seats and benches were erected on top of the dam, where not only the excavation and pumping operations could be seen to advantage, but also a beautiful view of the Stillwater valley.

Parties began to arrive by motor at 4 o'clock and spent their leisure in inspecting the work. Many brought their own basket luncheons, but for those who preferred not to do this a cold supper was served. In the evening there was dancing in the Community house and outdoor moving pictures by the Bray Studios. About 400 people attended the picnic.

The affair was an entire success. Too much credit can not be given to Chief Steward McCarthy of the Conservancy and his assistants and to Chief Steward Maher of the Engineers' Club for the delicious supper, served under decided difficulties.

The Ladies' Picnic

It was a gala day for the ladies in Camp, when they held their picnic in the woods adjoining the Camp school-house. Plans for the event had been in progress for several weeks before weather conditions would permit. Let it suffice to say that quite strenuous games and contests were on the program and picnic lunches disappeared with distressing rapidity.

Individual invitations have been sent to each household in camp, announcing that the school ground will be open throughout the summer for all those who wish to use it for recreational purposes.

THE MIAMI CONSERVANCY BULLETIN

School gardens are flourishing under the helpful supervision of Mrs. Everdell.

Mr. and Mrs. Riley are new residents in Camp. Mrs. Riley is a sister of Mrs. Williams, at whose home they are staying for the present. The Rileys sailed from England some few weeks ago and are intending to make their home at Englewood. A cordial welcome is extended to them.

Mrs. P. Bjorgum has had a distinguished visitor in the person of her sister who is engaged in missionary work in foreign countries.

Associate Editor Rodgers on Vacation

While Taylorsville insists that two half editors equals their editor, Englewood wishes to announce that they have lost the services of one complete Associate Editor, none other than George Rodgers. George completed his third year of the co-operative plan at Cincinnati University and Englewood Dam and has gone to Fall River, Mass., to spend the vacation at home. We hope to see him back again and wish to extend hearty good wishes. Incidentally, it is guaranteed to readers that the various ailments and stunts of Wald's dog will be excluded from the Bulletin for the time being.

Kirby Jones is in possession of a house, furniture and a prospective garden. Can anyone guess the other prospective?

Hopeful Outlook for Welbaum

To avoid any further necessity for answering inquiries, we wish to announce that the vegetation struggling for a position immediately under O. F. Welbaum's nasal organ will probably reach the mustache class within the next six or eight months.

As a final endurance test for their new car, Mr. and Mrs. Heller motored to Columbus and return. They report having had a very enjoyable trip.

Englewood Fire Department on the Job

Fire destroyed one section of a three family apartment cottage at Englewood. Contents of the house were destroyed, but no one was injured. The Englewood Camp fire department displayed their efficiency by preventing the fire from spreading to other parts of the building.

HUFFMAN

Supt. and Mrs. Clawson Taking Real Joy Ride.

We all extend our congratulations to Mr. and Mrs. Clawson upon the recovery of their automobile, which was stolen on the streets of Dayton on May 1 and found in Detroit on May 29.

Mrs. Cullen and Mrs. Burns entertained the Sunshine Club on May 5, and Mrs. Megley and Mrs. Maynard were hostesses on May 19 at the Community Hall.

Mr. and Mrs. Hodge and Mary Jane have been spending their vacation with Mrs. Hodge's sister at Thayer, Mo.

Barnes Invents New Fishing Tackle.

Fishing has recently become a popular sport here, many gardens being rapidly spaded in pursuit of worms. Barnes claims the prize fish and prize story, when he brought in a 2½ pounder which he says he killed with a rock. Isabelle Bailey says her daddy must catch only small ones and throw them away, as he never brings them home.

"Brides in Blue Denim"

In spite of the fishing fad there are many prosperous looking gardens in Huffman. The ones attracting the most attention are those being cultivated by the "brides in blue denim."

Several of Virginia Ann Zull's little friends helped her celebrate her birthday on May 26. They also helped her find the bottom of a big can of ice cream, besides devouring quantities of cake and candy.

When Doctors Get Together

Dr. Smalley and family were guests of the Saylers on May 23.

Mr. Inman is enjoying a visit from his parents from Canada.

Why does the ice cream man take so long to deliver? Probably trying to outpoint the meat man's bouquet of flowers with a bouquet of words. Ice melts rapidly when put into an ice box slowly, which no doubt explains B. V.'s regular shortage.

Mr. Maynard and family motored to Indiana to spend the week end and Decoration Day with Mr. Maynard's parents.

GERMANTOWN

Miss Pendland is visiting Mr. and Mrs. Pilcher this week.

Miss Marie Espel spent Decoration Day with Mr. and Mrs. Chris Foehr.

Miss Sadie MacDonald spent Decoration Day in Englewood with Mr. and Mrs. Alex McKinnon.

Mrs. Russel Minton and children are visiting her parents in Piqua.

Wednesday evening, June 2, Mrs. Pilcher entertained with a card party in honor of her cousin, Miss Pendland.

Mr. and Mrs. Ralph Layman had as their guests Mrs. Layman's parents, Mr. and Mrs. Long, of Dayton.

A very pleasant time was spent Monday by Mr. and Mrs. Pauls, Mr. and Mrs. Shively and son Dick, with C. W. Faber and wife.

Mr. and Mrs. Harnish are entertaining as guests Mr. and Mrs. Lines and family, also Mr. and Mrs. Loose.

If the men from Headquarters will please drive somewhere else instead of on Mr. Foehr's garden, when they come to Germantown, he may have green beans for the Fourth of July.

TAYLORSVILLE

Supt. Hauck as Platform Star.

"Daddy" Arthur Hauck endeared himself to the school children of Taylorsville by conducting a picture show for their benefit. The films on biology, borrowed from the N. C. R., showed the development of plants and animals from the seed to the matured organism. Mr. Hauck's remarks, accompanying the pictures, were very clarifying. We can cheerfully recommend Mr. Hauck as a lecturer of "reel" brilliancy.

Steve Brodie at Taylorsville

Walter "Jumper" Smith recently gave another exhibition of his aerial prowess. Mr. Smith leaped thrice from the upper end of the boom on the Bucyrus dragline into the waters of the gravel pit, fifty feet below. No doubt, we shall some day behold W. J. as a movie thriller.

Spring Moving

The moving bee has been as busy in Taylorsville as the presidential bee in Chicago. As results of this industry in our midst, we are compelled to acknowledge the loss of H. W. Tizzard and Masel Floyd, who are entering the contracting business; Clay Farmer now a sheep man near Lexington, Ky.; W. W. Cole, who has accepted a position near Battle Creek, Mich., and Lawrence "Bud" Crampton, now a surveyor for a Dayton concern. The residents of the camp unite in wishing these people prosperity.

HAMILTON

Mr. and Mrs. C. H. Eiffert and Mr. and Mrs. J. E. Faist motored down to the Ohio River Decoration day, and enjoyed a picnic dinner near Harrison's tomb.

Oscar Ross, timekeeper, has returned to duty after spending a short vacation in Dayton.

Mr. and Mrs. G. W. Schroeder spent Decoration day at Saylor Park.

Mr. and Mrs. R. B. McWhorter made a trip to Columbus during the Decoration day holidays.

The body of George Baerman, age 9, drowned in Miami river June 3, was recovered by Conservancy workmen near the Columbia bridge Sunday, June 6.

LOCKINGTON

Mr. and Mrs. Frank Morrin of Sidney have moved into camp, taking the cottage recently vacated by Mr. Joseph White.

Mrs. James Raferty has returned to her home in Newark, Ohio, after spending two weeks with her daughter, Mrs. L. J. McWilliams.

Steve Mihayloff is recovering from an operation which was performed at the Memorial Hospital in Piqua, and will be back on the job in a few days.

Some of the crack fishermen from the job report record-breaking luck at the Saint Mary's Reservoir this season. According to their stories, the legal limit—forty croppies per day per fisherman—has saved many a Ford from breaking down on the return trip. Mushroom hunters report no luck at all this year.

Mrs. J. J. Loehr and children returned to camp Memorial Day, after visiting for two weeks with relatives in Connersville, Ind.

THE MIAMI CONSERVANCY BULLETIN

JULY 1920



FIG. 151—DOWNSTREAM END, OUTLET STRUCTURE, TAYLORSVILLE DAM, JUNE 11, 1920.



FIG. 152—STONE ARCH BRIDGE, B. AND O. R. R., HAMILTON, BEFORE WORK BEGAN, JULY 3, 1919

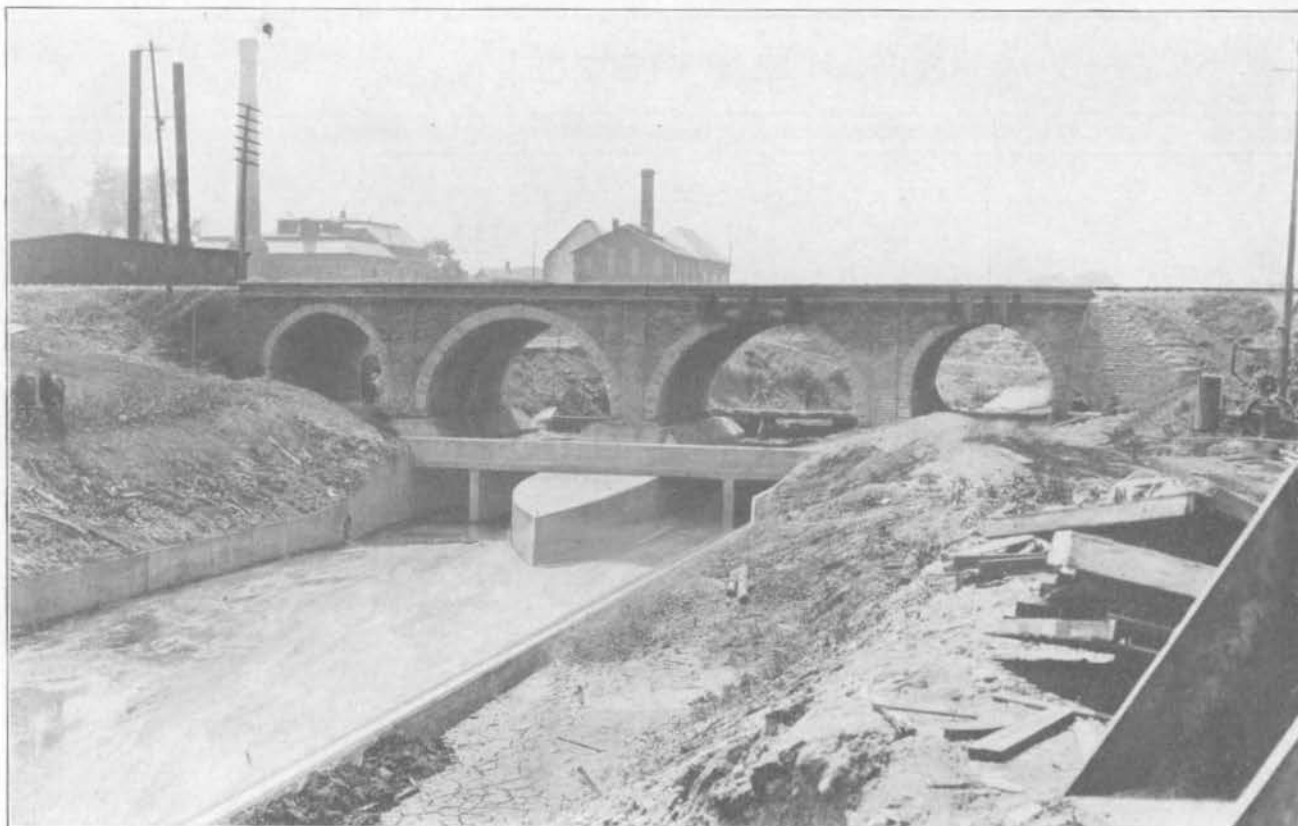


FIG. 153—STONE ARCH BRIDGE, B. AND O. R. R., HAMILTON, AFTER COMPLETION OF THE TAIL-RACE CONDUITS, JUNE 23, 1920.

The two pictures indicate the general nature of the construction problem involved. The stone arches were old, with some cracks and a few stones fallen out of the under sides, indicating some settlement. The foundations (on gravel), were shallow, reaching about to the top of the nearest cross wall of the conduits (in the lower picture). The tailrace from the Fordson Tractor power plant (in the foreground below), had to divide and pass under the two central arches, the bottom of its floor being about 12 feet below the bottom of the bridge foundations. The problem was to excavate to this depth to build the tailrace, without undermining the bridge piers. The conduits under the arches were roofed in order that the roof slabs might act as braces to the bases of the bridge piers. The vertical wall in the center of each conduit is to help support the roof, at some future time, when the arches will be partially filled with earth so as to provide for a widening of the bridge.

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THE MIAMI CONSERVANCY BULLETIN

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DAYTON, OHIO

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Subscription to the Bulletin is 50 cents per year. At news stands 5 cents per copy. Business let-
ters should be sent to Office Engineer, Miami Conservancy District, Dayton, Ohio. Matter for pub-
lication should be sent to G. L. Teeple, Miami Conservancy District, Dayton, Ohio.

Conservancy Court Inspects the Work

The Conservancy Court met in Dayton on Thurs-
day, July 1, and following the transaction of regular
business spent about two days in an inspection trip,
during which they visited all parts of the work of
the District excepting the upper end of the railroad
work in the Huffman basin and the work at Lock-
ington and Troy. They expressed themselves as
well pleased at the way in which the undertaking is
being carried out and at the progress made.

Action was taken at the Court Session on several
matters. One was the re-election of Mr. Henry M.
Allen for another five year term as a member of the
Conservancy District Board of Directors.

Another concerns the construction of Black
Creek Bridge in Hamilton. As originally planned
the District was obligated to build the abutments,
but the bridge was to be built by the city, the old
foot bridge which it will replace being permitted to
stand in the meantime. By the change of plans now
made the bridge will be built by the construction
forces of the District, the cost being defrayed by
the city. The change was made for two reasons.
It was desired to construct the new bridge as quick-
ly as possible on account of the danger to the founda-
tions of the old structure in times of flood if it
were permitted to remain after the excavating of
the new channel by the District. Also, with the
organization and machinery of the District now on
the ground, it was possible and convenient for the
District to undertake the digging of the foundations
for the new bridge much cheaper than the work
could be done by any contractor. Also the District

could design and build the remainder of the struc-
ture as well. Under these circumstances it was
thought both safer and cheaper to have the District
proceed at once with the work of construction. Fur-
ther, by construction this season, the work may be
sufficiently advanced to be out of way of the
river improvement next year, and thus facilitate the
latter. The bridge is much needed and by the new
program the public will get earlier use of it.

The second change was the introduction into the
flood protection plans at Hamilton, of a levee just
south of Coke Otto, extending from the east bank
of the Miami to the higher ground at the M. & E.
canal east of it. This levee will protect an additional
area north of Hamilton, will protect the B. & O.
Railroad bridge across Old River from any danger
due to high water, and will also protect the highway
south of Coke Otto and west of the river from
danger of scour at flood seasons.

The third change is the enlargement of the river
channel at Troy above Market Street, to take the
entire flow in time of flood, instead of depending
upon overflow lands north of the river. This in-
volves elevation of the levee on the north bank of
the river between the B. & O. Railroad bridge and
a point a little north of Adams Street, to full
height, a raise of about 12 feet. A street along the
top of this levee is also arranged for, with a raising
of the ground level back of it sufficient for building
purposes. The levee on the other bank in this neigh-
borhood is also to be raised and improved in align-
ment, so that the appearance of the river banks
when finished will be very pleasing. This plan is

contingent on the enlarging of the Adams Street bridge by the Miami County authorities. The advantages of the changes authorized are so great that no difficulty is expected on this score.

Opening of Baltimore and Ohio Railroad Relocation

The new line of the B. & O. R. R. was opened to traffic on July 7. This line begins just within the Dayton yards and extends north for about ten miles, being necessary on account of the interference of the old line with the Taylorsville dam and retarding basin as described in the Bulletin for October, 1919. This work was begun an April 8, 1918. The grading was finished in September, 1919. The ballasting and tracklaying were finished in December, 1919, but as it was not desired to open traffic over the new line in the winter season, owing to the dangers due to action of cold weather on new ballast, the final work of dressing and lining was not undertaken until the spring of this year, work being resumed in March. The general contractor on the work was Grant Smith of New York City, who sublet the entire work to H. C. Kahl, under whom the subcontractors were the Vang Construction Company, Kahl Bros. Construction Company, Condon and Smith, McAndrews Bros., and the La Boiteaux Company. The tracklaying and ballasting were let to Roberts Bros. of Chicago. The ballast was supplied by the Conservancy District from borrow pits in the gravel of the Miami Valley bottom just below Taylorsville dam. The work was done under the direction of Albert Larsen, Division Engineer for the District, the railroad company being represented by A. H. Griffith, District Engineer, and P. A. Callahan, Assistant Engineer.

Mr. Morgan Called to Be President of Antioch College

The call to the presidency of Antioch College, recently extended to Arthur E. Morgan, the Chief Engineer of the Conservancy District, is a matter of unusual interest to all the friends of the flood prevention project. It has also a significance beyond the usual announcement of such a call. The college is in fact to be reorganized, and along lines which mark a further step in a well recognized tendency in modern education. Mr. Morgan has for a long period given much thought and attention to such matters, and it is to effect the reorganization that the call has been extended to him. He has accepted it, on the condition that active service shall begin with the completion of the work of the Miami Conservancy District; and with the further provision that his service as president shall not require the discontinuance of his engineering practice.

Antioch College is situated at Yellow Springs, near Springfield and Dayton. It was founded in 1853, under the presidency of the famous pioneer in modern educational methods, Horace Mann, who refused the candidacy for the governorship of Massachusetts to accept the job. It embodied at the time many of his ideas. It was the first college in this country to embody the principle of co-education. For many years its policy has been inclined to be rather stationary, maintaining to a great degree the traditional small college policy of the latter nineteenth century.

The new departure is in a field not exactly that of any existing institution. It will remain a small

college, not attempting to compete in the peculiar field of the large universities. It will be co-operative, its students studying in the college, and working for a livelihood, by spells. The work for a livelihood will be in established nearby industries, at regular remuneration, on something like the Cincinnati University plan. But the result aimed at is different, being not to create technical experts (although graduates may well become such), but to educate in the broadest sense, the idea being that work is itself educative, and to be regarded as the application of ideas to life. Specialization will be subordinated to the inculcation of fundamentals and principles, with their application in practical arts and industries. The college course will be ordinarily six years in length, with a "book knowledge" equivalent of the usual four. The courses so far considered are Business Administration, Civil Engineering, Contracting, Education (as applied to the management of consolidated rural schools), Farming, Machine Shop Operation and Management, and Household Arts. As the last shows, the college will remain co-educational.

Seven new trustees give an infusion of new blood into the management, harmonious with the change proposed. They are C. F. Kettering, John C. Haswell, George W. Verity, F. D. Slutz, Gordon S. Rentschler, John W. Hunt and William Chryst. An acting dean will have immediate charge of affairs for the present.

Inspection Trip of the Dayton Citizens Relief Commission

An interesting incident in the progress of the Conservancy work was the visit of inspection on July 7 of the Dayton Citizens Relief Commission, as the guests of the Officers of the District. The Dayton Citizens Relief Commission was incorporated on June 25, 1914, to be the heir of the Citizens Relief Committee, the Flood Prevention Committee, and other similar bodies which had taken up and carried on the necessary work of planning and relief, following the disaster of the flood. It was this commission which raised and administered the \$2,000,000 Flood Prevention Fund, which enabled the work of investigating and instituting permanent plans for flood prevention to be started, and which had charge of all such work until the organization of the Miami Conservancy District. The work of public education, necessary to the organization of the District, was in fact part of its work. On the organization of the District the Commission turned over to the latter practically all of its activities. It has always, however, kept a warm interest in the project and remained in close touch with all that has been done. It has always been the intention of the Officers of the District that after the work had progressed to the proper point, the Relief Commission should be invited to inspect what had been done and see how the trust which they had turned over to the District had been administered. The visit of July 7 was the carrying out of this plan. The dams at Taylorsville, Englewood, Germantown, and Huffman were visited, as well as the work on the Baltimore and Ohio, and the Erie and Big Four Railways, now finished or nearly so. It is a satisfaction to record the pleasure of the Commission in seeing so far advanced the work which they had done so much to set actively forward.

Building a Concrete Tailrace Below Stone Arch Bridge Foundation Level

Conduits Carried 12 Feet Below Pier Bottoms. Low Headroom Under Springing of Arches Makes Driving of Piling Difficult.

An interesting variation on this problem was encountered in the building of the tailrace for the new power plant for the Fordson Tractor plant at Hamilton. Views of the Tractor and power plant are shown in the Bulletin for September and December, 1919, the latter showing also the concrete floor of the tailrace as it leaves the power plant. Both pictures are taken from an old bridge of four stone arches, used jointly by the B. and O., and the P. C. C. & St. L. Railways as a double track bridge. It was the carrying of the tailrace under this bridge which presented the problem referred to. The bridge is old, its exact age unknown. Its appearance previous to the work is shown in Fig. 152. Cracks in the arches testify to settlement of the foundations, and a few stones which have dropped out tell the same story. As originally planned, the new power plant would supply about 1,000 horse power, taking the place of the old power plant of the Hamilton and Rossville Hydraulic Co., removed from a central position in the city to its northern limit in the carrying out of the flood prevention plans. When Henry Ford and Son purchased a controlling interest in the power plant, with the intention of using the power in driving their new Farm Tractor factory, the original capacity required to be much increased, to a full load limit of 3,300 horse power. This required such a deepening of the tailrace, to take the increased water consumed, as to carry the bottom of the new structure about 12 feet below the arch bridge foundations. With the arches in the condition described above, and with many trains on both railways passing every day, which could not be interrupted, it was necessary to exercise unusual care to keep the foundations stable, both during construction, and afterwards.

The power plant is about 400' east of the bridge, and just north of the new Fordson plant and the north protection levee of the city of Hamilton. (See map, page 27, Bulletin for September, 1919). The head race is east of the power plant. Thus water from the head race passes through the wheels on westward into the tailrace, which passes under the arch bridge, thence curving northward and then southward to the river. From the power plant to the bridge the tailrace is an open channel 50' wide and about 400' long, with side walls 4.5' high, the walls and floor being plain concrete. The walls are 3.5' thick at the base and 1' thick at the top. The floor is 6" thick. This concrete channel is continued for a center line distance of about 73' west of the bridge, after which it continues as an open channel excavated in earth, widening gradually to 80', which width is continued to the river. No construction difficulties were encountered except those connected with passing under the stone bridge, described above. A view of the bridge before any work was done is given in Fig. 152 and after completion in Fig. 153.

The two center arches of the bridge are of 30' span; the two side arches of 20' span. It was planned to carry the tailrace under the bridge in two branches, one through each of the two middle arches. Each branch would then be a rectangular conduit, 20' wide by 8' 6" high inside, with side walls 2' 6" thick, bottom 2' thick and top 20" thick. This would leave only 2' 6" on each side between the conduit and the arch foundations. Excavation showed that the latter were shallow, resting on timber grillages, which rested in turn on gravel. The bottoms, of the grillages were about 12' above the bottoms of the proposed conduits. To keep the

The difficulty was in driving the piles, 12 feet long, the distance from the bottom of the bridge foundations to the under side of the arch near the pier being only a little more than this, leaving insufficient room to set the steam hammer on top of the pile. Fig. 156 shows the way it was done in detail. See also page 183. In general, the method was to set up nine piles at a time, interlocking as if driven, and drive the first pile part way down by means of a "stirrup" slipped over the top, the hammer playing on the foot of the stirrup. The second pile was then attached to the first by

(Continued below)



FIG. 154—DRIVING SHEET PILING FOR TAILRACE CONDUIT FOUNDATIONS, AUGUST 22, 1919

means of a pair of iron straps, and the first pile driven to full depth, taking the second pile with it to a depth sufficient to permit the hammer to work on it directly. The third pile was then strapped to the second and the process repeated.

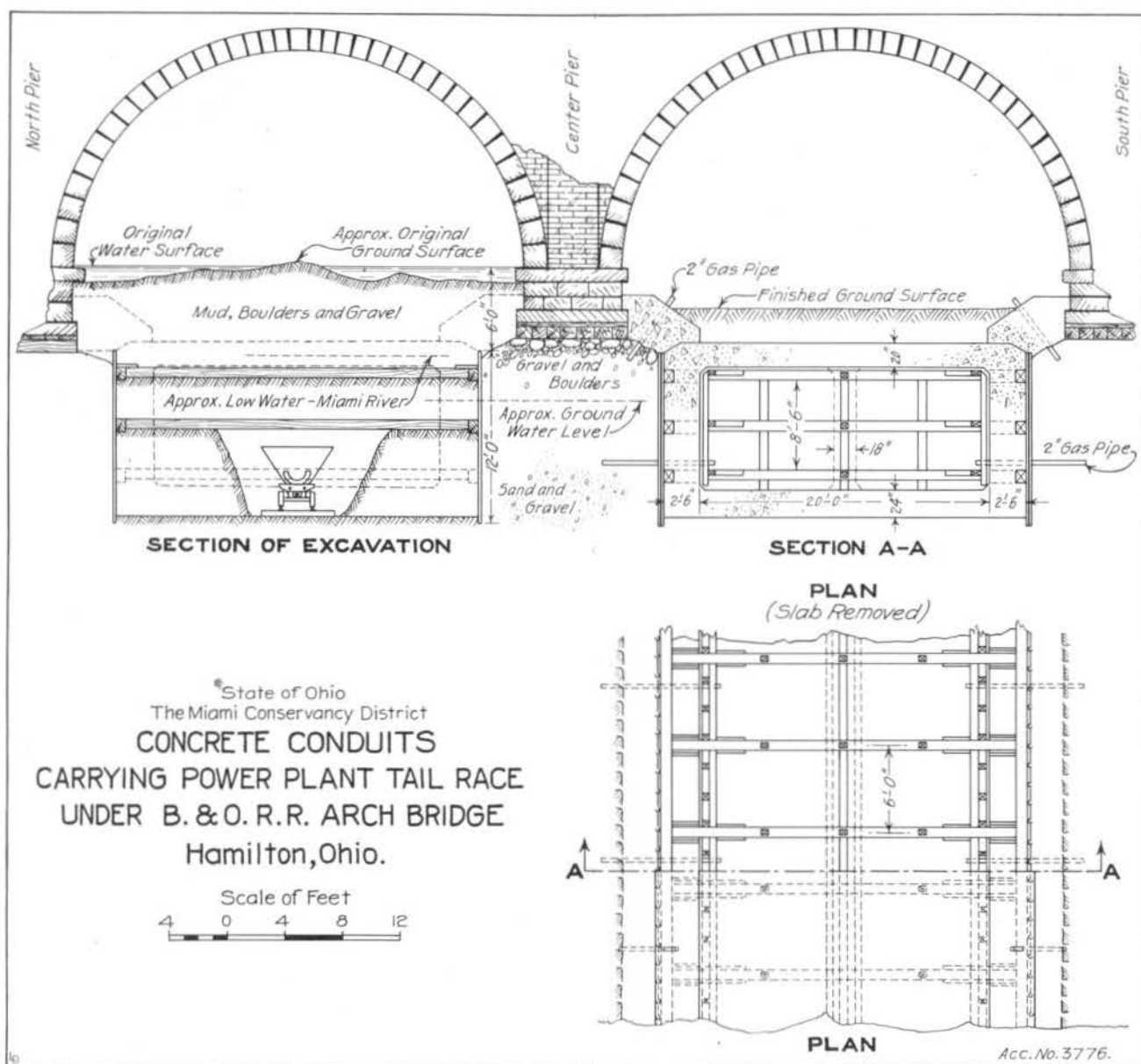


FIG. 155—TAILRACE CONDUITS UNDER B. AND O. R. R. ARCH BRIDGE, HAMILTON. PLAN AND SECTIONS

gravel under the grillages from caving, it was planned to drive a fence of interlocking steel sheet piling on each side of the proposed excavation, and as the material was dug out, to introduce bracing timbers between the two rows of piling. After the excavation the conduit floor would be cast; then the side walls, using the steel piling for the outsides of the side wall forms; then the roof. The floor and roof together would then act together as braces to support the gravel beneath the bridge piers, permitting the withdrawing of the bracing timbers.

These operations constituted the main program and were carried out as described. An additional feature was introduced owing to the desire of the railway companies to provide for a future widening of the bridge to accommodate four tracks. This would mean the extension of the concrete conduits and a partial filling in with earth of the space beneath the arches. The conduit roof as first planned would not provide sufficient strength to support this earth material. To meet this contingency, a center

wall was introduced into the design, 18" thick. This wall was poured after the roof, through holes left in the latter 12 feet apart, and of course after the removal of the brace timbers. An additional factor of safety in the design, a concrete coping was then poured, connecting the conduit roof to the bottom of the stone arch on each side. All of these features are shown in Fig. 155.

Finally, the plan provided for the forcing of cement grout, under pressure, into the gravel beneath the bridge piers. This grout was introduced through gas pipes cast into the side walls of the conduits, at the bottom, 12' apart. Similar pipes were cast into the copings connecting the conduit roofs and the piers, to permit air and water to escape as the grout was forced in at the bottom.

The program for the excavation is shown in Fig. 155. The upper 6' consisted of mud and gravel, with larger stones and boulders intermixed, the latter being apparently material wasted during the construction of the arches, or placed to prevent scour. Most

of this part of the excavation was done by hand and wheel barrows. On reaching the level of the top row of timbers for the sheet piling, these were laid and the piles driven. The excavation was then continued down to the level of the second row of timbers. These were then placed and the remainder of the material removed as shown in the figure, using a steel dump car into which the material was shoveled. Some of the material, after the upper part was removed, was taken out with slip scrapers. The excavated material was dumped in heaps outside and removed by a dragline excavator which was engaged in building the north Hamilton protection levee, the latter being located just south of the bridge. This machine also dug some holes which gave dumpage ground for material after finishing its work.

The most vexatious of the minor problems was the driving of the steel piling. The difficulty lay in the lack of room to set up the pile driver, the piles being 12' long, and requiring to be driven close to the faces of the bridge piers, where the dropping of the arch surfaces toward the springing lines gave very little head room. There was just sufficient space to set up the piles, but not enough to work the hammer. To meet this difficulty a stirrup like that in Fig. 156 was hung over the top of the pile, except that it was hung with its foot at the side of the pile instead of at its edge, the pile driver hammer striking this foot. This gave so much vibration under the impact of the blow that it was quite ineffective and had to be abandoned. The stirrup of Fig. 156 was then tried, with much better results. The first one used was too light and broke across the angle next the foot. Several trials evolved the form shown, which lasted through the job.

Driving with this stirrup, however, was found to be very slow, and other expedients were considered. The first of these was to drive each 12' of piling in two lengths, one of 5' and the other of 7'. By driving a 5' on top of a 7', and then a 7' on top of a 5', the short lengths would break joints, and present an interlocking wall 12' high. The idea was abandoned, however, it being thought that the scheme would give a weakened structure, and that the joints would not be tight.

Then an attempt was made to drive a 7' pile, draw it out and insert a 12' in its place, driving the latter to the full depth. This scheme failed on account of the gravel falling into the hole on withdrawing the 7' length.

Finally the scheme was tried of driving one pile about half way down, then attaching a second pile to the first, and driving the two as one. When the first was full down, the second would be half way. A third could then be attached to the second, and the process repeated. The attachment is shown in Fig. 2 of Fig. 156. It failed on account of the shortness of the link, this making the shear in the hole so great as to cut through the web of the pile. Lengthening the link as shown in Fig. 3 of Fig. 156 lessened the shearing stress to the direct blow of the hammer, or nearly so, and cured the process of this weakness.

In the plan as perfected, about 9 piles were laid on the ground side by side, interlocking as if driven, and lifted by one end into an upright position next the ranger which guided and kept the piles in place during the driving. The stirrup was then slipped over the first pile, which was driven 5' down. Next

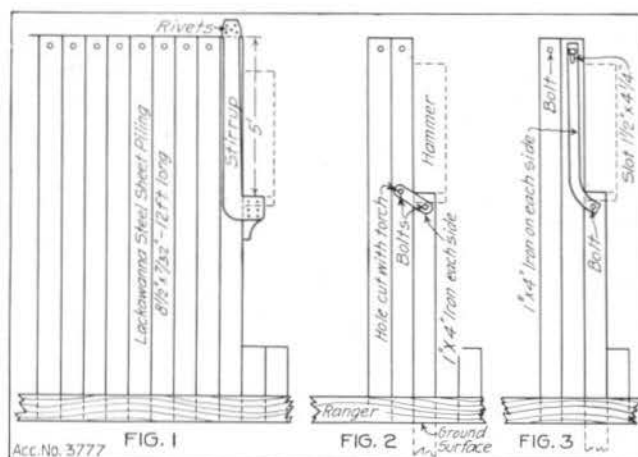


FIG. 156—METHOD OF DRIVING SHEET PILING, HAMILTON TAILRACE

the straps of Fig. 3 were applied, attaching the second pile to the first, and the first driven home. Then the straps were shifted to join the second pile to the third, and the process repeated till all nine piles were driven. A second set of nine piles were then set up as before and the process repeated. This left the stirrup to be used only on every ninth pile. The number nine was adopted as being the maximum which the crew could handle conveniently.

The driving was slow, both on account of the restricted space making the expedient described necessary, and also because of the large number of boulders encountered by the piles in the driving. Sometimes hours were necessary to get down a single pile. Sometimes 16 could be put down in the 10-hour shift. Spite of the boulders the alignment at the bottom of the piles was fairly good, although a good many blocks and wedges were found necessary in lining up the lower set of rangers. The job as thus completed was quite satisfactory.

The pile driver rig is shown in Fig. 154. It was hung from a pulley carried at the top of a tripod mounted on a timber platform which ran on rollers. The hammer was lifted and lowered by a hand winch. The pulley at the top was carried by a heavy horizontal plank which slid in guides, driven by a lever, to permit setting the hammer directly on top of a pile, or beside it, as required in the experimental adjustment of the scheme for driving the piles by a stirrup, as above described.

Water in the excavation gave very little trouble during the progress of the work. A tailrace discharging from the old hydraulic canal formerly ran under the bridge, but this had been long out of service except to carry overflow. Old River channel, a former course of the Miami, also ran under the bridge, but it is now dry in ordinary times. Water level in the present Miami, about 1,000 feet away, stands in dry seasons about 6 feet above the bottom of the new tailrace structure, and ordinarily, the soil being mostly sand and gravel, this would have given heavy seepage. Fortunately, however, the Hamilton water works pumps take their supply from drilled wells in the gravel, only a short distance from the bridge. These pumps, in the regular course of their duty, did most of the work of keeping the excavation dry, by drawing down the general ground water level. There was, of course, some seepage, which was removed at first with steam

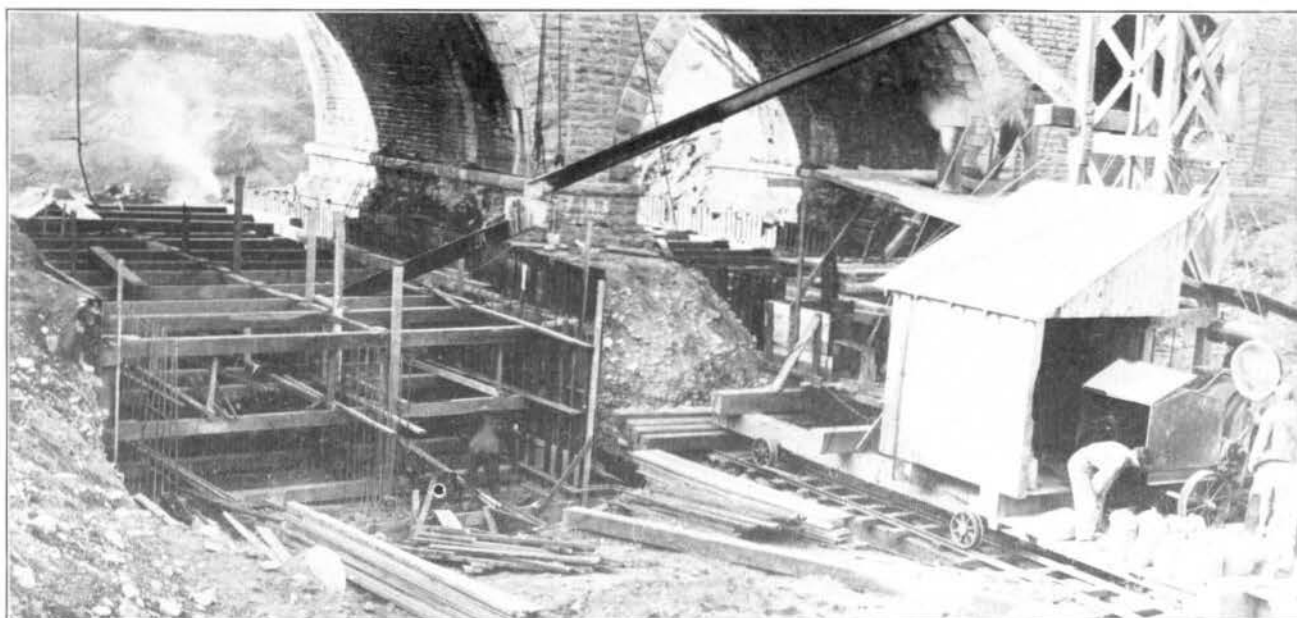


FIG. 157—CONCRETING THE CONDUITS, HAMILTON TAILRACE, NOV. 17, 1919

This shows well the shallowness of the bridge foundations, and the plan of the piling and brace timbers. The nearest pier is the central pier of the bridge. The piling and braces are in for both conduits. The tops of the piles are about on a level with the bottom of the foundation. The pile bottoms are about three feet below the third (lower) set of braces. The scant headroom above the piles to the arch ring, which made the driving of the piles so troublesome, is apparent, the foot of a pile at starting being at the level of the upper braces. The concreting plant is shown in operation at the right.

jets. These, however, gave too small discharge, and were replaced by a centrifugal steam pump. This gave trouble from excessive vibration and running normally at constant speed, it tended to pump the excavation dry, and require frequent re-priming. A Worthington duplex pump was the final solution of these troubles, and proved very satisfactory. Steam was obtained from the B. and O. pumping station near by.

The portion of the tailrace under the bridge was integral with the remainder, as described in the second paragraph in this article, and the concreting in both cases was done under contract by the F. K. Vaughn Building Co., the same firm who built the Fordson Tractor plant adjoining. The concreting plant used was the same throughout, and consisted of a mixer and tower on a platform running on rails as shown in Fig. 157. In building the twin conduits here described, the floors were poured first in about 15-foot sections. The forms for the side walls and the roof slabs were then built, and these concreted. The forms were then set for the portions of the structure which embrace the bridge piers, and connect the latter with the conduits. (See Fig. 158.) The forms for the center walls through the conduits were built, and these walls poured, after the removal of the side wall and roof slab forms, the concrete being passed through 6" by 12" holes spaced 12' center to center, which had been left in the roof. The brace timbers crossing the excavation from pier to pier were boxed in, where they passed through the side wall forms, and not removed until after the side walls, floor and roof were cast; following which the boxes were knocked out and the holes they left in the side walls filled with concrete.

As a final precaution against any possible weakening of the bridge foundations by the work of building the conduits, provision was made at the

request of the railroad company, for grouting any possible vacant spaces in the gravel under the bridge piers with liquid cement grout. This was accomplished by casting 2" gas pipes into the side walls of the conduits at the bottom, 12' center to center, extending through under the bridge piers as shown in Fig. 155. The free ends of these pipes were then connected to a compressed air tank, the lower part



FIG. 158—CONCRETE REINFORCING BRIDGE PIER, JUNE 23, 1920

The rectangular ring of concrete seen embracing the pier, the central pier of the bridge, connects solidly with the side walls of the conduits on each side (see Fig. 155), in such a way as to act as a buttress to the base of the pier foundation. It also protects the gravel beneath from possible scour due to water in flood seasons overtopping the conduits and passing under the arches of the bridge. The gas pipes seen projecting from the concrete pierce through to the gravel beneath the pier, giving vent to possible water and air rising through the gravel as the liquid cement grout is forced in below. See pages 184 and 185.

of which was filled with the fresh grout. On admitting the compressed air to the tank the grout was forced through the pipes into the gravel under the foundations. Similar gas pipes were cast into the wall coping which embraces the bridge piers, the pipes connecting with the space immediately below these piers. (See Fig. 158). Air and water in this space, rising under the pressure of the entering grout below, would thus find vent.

With the methods of construction employed, the care which was used in carrying them out, and the behavior of the bridge piers during the work, it is believed by the engineers who were in charge that the original bridge foundations, so far from being weakened by the building of the conduits, have been materially strengthened and improved by them. There was no caving of the gravel beneath the piers during the work. No visible cracks or seams opened in the stone work. Moreover, the concrete coping which embraces the original piers, shown in Fig.

158, acts as a buttress to the bases of the piers involved, transmitting any thrust directly to the concrete of the conduit; and also acts to protect the gravel under the piers against wash from water during floods, which might pass over the conduit roof and beneath the arch. It was fortunate also, as regards the possibility of undermining, that very little sand was encountered, in the process of the excavation, which showed any tendency to run. Considerable seams of running sand might have given some trouble, but none of any consequence was encountered.

The work was carried out under the supervision of C. H. Eiffert, Division Engineer, R. B. McWhorter, Assistant Division Engineer, and W. T. Rains, Superintendent of Construction. It was under the general supervision of J. H. Kimball, Construction Engineer, in charge of all the Conservancy work of river improvement. The Inspector was G. W. Schrader.

May Progress on the Work

GERMANTOWN

During the month of May, 63,850 cubic yards of hydraulic embankment was placed, making a total to date of 563,000 cubic yards. This is approximately 71 per cent of the total hydraulic embankment to be placed.

As a prevention against scouring of the inlet channel, riprap is being placed along the slope of the right bank. Riprap is also being placed on the upstream slope of the dam from the toe to the second berm. On the downstream slope an earth surface dressing is being placed by wheeled scrapers whenever teams are available.

The contract for raising the approaches to the bridge across Twin Creek on Road No. 2 has been let to Mr. McCann. This work was started on June 3, and is making satisfactory progress.

Good progress is being made on Road No. 1. All culverts have been built and the road excavation finished. Final grading of this road is now in progress.

Mr. Daniels has been making satisfactory progress on the spillway excavation, there being about 8,000 cubic yards remaining to be excavated.

Arthur L. Pauls, Division Engineer.

June 18, 1920.

ENGLEWOOD

The hydraulic fill operations during the month have been concentrated upon the river closure. The favorable conditions for pumping at this place have resulted in an output of 145,000 cubic yards for the month of May, breaking all previous pumping records. The fill across the old river has reached a maximum height of 35 feet, sufficient to safeguard the structure against any of the small floods. On the first of June 1,280,000 cubic yards of embankment had been placed, or, in other words, the dam was 36½ per cent completed. The best record for a single shift was made on May 28, when 4,600 cubic yards were pumped through one pump in 8 hours, 48 minutes, a rate of 522 cubic yards per hour.

A large electric dragline has been engaged in building Cross Dam No. 2. This structure is nothing more than a cross slice of the main embankment, on the west side of the river, built in the dry by rolling in 6-in. layers with a large steam roller. Its purpose is to retain the end of the hydraulic fill and prevent the fluid core from flowing into the temporary spillway. The material of which the cross dam is being built comes from the adjacent excavation for the temporary spillway.

A beginning has been made on the rip rap and dry rubble paving at the inlet and the outlet of the conduits.

H. S. R. McCurdy, Division Engineer.

June 15, 1920.

LOCKINGTON

During the month both dredge pumps have been discharging material on the eastern portion of the dam, where a height of 18 feet has been attained in six weeks.

Filling this part will be continued with both pumps for about two weeks, until elevation 915 is reached. This is the present height of the west part and is sufficient to care for a flood equal to that of 1913. Both parts will then be brought up together, one pump discharging on each.

A 14-in. low head pump has been installed for sluicing to the dredge pumps the material dug and piled by the dragline now working in the borrow pit. This pump will soon be in continuous operation.

The 50,000 cubic yards sluiced in the last 3 weeks, as against a previous average this year of 32,000 in the same length of time, shows an increase of 56 per cent in rate. This is due in part to an extra volume of water in the sluiceway, pumped in a continuous circuit, to be described in a future number of the Bulletin.

With the present pumping equipment a fairly wide range of pressures and nozzle sizes is now used for tearing down the material. It has been found that in the western part of the borrow pit, where stone, gravel and sand prevail, the combination of an oversize nozzle and low water pressure (about 40 pounds per square inch) is most effective. In other parts a higher pressure and smaller nozzle must be used.

The rock surfacing of the dam closely follows the fill.

Barton M. Jones, Division Engineer.

June 22, 1920.

TAYLORSVILLE

The Lidgerwood dragline is in place to start excavating the inlet channel as soon as the sluicing starts. The sluicing is still waiting for the B. & O. Railroad to move.

The concreting in the outlet works is moving very satisfactorily. Our average daily yardage for this month to date if maintained until the end of the month will establish a record for a month's work. For the week ending June 19th, we placed slightly more than 1900 cubic yards which we believe establishes a new week's record on the Conservancy work. On Friday, June 18th, we placed 518 cubic yards in nine hours and thirty minutes, having lost the thirty minutes because of motor trouble on the mixer motor. This is a new record for a single day.

At the present rate of concreting it is taking almost the entire output of the gravel plant for the concrete, so that very little is being stored for the spillway wier.

Mr. Crampton is making a fair start with his Keystone excavator on Road No. 12, north from the east end of the dam.

O. N. Floyd, Division Engineer.

June 21, 1920.

HUFFMAN

The cofferdams across the entrance and outlet channels connecting with the concrete outlet works have been taken out and on June 17th Mad River began to flow in its permanent location through these outlet works. A levee has been pumped across the diversion channel en-

tirely cutting off any flow through it. The gap between the end dam just north of the diversion channel, and the concrete outlet wall, will now be closed. By the time this is done it is expected that the Erie Railroad will be moved to its final location, so that the dam may be carried on up over its entire length.

The placing of the concrete block revetment below the outlet works has been practically completed.

The delivery of ballast gravel for the railroads has been continued during the past month. 41,000 cubic yards were turned over to them during the month of May.

Twenty-six thousand cubic yards of material were placed in the dam during the month of May. About half of this came from the stripping in the borrow pit and was put through the main pumps. The balance was sluiced from the hill at the north end of the dam. Although the output from this latter plant has not been large the results have been very gratifying. A large percentage of the material is being worked out into the center pool in the dam to form the clay core. This core pool has sealed up to such an extent as to reduce the seepage away from it from about 6,000 gallons per minute to practically nothing. This hillside borrow pit has opened up better than expected, as we find in places a thicker layer of clay on top of the rock than we had even hoped for.

The work on the relocation of the Valley Pike has been completed except a short section where it passes through the sluicing borrow pit. The surfacing of the Springfield Pike, from the south end of the dam to where it joins the present road south of the railroad cut, has been completed.

C. C. Chambers, Division Engineer.

June 23, 1920.

DAYTON

Dragline D-15 began operating June 5, after having been under repairs since it was wrecked by the high water on April 21. It is now working on a relocation of the 10-in. high pressure gas main which crosses under the bed of the river about 2,000 feet down stream from Washington Street. D-16 and D-8 are working on channel excavation above Third Street. D-19 is building a coffer dam for lowering the 20-in. water main near McKinley Park.

The South Robert Boulevard Wall is 77 per cent completed, 3,410 cubic yards of concrete having been placed to date.

Work on Stillwater Drive Wall, extending easterly from Main Street Bridge, has been started. The greater part of the necessary excavation will be performed by the Finke Engineering Company, working under contract. The work was started June 5.

Revetment work by Price Brothers Company has continued. Concrete is now being placed along the north bank of Mad River downstream from Webster Street. Pile driving is under way along the south bank of Miami River below its confluence with Mad River.

To date 21,000 cubic yards of sand and gravel have been issued from the gravel pit.

Channel excavation to date amounts to 830,800 cubic yards. The pay quantity in spoil banks and levees is 564,600 cubic yards. Levee embankment amounts to 75,500 cubic yards, including 60,000 cubic yards on Contract No. 41. In accomplishing this work the total yardage handled amounts to 1,435,500 cubic yards. These figures do not include 82,000 cubic yards excess excavation for the launching basin and scowling canals.

C. A. Bock, Division Engineer.

June 21, 1920.

HAMILTON

The electric dragline, D-16-18, has been working on channel excavation north of the railroad bridge, placing the material in the east levee. About 400 feet of levee slope and river bottom have been made ready for the concrete revetment.

Dragline D-16-17 has completed the excavation and pile driving for the east abutment of the Black Street bridge, and is at present working on the excavation for Pier No. 3.

The Marion dragline, D-16-20 is continuing the work of grading for the loading track on the west side of the river from the trestle to the Main Street bridge. It has also loaded cars with gravel for Price Brother's concrete block plant.

Concreting has been completed on the four main walls at the Main Street bridge with the exception of a part of the coping on the northwest wall.

Excavation has been started on the Black-Clawson wall. This work is being done with a stiff-leg derrick, mounted on car trucks. These car trucks were part of the 1913 flood wreckage dug out of the river by the dragline.

Price Brothers have completed driving the piling for the trestle at Station 110.

The total number of blocks manufactured to date by Price Brothers is 40,000. The total requirement will be 225,000.

The total amount of item 9, channel excavation, to June 1, was 691,400 cubic yards.

C. H. Eiffert, Division Engineer.

June 20, 1920.

LOWER RIVER WORK

Miamisburg. During the past month the Bear Creek Road fill at the point of its crossing with the east and west levee has been completed and the road will be opened to traffic in a few days. This road has also been brought up to the present height of the levee just east of the twine factory. Trestle for the construction of the levee and road between the upper Germantown Pike and the Groendyke spur track is ready for use and work on this fill will start soon.

Franklin. Jeffrey, Boorhem & Co. are working on the strip of levee which extends from Miami Avenue to the gravel pit near the C. N. R. R. They have constructed 500 lineal feet of levee in the past five days and will probably finish this strip in about two weeks. The Miami Avenue road over the levee has been constructed and is now open to traffic.

Middletown. Cole Brothers are now ready to move material for the levee between Fifth Street and Sixth Street with the narrow gage train outfit. They have two locomotives and twenty 4-yard dump cars. The length of haul is about 1,200 feet. The material will be dumped from trestle which is now being constructed.

The C. & C. Haulage Company has completed the fill along Hydraulic Street between North Main Street and the bridge over the M. & E. Canal at Tytus Avenue. They are now constructing a portion of the levee along the south bank of the canal from the bridge mentioned above to Milburn Avenue, connecting at this point with the levee completed by Cole Brothers. The material they are using is gravel, but this will later be covered with top soil.

F. C. Blackwell, Assistant Engineer.

June 18, 1920.

TROY

During the last month the dragline has continued excavating from the cut-off channel and has wasted the material on the left bank. The pay excavation from May 15 to June 15 amounts to 25,900 cubic yards, making a total of 81,500 cubic yards excavated from the channel to date. The length of completed channel is 3,400 feet.

The lower end of the channel was completed on June 8, and since then the dragline has moved to the upper end of the channel cut and has been undergoing repairs. As soon as repairs are completed the dragline will again excavate from the right side of the channel and place the excavated material in the levee embankment.

C. F. Griffin, Assistant Engineer.

June 15, 1920.

RAILWAY RELOCATION

Big Four and Erie—The ballast on the Big Four and Erie is 85 per cent complete. Practically all of the ballast has been distributed and the track raised up to its final position. Walsh Construction Company's forces have started dressing up the ballast.

The signal work at Tates Point and Fairfield is nearing completion. The ground work is almost complete and the line work has been started. The Western Union have the telegraph line about 90 per cent complete. The fences on these railroads are practically finished.

The Westwood Park underpass is completed and the backfilling and grading for the road approaches is in progress. The District forces are doing this work.

Baltimore and Ohio Railroad—The Baltimore and Ohio Railroad is now operating on the new relocated line. The station at Taylorsville is finished. The new line is then complete, with the exception of some 6,000 cubic yards of excavation to finish embankment which it was impossible to place because of the proximity of the old track. This is about three miles south of Taylorsville. Some crossing signs, etc., will also be constructed, as well as some short stretches of fence left unfinished because

of the new right-of-way being too close to the old railroad.

Ohio Electric Railway—The Walsh Construction Company started ballasting on this line June 18.

The construction of the pole lines for the trolley system is 50 per cent complete. This is being done by the District under Mr. Frank Harvey's supervision.

Albert Larsen, Division Engineer.

June 25, 1920.

RIVER AND WEATHER CONDITIONS

The river and weather conditions throughout the Miami Valley were comparatively normal during the month of May. No unusual storms and no freshets of any appreciable size were noted at any of the stations. At the Dis-

trict's stations the total rainfall for the month varied from 1.86 inches at Fort Loramie to 4.19 inches at Pleasant Hill. At Dayton the total amounted to 2.71 inches, or 1.17 inches less than normal.

Observations taken by the U. S. Weather Bureau at Dayton show that the mean temperature for the month was 60.6 degrees, or 2.0 degrees less than normal; that there were 14 clear days, 9 partly cloudy days, 8 cloudy days, and 9 days on which the precipitation amounted to or exceeded 0.01 of an inch; that the average wind velocity was 10.3 miles per hour, the prevailing direction being from the northeast; and that the maximum wind velocity for five minutes was 40 miles per hour from the north on the 23rd.

Ivan E. Houk, District Forecaster.

June 25, 1920.

Measuring Upward Pressure Under Island Park Dam, Dayton

Hydraulic Gradient of Seepage Water Through Gravel Under Dam Determined by Means of Gas Pipes Carried Up Through to Dam Apron.

A dam built upon porous material, like that at Island Park, where the dam foundation is mingled sand and gravel, permits unavoidably a slow creep or leakage of water through the porous material underneath the dam, the pressure producing the creep being measured by the difference in the water level above and below the structure. Half way across the underside of the dam, this pressure would be reduced one half, in the simplest case, and the same water pressure which produces the creep, also exerts an upward pressure on the under side of the dam. To reduce this leakage it is common to drive a tight fence of "sheet piling" into the gravel at the upstream and downstream edges of the structure; and also to build "cut-off walls" projecting downward from its under side at chosen points. At Island Park both these expedients were adopted. See Fig. 161). The theory is that the creeping stream of water follows the surfaces of the obstructions, down one side and up the other, and along the under side of the structure itself. Thus the sheet piling and the cut-off walls are supposed to act to increase the distance the water must travel through the porous material by double the depth of each obstruction. That is the theory used in calculating the creep or leakage under a dam, and also in calculating the upward pressure beneath the dam affecting its stability.

In point of fact, this theory, while proper enough when used with a proper "factor of safety," concerns an action not fully understood, and to which it has not been easy to apply in a finished dam, the test of actual measurement; and it was to remedy this lack that the engineers of the Conservancy District installed the simple apparatus described below, during the process of construction.

The apparatus was simply a series of 1-inch gas pipes, built into the concrete of which the dam is constructed, extending from various points at the under surface of the dam, up through it to the air above, the lower ends being open, but tied round with a burlap bag of coarse gravel, to prevent clogging. See Fig. 161, where the lower ends of the pipes are numbered "1," "2," "3," etc., and the bags are indicated. At the upper end each pipe terminated in a short vertical length open at the top. For convenience all the pipes were led through the structure to the flat apron below the dam crest, where the upper ends were easily accessible. Remembering that the water, which is flowing at all times over the dam crest, is also seeping slowly through the

saturated gravel beneath it, it will be seen that the seeping water will rise in each pipe till it reaches a height sufficient to balance the pressure under which it is flowing at the pipe's lower end. This height can be easily measured by inserting a stick in the open top of the pipe till it reaches the water surface. The pressures will vary with the heights of these water columns in the several pipes. The greatest will naturally be at the upper edge of the dam, at "10," where the pipe might naturally be expected to be subjected to the full head of water above the dam. The least will be at "1," next the tail water below the dam. Intermediate points will give the pressures just below and just above each fence of sheet piling, and each cut-off wall; and in the middle of the long level space at "2." Having the measures at these points, we have determined thus by actual test whether the creep of the water under the dam corresponds with the theory outlined above.

The heights of the several water columns in the pipes "1," "2," etc., are indicated by the small circles "a," "b," "c," etc., immediately above those points, as measured during the tests. Several measure-

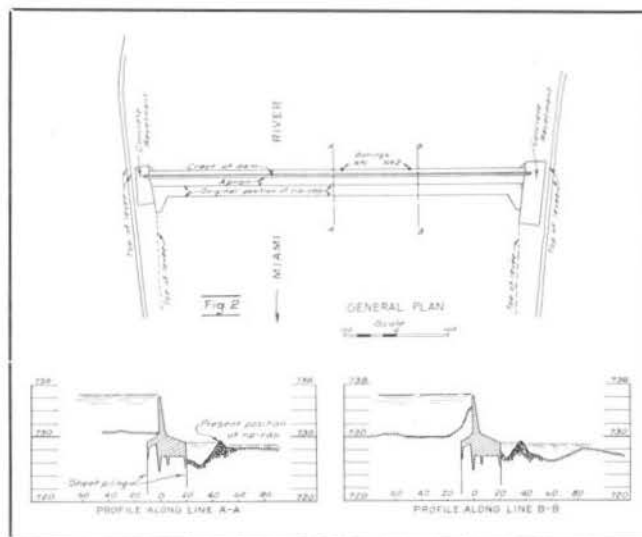


FIG. 159—PLAN AND PROFILES, ISLAND PARK DAM, DAYTON

It is an overfall dam, of concrete, with gravity section. The pipes used in the tests were installed along the lines "AA" and "BB." The profiles are along these lines. The foundations are on sand and gravel with a slight intermixture of clay. Borings were made as indicated in the plan.

ments were made in each case, with very closely corresponding results, assuring that the small circles give the actual pressures at the lower ends of the pipes. In some cases two small circles are seen, these indicating the extreme limits in the measures, due to slight differences in conditions. By joining the small circles by a line, called the "piezometric line" (or more often the "hydraulic gradient"), we get a diagram of the drop in pressure under which the water flows, as it seeps from the upstream to the downstream limit of the dam, through the gravel. Two lines are in fact shown, a dotted and a full line, corresponding to the slight differences in the measurements. They are so close together that they may be considered as one.

It would naturally be expected, since the pipes open below into porous gravel, that the pressure at "10" would be equal to the full depth of the water from "10" up to the surface of the water flowing over the dam. In fact, this pressure is only that from "10" up to the small circle at "k." The reason for this is that the pipe at "10" was protected from the full pressure of the water above it by a blanket of mud which had been deposited on the bottom of the pond above the dam during the period between the building of the dam and the taking of the measurements, this period being about two years. This mud blanket was from 2 to 6 inches thick. It "plugged" the porous gravel, to a great degree, stanching the seepage flow. The head of the water above "10," from the surface down to the small circle at "k," was occupied in forcing the water through the mud blanket, leaving only the drop along the piezometric line, from "k" to "a," to force the water through the gravel beneath the dam.

It is to be regretted that the measurements of pressure could not have been made immediately after the dam was built, thus furnishing a means of comparing conditions when the porosity and seepage were greatest, with those existing after the mud blanket formed. In fact, the dam being built in 1917, the active entry of America into the war made this practically impossible.

Nevertheless, the measures do tell something as to the theory used in calculating seepage flow, noted above. Without a mud blanket, the piezometric line, indicating the drop in pressure forcing seepage along the under side of the dam, according to this theory, is shown running from "m" to "n." With the blanket, according to theory, it is the line "p" to "n." Actually, as measured, with the blanket, it

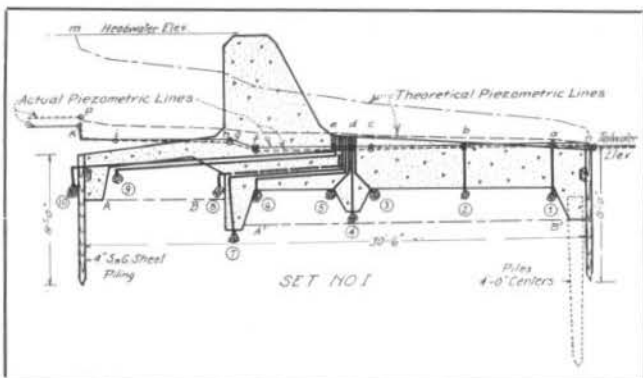


FIG. 161—SECTION SHOWING PIPE INSTALLATION ALONG LINE AA, FIG. 159



FIG. 160—ISLAND PARK DAM AT LOW WATER

Note the gravel shoal about 20 feet downstream from the dam apron, deposited from erosion just below the apron, where originally there was about two feet of stone riprap. Most of this was washed out and piled in the ridge seen. Compare profiles in Fig. 159. The water cushion and the sheet piling have protected the apron from undercutting. Slab concrete revetment of east levee is seen in the distance. Taken June 21, 1920.

is the line "k" to "n." The discrepancy is manifest. The theory is not backed by the facts in this case.

In fact, the "line of creep" theory is scarcely more than theory, and appears to be applicable only in a general way. The pressure falls from the upstream to the downstream side of the porous materials, but not in strict proportion to the distance as measured along the under side of the structure, especially if this is interrupted by cut-off walls and sheet piling. Sand and gravel, the usual porous materials, generally occur in more or less horizontal beds, interleaved and overlapping. Some of these are much more porous than others, according as they are free from clogging with clay and silt. The flow of water through these layers under a dam tends to be horizontal, following the more porous layers. The value of sheet piling is not so much in lengthening the line of flow by compelling the water to go up one side and down the other, as in shutting off the horizontal flow through a more or less open stratum, and compelling the water to go down through a layer or layers more impervious and resistant. Once below one of these, little of the flow will again rise to take the theoretical "line of creep" along the under side of the dam, and in these cases the law of proportionality fails.

It is true that "water blisters," and even "air blisters," such as not infrequently occur between the under surface of a concrete dam and the materials it is built on, make these spots peculiarly vulnerable to the flow of water, and this favors the "line of creep" theory. Nevertheless, the facts adduced above make it more often probable that the major flow is carried below the dam bottom through a considerable thickness of a lower stratum.

The piezometric line on the diagram in Fig. 161, taken from the experiments at Island Park, bears out the above. The portion from "f" to "a," for instance, is horizontal, indicating that there is no flow whatever along the dam bottom between these

points, but a condition where the water is trapped and stagnant. The flow seems to be from "A" to "B," along some stratum underneath, with a connection to the stagnant space at some point near the downstream sheet piling.

The greatest value of these experiments is in the proof they supply as to the efficacy of an upstream blanket of mud and silt in reducing the upward pressure acting to endanger a dam, when built, as dams must sometimes be, on porous strata. The proof came when the mud blanket next the pipe at "10" was removed, and the full water pressure allowed to reach that point. This was accomplished by lowering a fire hose nozzle under about 75 pounds pressure under the water, and directing the issuing stream against the mud at the bottom, washing it away and permitting direct pressure to reach the pipe end. The water in the open end of the measuring pipe on the dam apron immediately rose to practically the level of the headwater above the dam crest.

It was notable, however, that the water level in the other pipes was not affected by the change. This was to be expected. The area of mud blanket cleaned away by the nozzle was apparently small and the flow through it was so diffused before reaching the bottom of the sheet piling as not to appreciably affect the pressure beyond it. Moreover, the gravel layers below the end of the pipe at "10" may have been clogged with mud before the mud blanket formed, and these layers prevented any increased flow. Or there may have been a partially or effectively impervious stratum of the original material below "10," which the sheet piling forced the flow to penetrate, thus blocking the transmission of pressure as soon as the piling was driven. Observations immediately following the building of the dam would help in determining some of these points. In any case, the efficacy of the mud blanket itself was demonstrated beyond doubt, and points to the desirability of the introduction of this feature (by

means of rolled fill or otherwise), as an additional factor of safety in dams built on porous material.

An interesting feature of the investigation was the discovery that considerable quantities of gas were accumulating beneath the dam, especially at the end of the pipe "9," where the shape of the under surface caused it to act as a gas holder. "In a period of about a month between observations gas had collected so that the flow from a 1/4-inch nipple connected with this pipe was sufficient to maintain a flame about a foot high for ten minutes. The gas was evidently methane, generated by the decomposition of slight quantities of vegetable matter in the gravel." This gas evidently increased the tendency of the dam to float—that is, increased the upward pressure on its bottom; a fact which should be considered in some cases in dam design.

The investigation was carried out by E. W. Lane, Assistant Engineer with the District, and E. L. Chandler, Assistant Division Engineer on the Miami River improvement through Dayton. In the original installation of the apparatus in the dam, Mr. Lane collaborated with B. M. Jones, whose transfer to be Division Engineer at the Lockington Dam made his further participation in the enterprise impossible. It is believed that the investigation has a distinct value along the lines indicated, and it is to be hoped that further work of the same nature may be done, inasmuch as the apparatus can be very simply and inexpensively installed during the work of construction of a dam or similar structures. The effect of cut-off walls and sheet piling, and of the porosity of strata located by test pits and borings made in the regular progress of the preliminary study of the site, can be determined by such tests in a way to put the problems of design, in these matters, on a more exact foundation.

Engineers wishing to know more of the details of the investigation herein described are referred to an article by Messrs. Lane and Chandler in the Engineering News-Record for May 20, 1920.

The new channel is 4,000 feet in length, and cuts off a wide bend in the Miami (part of which can be seen at the right), thus increasing the velocity, giving increased discharge in flood seasons. The present bed of the new channel is 40 feet wide. It is expected, however, that the action of the river will be the same as it has been at Middletown, where it was depended on to increase the width of the channel by the water's own erosive power. This increased width was scoured out at Middletown within a

(Continued below.)



FIG. 162—THE NEW CUTOFF CHANNEL BELOW TROY

period of a few months. In both cases the first excavation was done by a dragline excavator. The work here shown is just below the city limits of Troy. Improvement in the flood prevention plans through the city of proper, recently authorized by the Conservancy Court, are noted on the editorial page.

Stability of Conservancy Dams

The importance of stability in dams like those of the District, and the care which is being exercised in making certain that such stability is secured, have been several times mentioned in these columns. The pictures on this page are shown in proof of the fact that these efforts have had their due effect. They show two excavations in the material of the sand and gravel embankments which enclose the impervious core material of the Englewood dam. These embankments are composed of the materials deposited on the beaches in the process of hydraulic fill, as described in the Bulletin for February, 1920. Fig. 164 shows an excavation made in the outer edge

of the Englewood beach in order to build the concrete walls of Sump No. 3. (See Bulletin for June, 1920, p. 166). Fig. 163 shows excavation made within thirty feet of the core pool (which may be seen beyond the excavation, at the left), for another purpose. In Fig. 164 the wall of the excavation stands nearly vertical, as is evidenced by the shovel standing against its base. There seems to be just enough clayey silt intermixed at this point to make a binder, producing a "cemented gravel." This, of course, is an aid to the stability.

In Fig. 163 there seems to be no such cementing material, the sides of the hole showing what seems to be almost pure sand and gravel. Still, at its upper part the bankside stands at a very steep slope. In both cases, the material, even at the bottom, is perfectly dry, although in both cases the water in the pool is ten or more feet above the level of the bottom of the excavation, and in Fig. 163 is only thirty feet away. This is an evidence of the perfect drainage afforded by the two embankments enclosing the dam core.

The facts noted should be considered in connection with the facts as to the relative thickness of the enclosing embankments, as compared with the core, brought out in the February article above referred to. The core constitutes only one-fifth to one-sixth of the total dam thickness. Even if quite plastic, the danger of its breaking through such relatively thick embankments, as has sometimes happened in imperfectly designed earth dams, will be very slight in the Conservancy dams, due to the high stability of the embankment materials just noted. Taken in connection with the evidence afforded by the pressure cells as to the rapid stabilizing of the core itself (as given in the Bulletin for March, 1920), the pictures give highly satisfactory proof as to the efficiency of the Con-

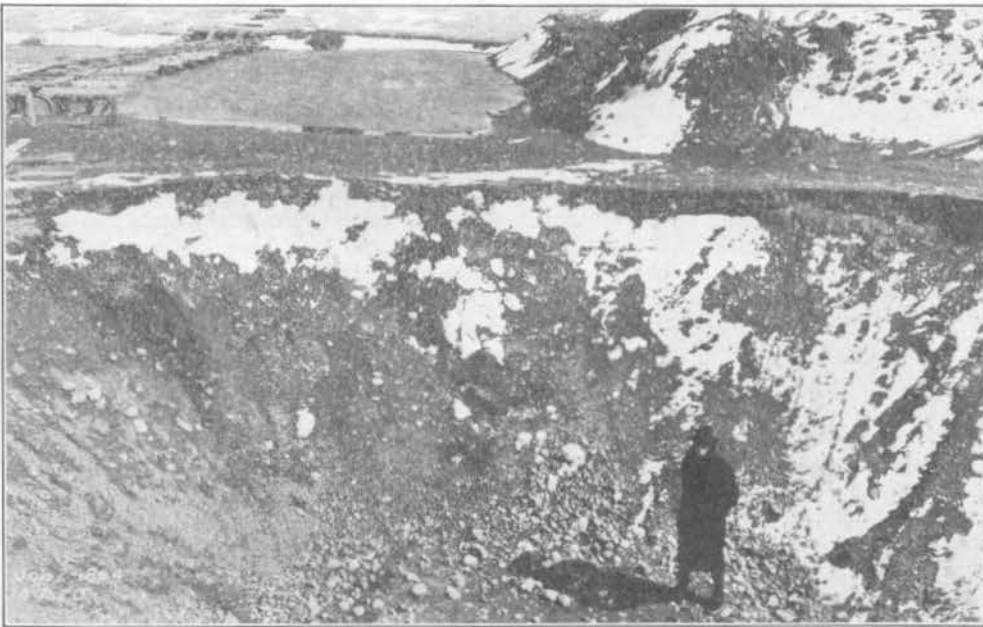


FIG. 163—STABLE GRAVEL SLOPE IN DAM EMBANKMENT, ENGLEWOOD, TAKEN APRIL 7, 1920

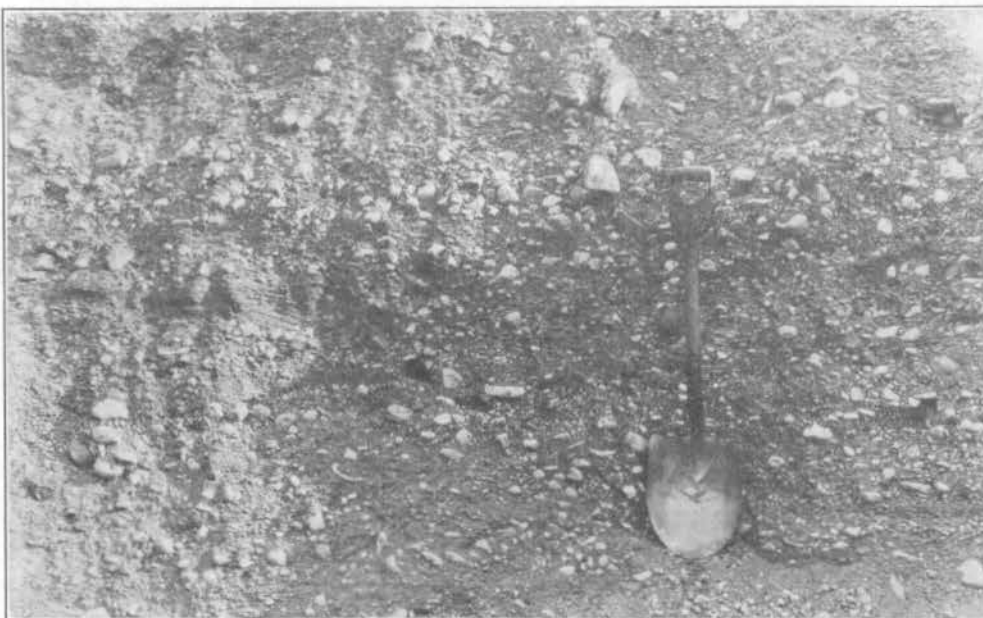


FIG. 164—STABLE GRAVEL WALL IN DAM EMBANKMENT, ENGLEWOOD. TAKEN MARCH 5, 1920.

servancy dams at the point where there has in some quarters been most question—the matter of the stability of a hydraulic fill dam as affected by the temporary plasticity of its core materials.

Direct observations on the core materials at various depths are in contemplation which will set this matter still more conclusively at rest. A further discussion of the subject will be published later.

MIAMI CONSERVANCY INEXHAUSTIBLE FARMS FOR SALE



FIG. 165—FIRST AND SECOND BOTTOM LANDS, GERMANTOWN BASIN, JULY 1, 1919

Rich Corn Farms, Kept Perpetually Fertile by Alluvial Deposits.
No Manure or Fertilizer Necessary.

No Pioneering—These Are Well-Improved, Going Farms.

In One of the Richest River Valleys of the Middle West.

Fourteen Steam and Electric Roads Run Through It.

Nine Flourishing Cities (Populations from 4,000 to 153,000), Furnishing Near-by Markets.

Address Office "F"—Miami Conservancy District, Dayton, Ohio



FIG. 166—HOUSES TO BE WRECKED FOR DAYTON RIVER IMPROVEMENT

The houses to be wrecked are the three at the right

Records Broken at Taylorsville

The picture shown in the frontispiece at Fig. 151 shows a late stage of the concrete outlet works at Taylorsville dam. The past month has seen notable progress in this work. Records have been broken in the amount of concrete placed in a day, in a week, and in a month. The day's record was 522 cubic yards, made on June 18. The highest previous record was 374 cubic yards, made at Lockington. It is worth noting also that the high day's record at Taylorsville was preceded and followed by excellent days records and was not the result of any careful piling up to achieve a summit. The week's record

was 1890 cubic yards. The month's record (June) was 7026 cubic yards, as against a previous month's record of a little under 6100 cubic yards, made at Huffman. The total of concrete to be placed at Taylorsville is 55,000 cubic yards, much the greatest at any of the dams. The program for the year is 48,000 cubic yards, which it is expected will be finished, at the present rate of progress, by November 1. This will enable the Miami River to be turned through the outlet works and the river section of the hydraulic fill to be started. Details regarding the concrete work at Taylorsville were given in the Bulletin for March, 1920.



FIG. 167—CONSERVANCY SCHOOLHOUSE AT ENGLEWOOD CAMP, JUNE 19, 1920

This house was formerly a summer residence in the woods on the western slope of the Stillwater River, a short distance above the Englewood damsite, and was one of the properties necessarily acquired by the Conservancy District on account of its situation within the boundaries of the flood retarding basin. Being adjacent to the Englewood Camp, and capable of being converted into a schoolhouse for the children, it was used for the purpose. It is one of four schoolhouses, at as many camps, which it was deemed advisable to establish in order to furnish the necessary educational facilities for the children of the employees.

This supplement was provided by Mr. Don Lawrence, a citizen from Middletown, Ohio, and is not in MCD's bound copy of the bulletins.

THE MIAMI CONSERVANCY BULLETIN SUPPLEMENT

"The News Letter"

To Promote the Conservancy Spirit on the Work

July 1920

OF GENERAL INTEREST

School Children Have the Grandest Lark of the Year

The Conservancy School Picnic—correctly spelled with capital letters, for it was that kind of an affair—came off on Friday, June 18, "as announced exclusively" in the Miami Conservancy Bulletin for June. The "High Old Time" was had, with all the sports and eats and etceteras as per program. One hundred and seven children turned out, with teachers and parents and friends to help the ball roll and renew their youth. "Daddy" Hauck proved his title and was head of the whole family, ably assisted by our friend Moyer. Give the children the ballot, and they would turn down the whole bunch of presidential and vice-presidential candidates, and vote for Hauck and Moyer as the best ticket ever put up. We don't know how those two do it. It's a gift. Nobody but the Lord ever taught them how.

The story begins with a baseball game, the ancient rivals, Taylorsville and Englewood being the contenders. It was Taylorsville's day and Taylorsville won—11 to 4. Then came the assault on the picnic tables, and the rolling of the eats down those hundred and seven juvenile throats into the hundred and seven pleased interiors below. Following that came the presentation of the Bulletin prizes for the best contributions to the periodical during the past year. The winners were as follows:

First Prize—Three Dollars—Albert L. Proteau, Taylorsville.

Second Prize—Two Dollars—Geneva Sayler, Huffman.

Third Prize—One Dollar each to Mary Williams, Englewood and Martha Hancock, Germantown and Huffman.

Fourth Prize—Seventy-five Cents each to Edna Kervin and Robert Kemp of Huffman and to Catherine Brock and Aline Slayback of Taylorsville.

Following this came the most exciting part of the program—the contests. The old Roman Hippodrome was nowhere. It was Barnum, Forepaugh, Sells and Ringling Brothers rolled in one, with Hauck and Moyer as Ring Masters. The winners were as follows:

50-yard races, boys 12 years and over—Robert Connelly.

30-yard girls' races, 12 years and over—Ruth Girard.

30-yard race, boys 9 to 12—Fred Davidson.

30-yard race, boys under 9—Kenneth Wehrly.

20-yard race, girls under 9—Evelyn Sturm.

Sack race—Will Tully.

Tug-of-War, Boys vs. Girls—Boys.

Wheelbarrow race—Will Tully and Will Rogers.

Fat Folks Race—Mrs. H.

We forgot to include the special prize for four-year-olds, awarded to "Junior" Moyer, for coming in last, in the 30-yard race, which he did in fine style, winning in a walk.



CONSERVANCY SCHOOL PICNIC, COMMUNITY COUNTRY CLUB, DAYTON, JUNE 18, 1920

THE MIAMI CONSERVANCY BULLETIN

"Rusted Auto With Skeleton Driver Found"

A sensational head, with the above wording, appeared in the columns of our esteemed contemporary, the Dayton Daily News, under a date of July 2, followed by an account of the excavating from the river bed at Hamilton, of the objects above noted, by the big Conservancy dragline, auto and driver being supposed victims of the 1913 flood. In fact, the story was a canard, fabricated out of whole cloth by some of our boys at Hamilton, for the benefit of a Hamilton reporter. Rusted heaps of wreckage were actually dug out of the river there, in times past, by the dragline—relics of the flood—but no skeletons. Wrecked car trucks, salvaged from the river, are now in use as running gear under a traveling derrick.

Passing of a Land Mark

A recent occurrence in Dayton has a peculiar interest for the members of the Conservancy force who are also members of the Engineers' Club of the city. We refer to the death of the old lady who owned the frame dwelling which now stands in front of the Engineers' Club house. The property on which the club house is built was bought from this old lady, and a clause in the deed reserved the house as a dwelling for her until her death, after which it should pass into the ownership of the club. The club having now, by the passing away of the old lady, acquired full title, we may expect the house to be sold and moved away at any time. This will permit the grass plot in front of the club house to occupy an uninterrupted space along the entire front, and will greatly improve the appearance of the property, giving it the aspect originally planned.

Paul, Idaho

It will be news to most of us that our Assistant Chief Engineer has been honored for some years past in having one of the cities of Idaho named for him. In the early days he was not particularly proud of the fact. The town is situated on the Minidoka Irrigation project, of which Mr. Paul was Chief Engineer, and following the usual beginnings of such burghs, "with a depot, a saloon and a lumber yard," it first broke into print with a shooting scrape and other undue excitements generally connected with too much whiskey. However, it survived these mumps and measles, and in time came to the period of citification and respectability—paved streets, schools, churches, banks and that rainbow arch over all, a Chamber of Commerce. Wherefore our Assistant Chief, who at one time was not at all chesty over his child, is now pointing at it with pride.

On the Railway Map Also

Word has been received from the B. and O. R. R. by Fowler S. Smith of the Accounting Division that the new railway station at Taylorsville Camp is also and officially "Taylorsville" on the B. and O. R. R. time tables. It has heretofore been "Johnson."

Which reminds us that we were there on the morning of July 7, with Assistant Photographer Johnson, and saw the first freight and the first passenger train roll in on the new relocated line. Pictures were taken of both as mementoes of the historic occasion, one of which we expect to publish in the next Bulletin.

Around the Corner

Around the corner I have a friend,
In this great city that has no end,
Yet days go by and weeks rush on
And before I know it, a year is gone;
And I never see my old friend's face,
For life is a swift and strenuous race.
He knows I like him just as well
As in the days when I rang his bell
And he rang mine. We were younger then,
But now we are busy, tired men.
"Tomorrow," I say, "I will call on Jim,
Just to show that I'm thinking of him."
But tomorrow comes—and tomorrow goes—
And the distance between us grows and grows.
Around the corner!—yet miles away,
"A telegram, sir" . . . "Jim died today."
—From The Earth Mover.

Right and Wrong Argument

Argument is good when it seeks to bring out facts. When it seeks the tawdry glory of temporary mastery, it is a wind from the desert, neither bearing rain, nor soothing the traveler.—Exchange.

DAYTON

W. L. Sylvester Goes With the Cleveland Discount Co.

W. L. Sylvester, Assistant Engineer and Inspector with the Dayton Channel Division, has resigned his position to accept an agency with the Cleveland Discount Co. of that city. For some time he will be in Cleveland at the company headquarters, after which he will be assigned to territory, very likely Dayton. The company is a large one, perfecting and selling first mortgages on high-grade city real estate over a wide territory. It appears to have risen rapidly and successfully, and Mr. Sylvester is sanguine of making much more money out of his new job than out of his old one. Nevertheless, he is not planning a complete break with engineering, and looks some day to get back into the old game better equipped for it on account of his new experience. We wish him success.

Piere Jackson Goes to New Orleans

Piere Jackson, accountant in the Railway Division, has resigned his position with the expectation of going to New Orleans. Mr. Jackson has been with Mr. Locher's organization for a number of years, has shown himself thoroughly "onto his job," and his departure is noted with regret by his associates in the work of the District. The Bulletin joins heartily in wishing him every success in his future work.

S. L. Rice Goes to Dayton Channel Division

Another member of the Railway Division, Mr. S. L. Rice, who has been Assistant Engineer in special work connected with the final estimates has also finished his work with that division, and has been transferred to be Inspector with the Dayton Channel Division in place of W. L. Sylvester, whose resignation is noted elsewhere. Mr. Rice has had much experience in railway work, and will find his new job an interesting extension and variation of the lines familiar to him.

"Three Inch Square-Faced Blacksmiths"

The Purchasing Division was put somewhat up a tree not long ago by a purchase requisition, duly signed and countersigned by the proper authorities, for "2 3-inch Square-faced Blacksmiths." Knowing the omniscience of editors, they referred the question to us, but we were obliged to re-refer them to the requisitioners. We had known people who were "2x4," but a 3-inch square-faced blacksmith we admitted was beyond us.

WOMANS' CLUB

Wedding Bells Again

The rumor we printed last month, that another Conservancy girl was on the narrow verge, proved true, the girl in question being Miss Clara McGee of the Taxation Division, who was married on Saturday, June 26, at 8:30 a. m., at the home of her mother, Mrs. Clementine McGee of this city, to Mr. Claude Allen. Mr. Allen is connected with the Automotive Specialty Co. of Dayton. The young couple will be at home after July 15 at No. — East Second street. The Bulletin extends its best wishes.

Miss Herbig at Frontier Place, Colorado

We have received a letter and circular from Miss Herbig from Frontier Place in Colorado, where she is now staying, a beautiful resort at the foot of the Rocky Mountains, near the entrance of the Cheyenne Canons.

She writes that she is feeling very well, and wonderfully contented, so much so that she is putting off the journey on to California, as planned originally, to an indefinite date in the future.

HELLO

With a clamp on her head like a cage for her hair,
She sits all the day on a stiff little chair
And she answers the calls that come over the wire,
From people of patience and people of ire;
And "Number?" she queries of noble or churl—
A wonderful voice has the telephone girl.
She has to be pleasant, and hustling and keen,
With a temper unruffled and ever serene.
There are forty-five things she must think of at once,
Or some one, impatient, will call her a dunce,
Since it seems there's a general custom to hurl
The blame for your grouch on the telephone girl.
It's wearisome work on the nerves and the brain,
Continual hurry, continual strain,
And of course she gets tired—as other folks do—
And needs to be thoughtfully treated by you.

THE MIAMI CONSERVANCY BULLETIN

EDITORIAL

Board of Editors

Germantown	Miss Julia Darnell
Englewood	Albert L. Wald, George Rodgers
Lockington	C. H. Shea
Taylorville	Mr. M. H. Sando
Huffman	Mrs. C. C. Chambers
Hamilton	R. B. McWhorter
The Woman's Club, Dayton, Ohio.....	Miss Mayme McGraw
Dayton Warehouse.....	J. T. Hall

New Editor at Taylorville

We are glad to welcome into our editorial midst a new colleague, Mr. M. H. Sando of Taylorville Camp, the new Camp Inspector there. He makes his debut with this issue.

We are making this a kind of "school picnic number," in honor of our young friends of the Conservancy Schools, and their parents, the "feature" being the front page picture, which we hope they will like.

Wait!
Stop! Look!! Listen!!!

Grand Opening

—Of—

B. & O. Traffic
Between

Dayton and Tippecanoe City
Linked at Last by Bands of Steel

See the palatial trains rush through space over the new
and perfect relocation

2—Brass Bands—2

2—Boxes of Cigars—2

Wheelbarrow Races Fat Women's Races
Grand Finale

4—Four—4 Round Bout
Kid Callahan

—vs.—

Norsky Larsen
Free Air and Water

The above bill of fare was received by us from what purported to be an authoritative source, but no date was appended, and we are therefore unable to make a definite announcement on that head. However, we do know that trains are now running on the relocation and have been since July 7.

Herbert Ressler Marries

Mr. Herbert Ressler, of the Accounting Division, was married on Saturday, July 3, at high noon, to Miss Ruth Lewis, formerly with the Delco-Light Company. The Bulletin extends its congratulations and best wishes.

An interesting article to the engineers of the District is that of Walter M. Smith, our former Designing Engineer, on the Design of the Conservancy Dam structures, published in the Engineering News-Record of June 10.

Elldée Takes Vacation in New York City

Our well-known collaborator of the Drafting Division, Elldée, is taking a few days' vacation in New York City in company with his father. The latter has been for many years a resident of Dayton, but expects to remain in New York with a daughter.

Shop, Warehouse and Garage

After Eby had missed the pick-up truck two mornings in succession, we understand he was tied to a telegraph pole at Fifth and Williams street on Tuesday evening in order that he would sure be there Wednesday morning.

I do wish some kind reader of this Bulletin would advise Harry Kuth, in Mr. Harvey's office, why men have such large "Adam's apples."

Tommy Lahey has again gone east for a few days. We sure hope he will not disappoint us this time. He surely will return with a better half.

Henry Wagler says he cannot afford to ride the pick-up truck, as his appetite always increases after riding to or from work. However, walking is rather crowded these days.

Politics is at its height in the shop at the present time. The chief politicians are Dad Hall and Peggy Ames on the Republican bench and Harry Brown and George Swinderman on the Democratic bench. Some heated arguments are in session daily during the lunch hour, believe me.

Wednesday, June 30, was the zero hour for Dave Rike. In trying to find a reason for his absence, it was discovered that Dave had gone "over the top" and hit the long trail for life. Congratulations, Dave.

Frank Kuboski has given Walter Johnson and Alexander of the Cubs a new lease on their jobs. Frank was pitching wonderful ball until he hooked up with the Tellings bunch in the Saturday Afternoon League Saturday, June 26.

Dayton's population might have gone away ahead of some of her near competitors if Uncle Sam had waited until vacation time to take the census. We notice that John Braun has increased his order to four quarts of milk daily for the rest of the summer. Some fine bunch, Braun; we envy you.

We are glad to see Judge Winch back on the job after a sickness of several weeks. Judge says he is feeling better now.

Dan Daub recently went to Toledo to drive his new Oakland Six through to Dayton. After spending twenty-four hours taking in the high spots of Toledo, Dan filled his gas tank with ten gallons and started for Dayton. Arriving home he says he measured his gas and found that he had twelve gallons in his tank. The only way we can figure this out is that Dan had a tube installed on his car running from his mouth to the carburetor, and judging from the hilarious time he had in Toledo, he was able to run his car home and gain two gallons of gas enroute. Dan advises all auto owners to try this method.

We understand that Eddie Holliday has sent his wife to the country. We believe Eddie is having a glorious vacation.

Bill Shriver is still frequently seen under his Paige on the Covington Pike.

ENGLEWOOD

Wedding Bells

Englewood reached its quota of two June weddings in Camp. Kirby Jones and "Cleo" Ruble are the happy bridegrooms. Each has selected a cottage in camp. They were informally introduced to their neighbors and future friends on Wednesday evening, June 30. Practically every person in the village assembled, armed with every imaginable kind of noise-producing device. The Jones cottage was the first to be attacked and the occupants were taken prisoner after a brief bombardment. Loading the newlyweds on a spring wagon, the throng wound through the camp streets to "Cleo's" cottage. Another, and more vigorous onslaught produced Mr. and Mrs. Ruble. They, too, were enticed to ride on the matrimonial spring wagon. Bound for Community Hall, the crowd and noise followed a most bewildered quartette of newlyweds. After a few rounds at the refreshment stand, the merry-makers indulged in dancing and singing. We all join in sincerely wishing to Mr. and Mrs. Ruble and Mr. and Mrs. Jones a spring wagon load of happiness and success.

Mr. and Mrs. A. R. Reaver are now making their home in Englewood, having moved here from Taylorville.

I. H. Pei has been appointed Office Engineer. Mr. Pei recently graduated from Cornell University.

We all remember little Capitola Mitchell, and were glad to see her in camp visiting her uncle and aunt, Mr. and Mrs. Spaid. "Cappy" says her daddy is some farmer.

Notice to the Public

Will you kindly send me any copies of the Dayton News of June 21 which you may have on hand. I will gladly pay for them. At least send me the picture of the young lady graduate of Xenia high school, which appeared in this issue of the News. I admit being specially interested in her, and would like several dozen more of her pictures. Thank you.

Edw. C. Jordan, Timekeeper, Englewood Dam.

Mrs. Morgan and Mrs. Everdell Take Motor Trip

Mrs. A. E. Morgan and Mrs. Everdell are motoring through to the Atlantic Coast. Communications received

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from them state that their trip is proving most enjoyable and interesting.

Mrs. Wm. Heller is spending the balance of the summer visiting her friends and relatives in various neighboring cities and states.

HAMILTON

Mrs. F. J. Rolf, and her three children, of Rock Island, Ill., are visiting Division Engineer and Mrs. C. H. Eiffert. Mrs. Rolf is a sister of Mr. Eiffert.

W. Z. Bovard, Inspector, has recently joined our force.

H. B. Linden, dragline operator, who has been working in Arkansas and Texas for several months, returned to Hamilton this week and is back at his old job.

Morris Forman, who finished his course at Kentucky State University a few days ago, is now with us as draftsman.

Gordon Lindsay, machinist, married recently.

Superintendent W. A. Roush has invested in an automobile.

Bill Eiffert, age 4, said to his aunt when she arrived at the station: "Gee, I didn't know you had that much kids."



"EMPTIES" STACKED UP FOR MONTHLY ESTIMATE OF FUEL CONSUMPTION

Forty-two "toppy red tins" of "smoke stuff," property of Herman Klenke, Head Rodman, Hamilton Field Party, now unfortunately empty. (The tins not Herman). Not an advertisement. Note the uncertainty of Herman's affections, fluctuating between two brands.

"With either he could be happy,
Were 'tother dear charmer away."

TAYLORSVILLE

Farewell Reception to Mr. and Mrs. Petty

The farewell reception tendered Mr. and Mrs. B. H. Petty was an event of no small importance. The reception was planned and held under the auspices of the Community Association. Mr. O. N. Floyd gave the farewell address, following which a good social time was enjoyed by everyone. As a token of appreciation for their unselfish services the Sunday School presented them with a very fitting gift.

Mr. Petty, having accepted a position with the Lasalle Extension University, will go to Cleveland for a short time before deciding upon a permanent location.

Mr. and Mrs. Petty were among the first residents in Taylorsville and were especially interested in doing those things which aided in a constructive way about the camp.

During their stay they made many friends, all of whom wish them success in the new field.

Introducing Mr. Sands

Mr. M. H. Sands has appeared on the scene in Taylorsville as the new camp manager. It remains for him to demonstrate whether he can maintain the "Sandow" reputation.

End of School Year

The picnic for the Conservancy schools, planned by "Daddy" Houck, marked the close of a successful school year for Taylorsville. Mr. F. E. Floyd and Miss Opal Floyd have temporarily taken up their residence in Day-

ton, and within a short time will move into a home which they have recently purchased.

Mr. Shively Becomes Office Engineer

Mr. W. J. Smith has occupied the property recently vacated by B. H. Petty. Mr. Shively, who will be the new office engineer, will soon move from Germantown, and occupy the home vacated by Mr. Smith.

GERMANTOWN

Mr. and Mrs. Ralph Lehman spent the Fourth with their old friends, Mr. and Mrs. Austin Philpot, at their home in Ada, Ohio.

Mr. and Mrs. Chris. Foehr spent their holiday with their own folks in Cincinnati.

A Farewell Party

A farewell party was given in honor of Mr. and Mrs. C. O. Shively, who have moved to Taylorsville dam, where Mr. Shively will be Office Engineer in place of Ben H. Petty.

Messrs. Jim Agla, Pasqua Oddi, and Geridini are visiting August and Joe Oddi in camp.

G. W. Kelly and wife visited Urbana, Three Oaks and other patriotic points on the Fourth. They report a great deal of construction work going on at Urbana.

Anyone who has never heard of France, see Hackett.

If you see a Ford turning a corner on two wheels you may know it is Harnish driving his father's car.

Mr. and Mrs. Pauls spent the Fourth with Mr. and Mrs. Clawson at Huffman.

Miss Dorothy Haines of Washington, D. C., spent a few days in camp visiting Mr. and Mrs. W. J. Harnish. She was very enthusiastic over the work, declaring Germantown to be sure "some dam place."

HUFFMAN

The many friends of Mr. Hutzelman were made sad when the news came telling of the death of his mother. We all extend our sincere sympathy to him.

Mr. Hutzelman has resigned his position as storekeeper and has moved his family to his father's home in Dayton. He expects to go into business with his father.

We welcome Mr. Minton, our new storekeeper, and his family, who come to us from Germantown. We hope we can make it so pleasant they will never regret the change.

The Children's Day exercises, given by the Huffman Sunday School Sunday morning, June 20, could bring only commendations and honor to the committee in charge, as well as to the children, who rendered their well-planned part in such excellent manner.

Mr. DuBois is taking rather an unpleasant forced vacation since he tried to hold up a clam shell bucket with his foot. Fortunately no bones were broken, but his foot was so badly bruised he has not been able to walk on it yet.

The following have recently had relatives visiting them here: Mr. Hodge has had his father and mother from Bellefontaine, Ohio; Mr. Madigan has had his sister, Mrs. Nolan, from Cleveland; Mrs. Bailey has had her father mother and brother and sister from Indiana; and Mrs. Clawson is having her sister, Mrs. Boyd, and family, from Virginia.

Mr. DuBois's mother has gone for an extended visit with her daughter in Missouri. We regret to have Mrs. DuBois leave us, as we have come to consider her as one of our community family.

Gena, Shuler, Zull, Cullen and Burns spent the 28th on an inspection trip to Germantown and other points in the southern end of the District. They speak highly of Germantown's hospitality, and the dinner must have been extraordinary, as all attempts to reach Hamilton in the afternoon failed. They returned to Huffman at dark with a story of blow-outs, punctures, etc., that can be taken for what it is worth.

A committee from the Sunshine Circle engineered another of the celebrated Huffman community picnic suppers Friday evening, June 25, on the lawn east of the hall. After the splendid supper the evening was spent in games and dancing. There was no prize awarded in the cracker-eating-whistling contest between the ladies and gentlemen, on account of unfair methods used on both sides.

Mr. and Mrs. Zull recently celebrated their fifth wedding anniversary, with a big dinner, theater, etc., in Dayton.