Field drainage in the Netherlands

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Introduction

In selecting the topics of field drainage in the Netherlands that might interest people abroad, a close comparison between the practices in- and outside the Netherlands would be needed. Not many people will, however, know what the situation exactly is outside their own country. We will therefore mention a few points which seem to be of material influence on the approach as well as the results in the Netherlands. These points are:

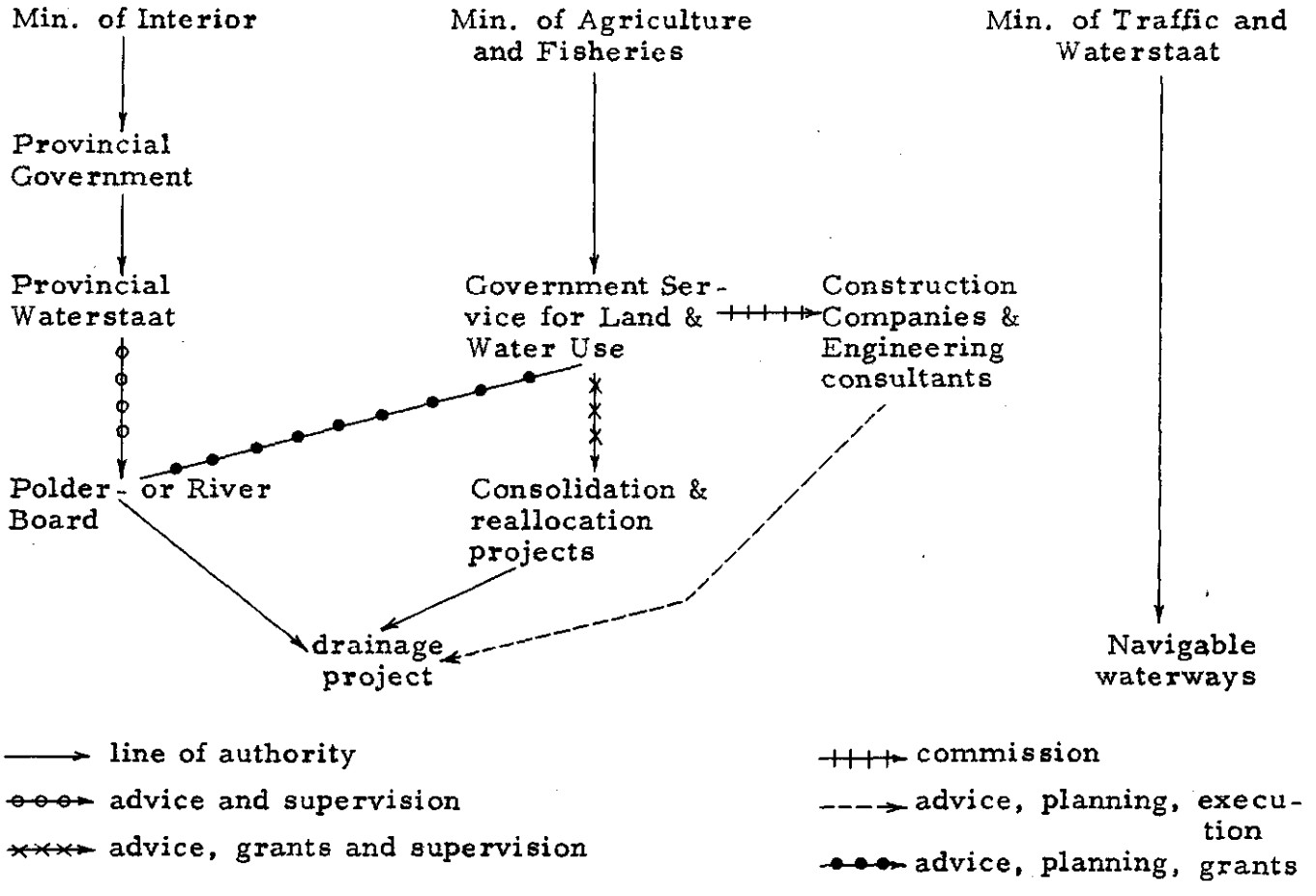
1. The plans are developed for the polder boards in close cooperation of the various authorities and companies without any power of enforcement by the government. This creates a favourable atmosphere.
2. Drainage plans are frequently integrated into consolidation and reallocation plans, in which property rights of the landowners are temporarily waived. Loss of land for new water courses is compensated, the plans can therefore be directed towards a more free changing of the situation in the field.
3. Field drainage has been practiced for many centuries and over a wide area, so ample experience is available.
4. The plans are strongly supported by research, done as well by the government as by the construction companies.
5. The construction companies in the field of agricultural drainage are small in number, different in set up and keen on working with subcontractors. They stimulate each other as well as the subcontractors, to extend their experience and to specialize on certain aspects. Contractors for civil constructions only seldomly accept tenders in the agricultural sphere.
6. The government takes initiatives to develop new ways of planning and of letting out work, making a wider field of experience available. This lessens the risks for contractor and drainage board. The desires of agriculture can in this way be better harmonized during the planning stage with the technical problems of construction.

The above will be shown by discussing the organization of the governmental and non-governmental institutes, by a discussion of the Schouwen project and by a discussion of the peculiarities of the two main construction companies and their cooperation with the government.

Organization

Schemes for improvement of drainage are in the Netherlands the result of a close and friendly cooperation between governmental services, engineering corporations, contractors and the polder- or river boards or the reallocation committees, the latters as principals.

Organization chart agricultural drainage



The organization is somewhat complex because the higher authorities are so much younger than the polders and the polder- and river boards have over the centuries obtained a large amount of autonomy. Supervision by the Provincial Water-

staat developed gradually and is not very close. The branches of Provincial Waterstaat are therefore not used to interfere much into the activity of the boards. The young Ministry of Agriculture, though without authority with respect to the polder boards, started to give grants for the execution of drainage projects and also gained much influence on agricultural drainage by the supervision of consolidation and reallocation schemes, due to the grants given for this general improvement of production conditions. The polder- and river boards as well as the reallocation committee are the principals and have the last say in the project and this system of checks and balances brougl the relation in the sphere of cooperation and consultance on a basis of equality. It may be noted that the Rijkswaterstaat, literally the Ministry of the Hydraulic Situation, only has influence where the project deals with discharge on or water supply from navigable water courses.

The technical implementation of the polder boards is very restricted. The areas are small, the total number of 2500 of the boards makes it impossible for them to have trained personnel. The plans of the projects are made for the boards by engineering companies with advice of the Government Service for Land and Water Use. Construction and soil moving is done by contractors Supervision is arranged, specialists are supplied and all kinds of investigations are done by the government institutes or by the two main construction companies, who also have their own research teams at their disposal.

Continuous consultation and discussion lead to the good cooperation, which saves time and improves the results.

Planning

The planning of the project may be discussed at the hand of the polder Schouwen, flooded in 1953 and reconstructed by a general reallocation plan, also embracing drainage.

The polder was flooded through wide breaches in the dikes, dangerous because the soil surface was below mean sea level and a continuous current, not coming to a stop at low tide, was enlarging the breach. In this emergency no consultation was required and Rijkswaterstaat started as soon as possible with closing the dams, partly with the aid of D-day breakwater pontoons, procured from England. The whole might of earth moving equipment available in the Netherlands was concentrated on the reconstruction of the dikes. Closure was reached without much attention being given to the otherwise beloved investigations into the economic feasability of the project.

The next phase was the rehabilitation of the area. The division of the polde into areas with equal water level was revised, new water marks were computed from the reaction of the crop on water levels, the contour map of the islanc and the soil profiles. Using auger hole permeability measurements, the depth and spacing of tile lines were determined. These data were collected by research groups of the government and teams of the construction companies. On account of these data the old drainage system was entirely changed. Canals and ditches were traced at the optimal places, a new division into agricultural units was devised, pumping stations, bridges, culverts and roads were constructed at the most appropriate places and what was damaged by the flooding was completely repaired or radically rebuilt. It was the reallocation law which made it possible to improve the whole drainage system so profoundly without paying attention to the previous boundaries and property rights. A special problem was in this case the de-salinization of the soil. Large quantities of gypsum were made available and the restoration of the permeability, damaged by the sodium, has been quick. In very wet years, however, the soil still proves to be sensitive to loss of structure, probably due to the extremely slow leaching of the smallest pores.

The reallocation procedure allows all aspects which need revision to be put in order, be it roads, consolidation of farms, drainage or the rebuilding of farmhouses. Loans are given on easy terms. The owners get their property back in the same propertion to the entire value of the land in the scheme, as they brought it in into the reallocation and they get it back as new land of high production possibilities, ready to offer a prosperous living.

Now that within some 10 years behind the to be constructed closing dams a fresh water lake will occupy the area now invaded by the tides, minds go out to further improvements. The application of fresh water to the crops, in particular horticultural crops, might offer new possibilities to the development of the island. Seepage of saline water will not stop from the day the water in the estuary becomes fresh. For several centuries the subsoil will still convey saline water to the surface. If fresh water should be made available, it will be necessary to route the water through the least saline part of the polder. The pattern of seepage should therefore be known.

Today investigations into place and quantity of seepage are in progress. Here it was noted that the deeper the drain, the more salt was brought into the polder. Tile drainage supplied the least amount, the deep main drains gave the severest intrusion of salt. Results of soil surveying are investigated which may show where one has to be particularly careful with deep drainage. A not well-

prepared plan may spoil or hamper the future development of horticulture and the possibilities for a more presperous living of the population. Research and supervision have here an important task.

Construction and contracting

Two big companies are dealing with most of the projects, the Nederlandsche Heidemaatschappij and the N.V. Grontmij. They may plan the land improvement schemes as engineering consultants, they may superintend the work or execute the plans on a cost-plus or a contracting basis.

Of old they already had a large task in this field of work, but the gradual increase in the size of the consolidation projects, reallocation- and the drainage schemes as a part of the former, make it difficult for the small contractor to accept a tender for the entire work. It is the policy of the Grontmij to have no, and of the Nederlandsche Heidemaatschappij to have only a small quantity of machines and the normal way is to work with subcontractors.

The Heidemaatschappij, with a personnel of 2400 - local labour excluded - is the largest company. Some 70 graduate officers plus a research division of 20 heads, of which 5 academically trained men, work in the Netherlands, but also for part of their time on projects abroad.

It is the policy of this company never to accept tenders, but to work on a cost-plus basis, or as engineering consultant to and superintendent of the project. The projects are for 40% dealing with reallocation and drainage, for the rest with village sanitation, road building, construction of recreational areas, sports fields and swimming pools.

The organizational set up - the Heidemaatschappij is a non-profit making company - is a relic of the last part of the 19th century when the landed gentry assisted the agricultural population with this kind of organization in their struggle against the importation of cheap products from overseas and in this way tried to improve the low level of agricultural know-how. This tradition is continued by activities as running the only school for middle level land improvement training, the only fish breeding centre in the Netherlands and an experimental farm for the improvement of soil profiles. In this context it must be mentioned that the Heidemaatschappij is the centre of activity of a union of people interested in land improvement. For this group lectures, excursions and demonstrations are organized. The company might be compared with an English chartered company. The Heidemaatschappij has always profited a great deal from its school of land improvement. The best students are offered a position

with the company and the staff on the project has always shown its excellent training.

The Grontmij, with 1000 men personnel and 55 graduate officers is not as large as the Heidemaatschappij, but is rapidly gaining. The research department is run by 2 graduate officers and a complement of 20 men.

Besides working as engineering consultant, superintendent and contractor on a cost-plus basis, Grontmij does accept tenders. An other difference with the Heidemaatschappij is, that with Grontmij the work is gradually extending into the field of civil engineering. Not only sports fields and recreational areas are constructed, but also bridges and port facilities are built. The differences with the engineering companies for civil constructions diminish. This company also extends its activities to the developing countries, where its experience in agricultural improvement projects is a great asset. A gradual shifting from work on a cost-plus basis to contracting is beneficial to the activities of the Grontmij, especially because of its willingness to accept tenders.

In the field of contracting and the execution of projects, habits are gradually changing, largely due to initiatives of the Government Service for Land and Water Use of the Ministry of Agriculture.

An interesting venture is these days to let out work as confidence commission. The contract is signed at the end of a consultation with a contracting company considered to be best suited for the job. This contractor, the superintending company and the Government Service discuss at the conference table the best method to deal with the project. Suggestions are exchanged as to the most economic way of executing a good job. All scientific data available are made accessible to the contractor. Important is also that during this consultation it may prove advisable to change the plans to some extent so that even less costly methods may be used. In this way a reasonable price for both parties may be reached, risks are diminished and the experience from all other projects is used to advantage. It is expected that planning, execution and supervision may profit from this exchange of experience. It will most certainly give cheaper projects and better results. Time will show how this free cooperation will suit all parties involved and to what extent it may be beneficial to the technical and financial interests involved.

Contracting and construction, supervision and planning are in a state of permanent change. The main emphasis went after the Second World War from the technical to the financial and then to the organizational aspect. With the, these days, reduced earning power of agriculture, it becomes more and more

important to assist and support the agricultural community with better projects for less money.

Directly after this war, a main aim was to make the world safe from hunger. The higher developed countries have amply succeeded in solving this problem. This has, however, not lessened but increased the difficulties in the section of land improvement work. The attempts to solve the problems of agricultural drainage now under consideration in the Netherlands, may therefore deserve interest from circles wider than national.

Wageningen, December 1962