minimum depth below the edge of the metalled way, or slightly deeper if necessary. The slope from the shoulder into the ditch should be 2:1 or 3:1. If the ditch grade is too steep, erosion troubles may develop. Where it is obvious that this might occur, the ditch should be paved or baffle walls used. However, some baffle walls may cause additional erosion troubles. If bad erosion occurs, or is likely to occur, then a tile line several feet below the bottom of the ditch, with properly placed inlets, must be used. The tile should be large enough to take the full flow, and the inlets should be placed close enough together so that ditch erosion is prevented.

Where open-ditch drainage, or stream flow, must be taken through pipe culverts under farm driveways, or under the roadway proper, the required area of opening can be determined by the equation.

\[ A = c \sqrt[4]{D^3} \]

where "A" is the area of opening in square feet; "c" is a runoff factor; and "D" is the drainage area in acres.

The demand now is for safer roads, improved grades, straight alignment, less crown, and shallow ditches. Snow removal bares the road surface to daily changes of temperature during winter months. This has an appreciable affect in aiding the softening of the roadway, the formation of frost boils, and the breaking up of the surface. These damages to the surface are aggravated by the heavier vehicles that travel the roads. Better drainage is required to save the roadway surface.

The engineer has a reputation at stake in the road he builds, and if he wants to serve all and serve well, his roads must be well built. If he builds well, he will merit the praise of the traveling public and avoid the wrath which otherwise might be poured upon him. Build well, if only for your own satisfaction in a job well done, and words of praise will be forthcoming from sources least expected.

DRAINAGE LAWS AND PROCEDURES

Arthur Call, Attorney,
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Westcott in David Harum says, “There is as much human nature in some folks as there is in others, and sometimes a little bit more.” This is true with the average farmer concerning drainage, the man you must deal with in the construction and repair of drains.

Throughout Indiana we have a wonderful system of roads, and any farmer would say that it would be a crime to pile his junk, his debris, into the highway, and he would be correct. Nevertheless, six out of every ten farmers who are assessed
on the construction or repair of a drain that directly affects their land pay their assessments, regardless of amount, under protest, and will use the drain. If the drain is a tile drain, they will break a hole in it for the watering of their stock, and if it is an open drain, they will use it for a dumping ground, regardless of what it cost them to construct it.

I am inclined to think that, in order to have more efficient drainage, you must get the actual maintenance and repair of ditches into the hands of the persons who will have it done in a uniform manner in order to reach the highest point of efficiency in drainage.

There have been advanced in this state two theories of drainage. The first is the theory whereby, in the construction and repair of drains, the land in the particular watershed is assessed for the construction or repairs. This is the method of drainage and repair of drains that we have pursued in the state of Indiana for a great many years. In the establishment of a drain under this theory, the court must find that the drain will be of public utility, that it will benefit the health, and benefit the highways, in the watershed. If it does not accomplish these purposes, then it must be defeated by the court under our present drainage system. This method has been practiced in Indiana for the last 50 years.

The second method is one that is being more or less discussed throughout the state and that is, the placing of all the drainage, open and tile, in the county on the same basis as the highways, the levying of a county tax for their repair and upkeep, and authorizing the county surveyor to maintain them out of this fund.

If a drain in any particular watershed benefits the health in that watershed, then it directly affects the well-being of all of the citizens in the township or county and would be an improvement to the township or county.

If the drain benefits the highway in the watershed, that would be an improvement to all of the lands in the township or county because the improvement of the highway in any particular section of the county benefits, and makes the land more valuable over the entire taxing unit.

The drainage of wet land, the cleaning up of swamps, and the making of the land tillable, not only affect the particular land, but in a way make all of the land in the township and county more valuable; and this is a matter that should deserve careful consideration by the legislature. This would be a new procedure concerning drainage and would probably require considerable discussion in order to convince the lawmaking body of its merit. The time may come when this theory of drainage will be given attention by the lawmaking body of the State of Indiana.

Legislatures for the last forty years have made some changes, from time to time, in our drainage law. The legisla-
ture of 1933 gave us a drainage law that I believe is as good as we have ever had in Indiana.

The present drainage law makes quite a saving to the farmer in overhead expenses on the drain. Under the old law the county surveyor acted with the viewers in going over a drain and in making all the assessments. The viewers were paid for their daily work plus expenses. Under the present law the viewers only help the surveyor determine the practicability of the drain, whether it will be of public utility, benefit the health and highways. When this is done, the viewers, under the present law, drop out of the picture, and the surveyor determines the watershed, the size of the ditch, and the costs, and makes all assessments.

Under the old law, newspaper advertisements were quite an item of expense. Under the present law, some publications are entirely eliminated, and others only require one publication.

Under the old law, the superintendent of construction collected the assessments, let the contract, and paid the contractor from time to time, if he had the money. The contractors would bid on the work knowing that they might have to wait two or three years for their money; therefore, the bid would be higher than if it were a cash proposition.

Under the new law, this is all changed. The surveyor lets the contract and pays the contractor from time to time out of the General Ditch Improvement Fund, so that we are able to get a contractor to bid the work in for less, since he knows that he is going to get his money.

Under the old law, the clean-out and repair of drains were placed in the hands of the various township trustees. Under the present law, they are placed under the county surveyor of the county where they properly belong.

I know of no better way of getting before you a brief synopsis of the present drainage law than to give you the various steps through the court that are necessary in the establishment and construction of a drain.

**FILING PETITION**

Owners of ten per cent of the acreage affected by any drainage system of a watershed that lies outside the corporate limits of any city or town may file their petition in the Commissioners Court or the Circuit or Superior Court of their respective counties. This petition must describe in area at least eighty per cent of the acreage in the drainage area and at least eighty per cent of the total length of the main drain to be constructed.

At the time of the filing of the petition, the petitioners shall give an undertaking that they will pay all costs in the event the drain is not established by the court. Notice shall be given by the petitioners to all of the parties affected by serving
notice on the parties in person or at their usual place of residence and by posting notices along the line of the ditch, three in each township into or through which the ditch runs and one at the court house. If the drain runs into two or more counties, the county having the greatest length of the drain shall have jurisdiction.

At the time the petitioners file their petition, they shall fix thereon the day for the docketing of said petition. If the court shall find that notice is given as required by law at least ten days prior to the day fixed for the docketing of the petition, the court shall order the same docketed as a cause pending. At the time that he makes that order he shall appoint two viewers, who shall be residents of the township into or through which the ditch runs, disinterested, competent men, and not related to any person affected by the ditch.

HEARING FOR OBJECTORS

Any person has a right within ten days after the appointing of the viewers and docketing of the cause, to demur, object, or remonstrate as to the form of the petition or as to the action of the viewers or the surveyor. If the court should find that the surveyor is disqualified, he may appoint a competent engineer in his stead.

After the lapse of ten days, all objections to the form of the petition or action of the viewers or surveyor shall be waived. If within twenty days, exclusive of Sundays, from the day set for the docketing, owners of two-thirds of the area of the acreage of the land named as such in the petition, or who may be affected by any assessment, shall have remonstrated in writing, the cause shall be dismissed at the cost of the petitioners.

If no remonstrance is filed and the court deems the petition sufficient, he shall make an order referring the petition to the viewers and the surveyor for report. The court shall fix a time when they shall report. The viewers with the surveyor shall view the drain and shall first determine whether the drain is practicable, whether it will improve the health, and benefit the highways, and be of public utility, and also whether the expenses will be less than the benefits to the various landowners affected thereby. If they find any of the above grounds wholly in the negative, they shall report it to court and the petition shall be dismissed at the costs of the petitioners. If they find the above questions in the affirmative, then it becomes the duty for the surveyor, without the co-operation of the viewers, to proceed to determine the watershed and the kind of drain to be established, and to fix and determine the assessments. As soon as he has completed this, the viewers meet and sign the report with him and report to court. The court notes the filing of the report of the viewers and at that time fixes a day for the
hearing on the report, which shall not be more than forty days
nor less than thirty days from that time. It then becomes the
duty of the county surveyor to notify by United States mail all
people mentioned in the petition of the filing of the report, of
the fact that the land is assessed, of the amount of the assess­
ment, and of the date for the hearing.

If persons are mentioned in the report who were not men­
tioned in the petition, then he shall notify them by United
States Registered mail with a five-day return; and if the letter
is returned, then he shall (fifteen days before the date fixed
by the court for the hearing) give one publication in a local
newspaper as to the date of the hearing. On the day designated
by the court for the hearing, it becomes the duty of the sur­
veyor to appear at the clerk’s office or adjourn his meeting to
any other place in the court house and hear all objections to
his report and the plan proposed to improve the drain. All
objections shall be in writing and, unless they are in writing,
shall not be effective.

After hearing all objections, the surveyor can change his
report or assessments therein in any way he may see fit. If
he changes his report, he shall report the fact with the ob­
jections to the court. If he does not make any changes in his
report, he shall report that fact to the court. Any person who
files a written objection before the surveyor to the effect that
he is aggrieved by the decision of the surveyor shall have ten
days to remonstrate to the court against the surveyor’s report.

GROUND FOR REMONSTRANCE

There are about ten grounds on which he may remon­
strate, five of which are as follows:

1. The report of the surveyor is not according to law. The
   legislature says that this is a ground for a remonstrance. The
   supreme court says that it is not sufficient, that it must set out
   specifically wherein it is not according to law.

2. The damages assessed to any specified tract of land are
   exorbitant.

3. Lands are assessed too much as compared with other
   lands.

4. Lands are assessed too high as compared with some
   one else’s land.

5. The drain will not be of public utility, will not benefit
   the health or highways, and the costs and expenses occasioned
   by the construction of the drain will be more than the benefits
   resulting therefrom.

If, during the time in which they have the right to remon­
strate to the court on the surveyor’s report, owners of two­
thirds of the acreage mentioned on any tributary or lateral
which was not described in the original petition shall remon­
strate against the tributary or lateral, it shall be stricken from
the report.
If the court shall find that the drain will not be of public utility, will not benefit the health, and that the costs and expenses occasioned thereby will be more than the benefits derived therefrom, then he shall dismiss the proceedings at the costs of the petitioners. If he should find otherwise, then on the other grounds he can adjust or equalize them as he may see fit.

If the court finds for the petitioners, he makes an order establishing the drain and orders the assessments, as made and modified, declares a lien on the real estate therein described. They shall become liens from the time the court renders the judgment and shall have priority with other improvement liens from that date.

CONSTRUCTION

The court shall refer the drain to the surveyor for construction. It becomes the duty of the surveyor to advertise the drain for letting by one publication at least ten days prior to the day fixed for the letting.

The surveyor can accept the low bid or, if he sees fit, may accept a higher bid, or may reject any and all bids and re-advertise. As soon as the contract is let, it becomes the duty of the county surveyor to proceed immediately and to certify to the auditor the total amount of the assessments on the drain, the total expense, including attorney fees allowed by the court, and the contract price, and also to state in his report to the auditor when the assessments shall be paid.

As soon as this is certified to the auditor, it becomes the duty of the auditor by one publication to notify all the people affected that the surveyor's certificate has been filed and that it has been certified to the treasurer and that they can pay their assessments to the treasurer as therein specified.

The law provides that within ninety days after the taking effect of this act the county commissioners of the respective counties may create what is known as the General Ditch Improvement Fund; or if they decide not to do this, then all payments on ditches, repair and construction, shall be paid out of the general funds.

DRAINAGE IMPROVEMENT FUND

In reading these statutes as a whole and in summing it up, there isn't any question in my mind that, when the Drainage Improvement Fund is created, all drainage funds held for any purpose prior to this time shall be turned over to this fund, and all money collected on drains hereafter shall be turned in to this fund. All money advanced from this fund for the payment of expenses on any particular drain shall be reimbursed by that drain plus six percent interest from the time it was advanced. If the improvement fund is not created, then the general fund shall operate in exactly the same manner.
The law provides that the county commissioners by proper resolution may, at any time they may see fit, issue bonds on any ditch or any number of ditches in one bond issue to replenish the drainage improvement fund or the general fund, and that all money so used shall go to this particular fund and not be used for any other purpose. These bonds are not county obligations but are issued by the county and paid out of the drainage fund only. If the interest or principal payment of any bonds shall become delinquent, the county can pay out of the drainage funds and be subrogated to the right of the holder of the bond.

COMPLETION OF CONTRACT

The surveyor in letting the contract shall fix a time in which the drain is to be completed. The contractor can draw on his contract price from time to time on estimates furnished by the surveyor, for not more, however, than eighty percent of the construction actually completed. The twenty percent remains until the entire drain is completed. When the work is finally completed, it becomes the duty of the surveyor to report the fact to the court, and the contractor makes an affidavit that all pertinent bills of every kind are paid. He is to be paid his final payment from the county within sixty days after the completion of the work.

All bills paid out of the drainage or general fund for drainage shall be made out and verified by the claimant, approved by the surveyor and court in charge, allowed by the county commissioners, and paid by the auditor.

If any person furnishes any material, board for employees, oil, grease, or labor, he shall have sixty days from the furnishing of it in which to file his claim with the surveyor. In that event it becomes the duty of the surveyor to withhold that amount from the contract price. If there is a dispute between the claimant and the contractor, the surveyor shall certify it to the court, who shall determine the amount to be paid.

The contract and bond for the construction of drains under the present law are very important. The contractor becomes liable, under the present law, to any landowner who may be damaged by reasons of any delay in the construction of the drain. If the contractor does not proceed with the work diligently, it becomes the duty of the surveyor to cancel the contract and relet it for construction, and the original contractor becomes liable for any increased costs by reasons of labor and material prices. This should all be covered in the contract and bond in the letting of the drain.

RECONSTRUCTION OF DRAINS

The statutes for the reconstruction of existing court drains provide that five percent of those affected in acreage may petition the commissioners' court, or the circuit or superior
court of the county, alleging in substance that they were originally assessed for such and such a drain and that it is out of repair, and that it can be made more economical for the purpose for which it was designed and intended by increasing the size of tile or by deepening or covering and widening the drain, or by various other methods. When such a petition is filed, you proceed exactly under this petition as you do under original drains by notice, reports, remonstrance, and the letting. There is a difference as to the two-thirds remonstrance under the original drainage law for original ditches. Under the present statute, if two-thirds of those in acreage mentioned in the petition or that may be affected, representing fifty percent of the acreage abutting on the ditch, shall remonstrate in writing, then the petition shall be dismissed, unless the petition alleges that the drain has not been repaired for more than ten years and that it is out of repair, and that the petition is seeking to repair it and put it in proper condition; then in that event no two-thirds remonstrance will lie.

REPAIR OF DRAINS

The Act of 1933 covers approximately every phase of the repair drainage law. It was amended in 1935, and a part of it was also amended in 1937. The following discussion refers to the act as a whole with the amendments.

It becomes the duty of the county surveyor to divide all the ditches in his county into two classes, based on the necessity for repair. Class 1 includes those to be cleaned out in one year. Class 2 includes those to be cleaned out in two years. All are to be cleaned out biennially thereafter. Landowners are to remove all weeds and growths annually. The surveyor has the privilege of using old allotments until petitioned by the landowners to make a new allotment; and if on examination he finds it necessary, he can reallocate the drain. In making allotments he shall begin at the mouth of the drain and designate the various allotments. The farmers shall be notified of their allotments and shall keep them cleaned annually of all weeds and growths.

Tile drains shall be repaired at any time on notice of the necessity to the surveyor. If the amount of repair is under fifty dollars, the surveyor can have the work done without letting a contract and pay for it out of the ditch improvement fund. If such a fund has not been created by the board of county commissioners, then it shall be paid out of the general fund. This amount would draw interest at the rate of six percent and be a charge against this particular ditch.

If the repair is over fifty dollars, the surveyor shall make an estimate of the total cost, let the contract, and make assessments against the landowners in the watershed.

The Act of 1937 provides that the surveyor shall clean out and repair open ditches biennially, but no open ditch shall be
repaired until it has been constructed at least one year. This is done by letting contracts and making assessments against the various tracts of land.

The same act also provides that the surveyor shall make repairs on open ditches at any time that the necessity therefore arises; and if the assessment for the repair is not to exceed one hundred dollars in expenses, work may be done by the surveyor without advertising and letting the contract, and this amount shall be paid from the general fund. However, he cannot use more than one thousand dollars from this fund in any one year for the repair of ditches.

From my experience in the repair of open, tile, and dredge ditches in Indiana, I am inclined to think that our repair drainage law is wholly inadequate.

Under our present law, the surveyor shall make allotments and notify the farmers on open ditches to make their repairs and clean out their allotments. If it is a large ditch, there may be a hundred or more allotments with as many contractors, and you can readily see the result. Some will do the work properly, some will not, and others will not do it at all. As a result, it is practically impossible to make this law effective under present conditions. Not only is it ineffective, but it is a very difficult thing for the county surveyor to get proper action on these drains.

In conjunction with a committee appointed from your organization, I have drafted a bill for the present legislature that changes this entire clean-out and repair law.

The bill that I am proposing places all open, tile, and dredge ditches under the control of the county surveyor. If he is disqualified on account of being a landowner or a relative of persons affected, he is authorized to appoint a licensed engineer to proceed with the work after he has taken oath and given bond. This engineer shall have the same power as the county surveyor in this particular piece of work.

The bill also provides that the county surveyor shall receive three dollars per day and six cents for each mile actually travelled for the use and service of his automobile. These sums shall be retained by him in addition to his regular salary. These sums, including the salaries of the deputies and assistants, shall be paid out of the general ditch improvement fund if the same has been established, otherwise out of the general fund of the county.

The bill also provides that the county commissioners of the various counties shall, within sixty days after the passage of this bill, create a ditch improvement fund or make an order that the expenses of these drains shall be paid out of the general fund. Under this act I use the word "shall"; therefore, it is mandatory that the commissioners create this improvement fund or make an order for such payments out of the general fund.
All claims shall be verified by the claimant, approved by the surveyor, and paid out of this fund. The county shall ultimately be reimbursed for all money advanced plus six percent interest on all money so advanced. The board of commissioners may issue drainage bonds covering any one or more of the ditches repaired or improved, and the proceeds shall go to the ditch improvement fund.

The bill also provides that counties having two hundred miles or more of open, dredge, or tile ditches combined may, if the county commissioners so order, purchase drag lines, scoops, or other ditching machinery and place them under the supervision of the county surveyor, and charge for the repair and clean-out of ditches in that county.

This proposed law provides that when five percent or more of the real estate originally assessed for the construction of any court drain shall petition a surveyor asking for repair or clean-out, and showing a necessity therefor, the surveyor shall investigate, and, if he finds that it is necessary, he shall proceed immediately to survey the drain, divide it in stations, make an estimate of earth, shrubbery, and debris to be removed to restore it to its original depth and specifications.

Tile ditches may be repaired in the same way. All expenses incident to such work shall be paid out of the ditch improvement fund. Claims shall be filed, and approved by the county surveyor and board of county commissioners.

On all open, dredge, and tile ditches where the costs of the repair shall be five hundred dollars or less, the expense shall be paid by the county and charged to the respective ditch. On all repairs in excess of five hundred dollars, assessments shall be made. As soon as the surveyor has made an estimate of material to be removed from an open, dredge, or tile ditch, he shall proceed immediately to employ help to clean out and repair the ditch in accordance with plans and specifications, and all labor and material bills shall be paid by the county. Or if he so desires, he may proceed and let contract for the repair and clean out of the ditch, the contract to be let to the lowest responsible bidder. If the contract is for more than five hundred dollars, he shall make assessments and pro rate and divide the costs of all repairs to all the land that, in his opinion, will be affected.

The real object of this bill is to eliminate the handicaps of the old allotment law and to give the surveyor the right to clean out and repair open, dredge, and tile ditches, to use his own equipment or labor, or to let contract and have it done as a whole.

I believe in this manner we will be able to get satisfactory results on the maintenance of our court ditches in Indiana.