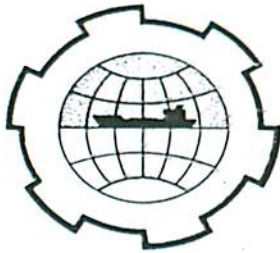


SECOND INTERNATIONAL CONFERENCE ON
PORT AND OCEAN ENGINEERING UNDER ARCTIC CONDITIONS
UNIVERSITY OF ICELAND
DEPARTMENT OF ENGINEERING AND SCIENCE



PLANNING OF REYKJAVIKS FISHING HARBOUR.

Hannes Valdimarsson
Civil Engineer.

Port of Reykjavik.

Reykjavik
Iceland.

INTRODUCTION.

Fisheries have long been linked to the name Reykjavik.

In Faxaflói, the bay outside Reykjavik there were rich fishing grounds. Fishing was conducted in open boats and the boats used to be run ashore for protection. Later small jetties were built along the shore, but the harbour area was poorly protected.

In the years 1913 to 1917 the present harbour area was enclosed by breakwaters. The following development of proper harbour facilities within the enclosed area made Reykjavik the center for the icelandic fleet of deep-sea trawlers in the following decades as well as the main commercial port in the country.

Fish landed from these trawlers in turn formed the basis for the development of Reykjaviks fishing industry. Around 1950 a fleet of more than 20 deep-sea trawlers 6 to 700 grt in size were operated from the harbour. At the same time, or shortly after the last world war, there was an increase in the number of fishing boats up to 100 grt operating from the harbour.

At that time the harbours at the Reykjanes peninsula were very primitive and although these were in many respects better oriented towards the fishing grounds, the bigger fishing boats had to operate from the better ports in Reykjavik and nearby Hafnarfjörður. These places became the centers for the fishing industry on the Reykjanes peninsula.

In the last decade there has been a change in the pattern described. Fishery harbours have been developed at the outer part of the peninsula and the connecting roadnetwork has been much improved.

The fishing boats, now growing in size up to 300 grt or more, are now able to operate from these harbours. As these are closer to richer fishing grounds, and at the same time fishing in the Faxafloi-bay has declined it has become more economical for the boats to be based there at least during the main season.

The processing industry in the villages at these harbours has developed rapidly and in recent years we have seen that smaller plants have moved from the Reykjavik area to these locations. Plants situated in Reykjavik now have their boats landing in these harbours during the season, fetching the catch by trucks over a distance of more than 50 kilometres, but the boats are still registered in Reykjavik and land their catch there outside the main season.

THE FLEET-SPECIES OF FISH.

The biggest number of deep sea trawlers operated from Reykjavik was in the fifties and the total catch from these vessels reached its peak in 1958-1960 when over 100.000 metric tons were landed per year.

Since then the fleet has been declining and in 1971 only 12 were left, and these were old and out of date ships.

At that time it was recognized that it would be necessary for the Reykjavik fishing industry to secure raw fish by renewing the trawler-fleet, and now 8 large trawlers are under construction or already in operation for firms, based in Reykjavik.

In Iceland the term boat is used for fishing vessels up to 3 - 400 grt and the total number of boats registered in Reykjavik

have in the last years been 60 - 70, varying in size from under 10 grt to over 300 grt.

The main species traditionally processed in Reykjavik are cod and redfish - the redfish mainly coming from deepsea trawlers. The main season for the codfisheries by boats at local grounds off the south-west coast is in winter from january to may with a very definitive peak in marz and mainly april. The boats land dayly and the fish is brought ungutted to the processing plants. No ice is needed in the boats due to the short trips and the low temperature at this time of the year. These fisheries ar mostly conducted from fishery harbours at the outer or southern part of the Reykjanes peninsula and the catch brought to Reykjavik based plants over a distance of 50 kilometers. In summer and autumn the boats registered in Reykjavik are usually operated from the home port making trips of longer duration or up to a week and the fish is then brought gutted on ice to the harbour.

The catch from deep-sea trawlers is brought to harbour gutted and laid on ice. The fishing trips are usually of 10 to 15 days duration and the fluctuation in quantity is nothing like that of the boats. On the other hand these trawlers often bring their catch fresh to foreign markets mainly in autumn and winter.

The trips in winter often coincide with the peak in the winter season for boats thus stabilizing the flow of raw fish to the plants but in autumn and early winter the boat catches are usually low so there often is a shortage of raw fish at that time.

The amount of demersal fish for processing in Reykjavik amounts yearly to between 50 and 60.000 metric tons. The variation month by month is shown on fig 2 where at the top we see the catch landed by deep-sea trawlers and next the amount trawlers registered in Reykjavik land abroad. The third diagram shows the variation in the amount landed by boats in Reykjavik. The forth diagram shows the total amount of fish landed by boats

in all harbours but processed in Reykjavik giving an indication of the amount brought from other harbours. The last diagram shows the total amount of demersal fish processed in Reykjavik. All figures are from 1971. A recent development is the fishing for capelin in the months february to april. The amount has increased from practically nothing in 1966 to over 400.000 metric tons this year, thereof over 50.000 metric tons landed in Reykjavik. Most of this catch is processed in meal factories, but a growing portion is quick-frozen.

HARBOUR DEVELOPMENT.

Following the enclosure of the harbour area in 1917 development of harbour facilities started in the eastern part of the harbour.

The area was used as a combined fishery and commercial harbour and around 1950 we had the situation shown in fig. 3

The plan had then long been to develop the fishery harbour in the western or northwestern part of the harbour. In the beginning there was hardly any land available. Breakwaters had been built from land to a small island to give shelter, and from the island came another breakwater ending at the harbour entrance. In 1950 only two plants had been built there on reclaimed land within the breakwater i.e. a canning factory - later changed into a quick-freezing plant - and a fish-meal factory, originally built for herring but now used for capelin. But land around the harbour was scarce and other processing plants were, and still are, scattered about the town. At this stage only three small jetties for smaller boats had been built in the planned fishery-harbour.

In the years 1950 to 1965 much development took place in the western part and in 1966 we had more or less the present situation (figure 4).

Although most of these facilities were intended for the use of the fishing industry a great deal of commercial traffic is still in that part of the harbour.

Development of a new commercial port at a new location is now under way with the first 400 metres of quay already in use and it is hoped that very shortly all commercial traffic can be moved away giving scope for exclusive use for the fishing industry.

Due to the scarcity of land in the harbour area only a part of the processing plant can be situated there. Some land has been reclaimed but it seems that it is not enough, or not well enough situated for at the same time little has been done to make provision for a rational distribution network within the harbour area.

As an example it can be pointed out that not even the plants in the harbour area have the benefit of direct access to the landing quays.

All landing from deep-sea trawlers still takes place in the eastern part of the harbour and fish is brought in bulk on trucks to the processing plants, the traffic going along the harbour border through the town center with much congestion. Fish landed from boats is handled in the same way and landing takes place in the innermost part of the western part of the harbour.

The fish landed in other harbours in winter season is brought to Reykjavik in the same way i.e. in bulk on trucks.

In the receiving halls in the plants the fish is dumped on the floor and iced for storing until processing can take place.

THE NEED FOR A MASTER PLAN.

This method of handling the raw fish has been much criticized and development is under way at least in some of the deep-sea trawlers to box the catch at sea but progress seems to be slow in that respect.

The problems facing the harbour authority when planning an exclusive fishing harbour in the western part are manifold but a few main considerations can be pointed out.

The growing demand for better hygiene in all handling of the raw fish has compelled the processing plants to take a critical look at their existing facilities. In many instances the result has been that the only viable solution for a long term development is to start a-fresh by building new factories as the present ones are now in many ways out of date.

The owners view is that the most logical location for these new plants is in the harbour area and preferably at the quayside.

The new and therefore more expensive fishing vessels that are now being built demand that less time be spent in port, thus requiring faster unloading and servicing. At the same time methods must be developed for handling the fish better in all stages of transport from the shipside to the processing plant.

As a public authority the harbour has to secure an economical use of harbour facilities. In addition to securing proper landing facilities, it also has to secure servicing of the ships, means of economical ways of exporting the finished products, (only a small part goes to local consumption), space not only for the processing plants but also for the service industry, a distribution network within the harbour has to be provided for, and many other factors have to be taken into consideration.

It thus became evident that a master plan for future development of the fishery harbour was needed, determining not only the need for more land but also providing a logical and economical distribution network within the harbour, division of the water area and determining the use of the present facilities.

The main tasks in the following planning work were threefold.

1. A study of the possibilities to provide more land in the harbour area for development for the fishing industry as well as the servicing industry.

2. To move all landings of fish from deep-sea trawlers from the eastern part to the western part of the harbour and at the same time to point out ways to improve the methods of handling the raw fish.
3. To look into specific service functions mainly the provision of an iceplant in the harbour area and a cold store for the finished products waiting for export.

PRESENT HARBOUR.

If we look at the present situation we see (figure 4) that in the planned fishery harbour the main two processing plants are in a small area close to land and further a processing plant and a fish-meal factory on reclaimed land at the outer part of the harbour. Scattered about the town are two major processing plants, over 5 smaller ones and a meal factory.

The harbour facilities consist of four jetties for boats at the innermost part of the harbour used for landing and servicing.

In the middle there are new quays with depth of water over 5 metres and new sheds now used by commercial traffic. Next we have two jetties one used for fuelling and the other now being outfitted by the fish-meal factory for direct landing of capelin by means of conveyor belts.

At the outermost we have a quay built inside the breakwater and the adjacent land has now been allocated to a quick-freezing plant to build a new factory at the quayside instead of an old and outdated one now situated outside the harbour area.

The original island and the added reclaimed land is planned used by the fishing industry, but the land available is limited and the lots limit the size of factories possible.

Along the original breakwater from land to the island there are huts mainly used by vessel owners for storing gear.

On the connecting road from land to the island there is considerable traffic limiting and disturbing all activities in the area.

Along the original shore we have slipways and a number of service and maintenance firms.

PLANNING.

The first step in the planning was to study the possibilities of providing more land. The only way to do this is by reclamation, as all land in the neighbourhood is already developed.

Depth of water north of the present breakwater is little and thus gives possibilities of reclamation at a favorable cost. A considerable protection of land is needed. It would thus be economical to take as much land for reclamation in one stage as possible to limit the proportional cost of the protection.

In the plan now being considered a proposal has been made for the reclamation of land measuring some 130.000 sq metres and the total quantity of fill needed is about 1.000.000 cubic meters.

The use of land is planned thus that about two-third is planned for the fishing industry and one-third for the servicing industry.

For the following planning it could be concluded that land could be provided in the harbour area at a reasonable price.

It could also be concluded that through the thus added land it was possible not only to offer land to the industry but also to solve many of the traffical problems now encountered.

By leading a new road along the boarder of this new land the present harbour area could be widened and freed from traffic, thus making room for improvements in all operations in the area.

The next step was to study the possibilities of moving the landing of fish from deep-sea trawlers from the eastern to the western part of the harbour.

Some considerations were given to the possibilities of providing quays and other facilities directly in connection with the existing mayor plants. This was soon found to be impractical.

Due to their size the deep-sea trawlers would need much room for manoeuvre thus making it necessary to limit or even destroy the present facilities for small boats. This was not felt viable for at the same time it was pointed out that it is just the plants situated in that area that need much improvement or even rebuilding, and space in the area is very limited.

The attention soon turned to the facilities in the middle part of the western harbour and the following master plan was based on the use of these facilities in connection with the reclamation of land mentioned.

THE MASTER PLAN.

The main features of the proposed master plan are as follows. (see figure 5). It is proposed that a certain division of the harbour area should be made. The innermost part should be kept for the exclusive use of boats up to abt 200 grt in size.

This is the best protected water area in the harbour. It is pointed out that there is scope in this area for further development. The basin in the middle part is to be used by deep-sea trawlers for landing and servicing.

Proposals have been made that the shed on the quay along Grandagarður should be taken into use as a receiving hall and cold store for the raw fish. Close by an iceplant is proposed built with possibilities of providing ice both to vessels after landing and to the receiving halls.

It is furthermore proposed that the shed on the jetty should be changed into a cold store for the finished products ready for export with all loading of ships at the outside of the jetty.

The use of the outermost basin is more or less as described earlier with landing facilities for capelin to the meal factory and a new factory on the outermost jetty.

The jetty dividing the fishery harbour from the commercial harbour is planned used for waiting, servicing and maintenance of fishing vessels, with good connection by road to the service and maintenance industry and the slip ways.

The three factors mentioned i.e. the direct landing of fish into a hall at the quayside, an iceplant situated in such a way that delivery of ice can be made directly to the trawlers by means of conveyor belts and a cold store for finished products at the quayside in the fishery harbour are the principal features of the master plan along with the proposals for land reclamation.

The argument behind these proposals for use of quayside facilities instead of allocating these sites to the processing plants, as proposed by the plant owners was that it was for more rational to develop a specialized operational zone to deal with functions that are linked to landing and storing of raw fish, servicing the vessels, loading the finished products for exports and other functions related to the fishing vessels and shipping.

It was argued that such use would lead to a more rational and economical use of the harbour facilities and to a more elastic plan where it would be easier to make necessary changes in order to adapt to new methods in handling storing and distribution.

If at the same time sites were developed on the proposed reclaimed land for new processing plants, it was further argued that these plants would enjoy a similar advantage as far as the necessary quaybased functions are concerned but would on the other hand enjoy far more favorable prospects of developing modern plants on ample land with due considerations to the many other facilities needed in a fishing industry as social amenities better road connection both with the town and within the area and many other factors have been pointed out.

In order to facilitate all activities within the operational zone it is planned that the existing road should be closed for all through - traffic and instead a new road should be lead along the boarder of the reclaimed land with good connections to the towns street-network.

All access to the new industrial sites and to the operational zone is planned by short roads connecting the new road and the operational zone thus giving each site easy and direct access to the operational zone and the surrounding town.

To facilitate distribution within the area it is thought necessary to break down the huts along the now existing break-water, thus giving more room in the operational zone, and a new inner road connecting the new sites and the existing ones on the former island, gives every plant in the area easy access to every part of operational zone.

Part of the reclaimed land is planned for the servicing industry necessary in a fishing harbour, mainly of the lighter type. This would be a prolongation of the existing servicing zone with easy access to the operational zone in the western part of the harbour, to the slipways and to the jetty in the middle of the harbour that is proposed used for servicing and maintainance.

In the preparation for the master plan it was necessary for the harbour authority to carry out operational research into activities that are not a part of its present operations.

The harbour authorities main function has been to provide the infrastructure. All other activities are in the hands of private companies.

Thus all landing is undertaken by the vesselowners and as for the landing from trawlers is concerned the trawlerowners have formed a seperate company to provide that service.

All transport of fish from quay to plant is the responsibility of each processing plant. The same is true for transport of the finished product to the shipside for export and also for the transportation of ice to fishing vessels as each quickfreezing

plant owns its own icefactory.

In its efforts to rationalize all these activities it was thus necessary for the harbour authorities to study each group of activities technically and the organisation involved to be able to co-ordinate them in the master plan.

Fig. 6 is an example from one of these analysis showing the proposed layout for the landing quays for trawlers, with two berths, two receiving halls and a cold store for the raw fish.

The receiving halls are expected to be able to receive the raw fish both in the present form i.e. in bulk and coming in boxes.

In the case of raw fish coming in bulk the proposal is that all fish should be re-iced and put in boxes in the receiving hall.

The boxed fish is then ready for storage or for direct delivery to the processing plants and the possibilities of mishandling should diminish.

The fact that all fish in Iceland is sold at fixed prices by direct agreement between vesselowner and plantowner but not by auction should make all administration of the system simpler.

On the same figure we see the situation of the proposed iceplant and the cold store for the finished products.

From the ice-plant conveyor-belts can be led to the landing berths to the receiving halls or to the berths inside and at the end of the jetties giving a flexible delivery system.

As for management of the functions described it has been proposed by the harbour authorities the landing-company mentioned owned by the trawler-owners should widen its scope of activities also to include the operation of the iceplant thus giving a fuller service to the fishing vessel.

A similar company could be formed by the plant owners to manage the cold-stores for the raw fish and the products and even to manage the distribution within the area.

The proposals for a master plan that have been outlined call for much co-operation between all parties concerned, as their realisation would lead not only to a new technical approach, but would also include a new managerial and operational approach.

The proposals have already been presented to all interested parties i.e. vesselowners, plantowners and their organisations as well as technical and financial institutions dealing with the fishing industry.

At present the harbour authority awaits responses from these parties.

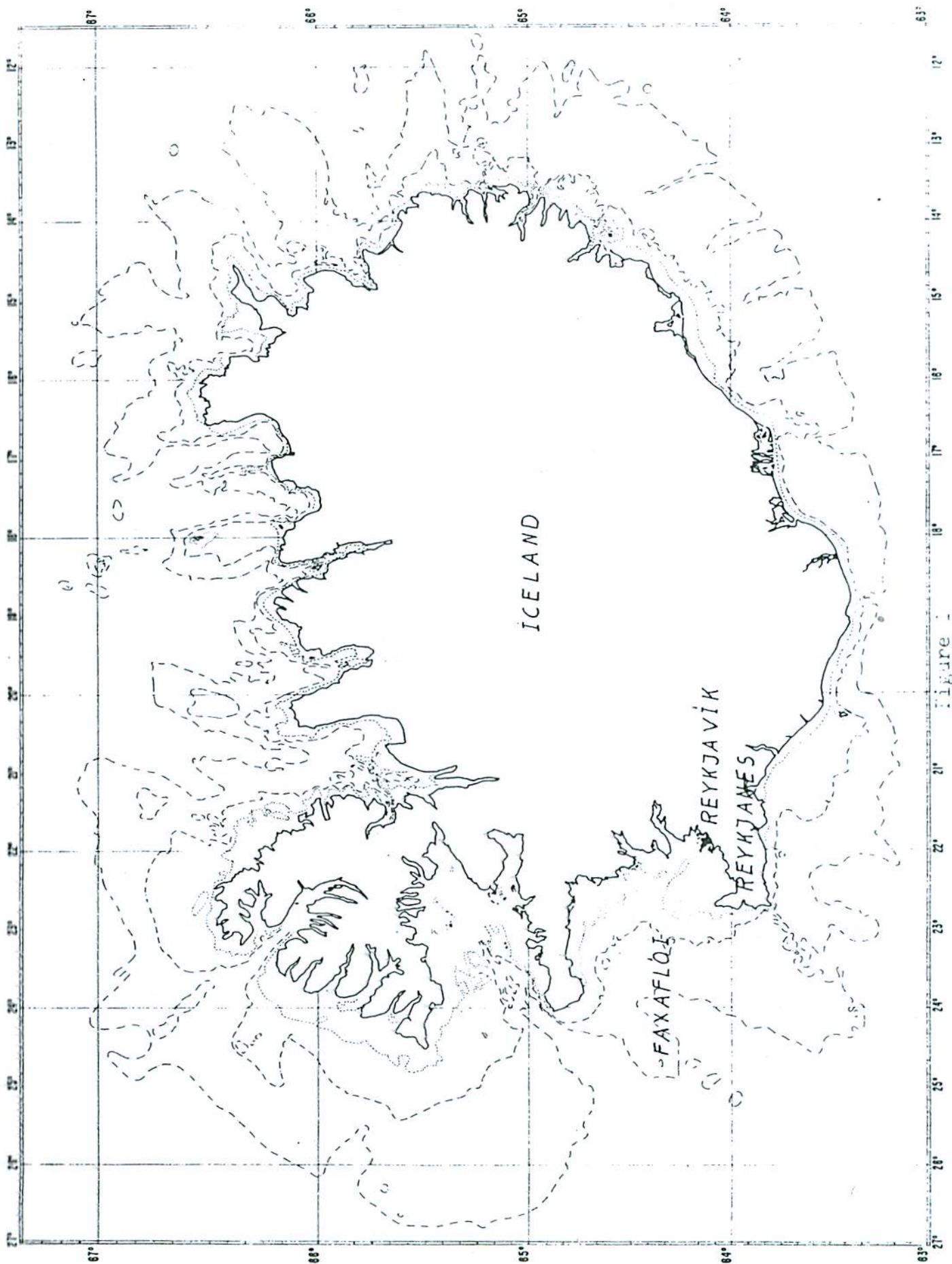


Figure 1

Variation in landing and processing (1971)

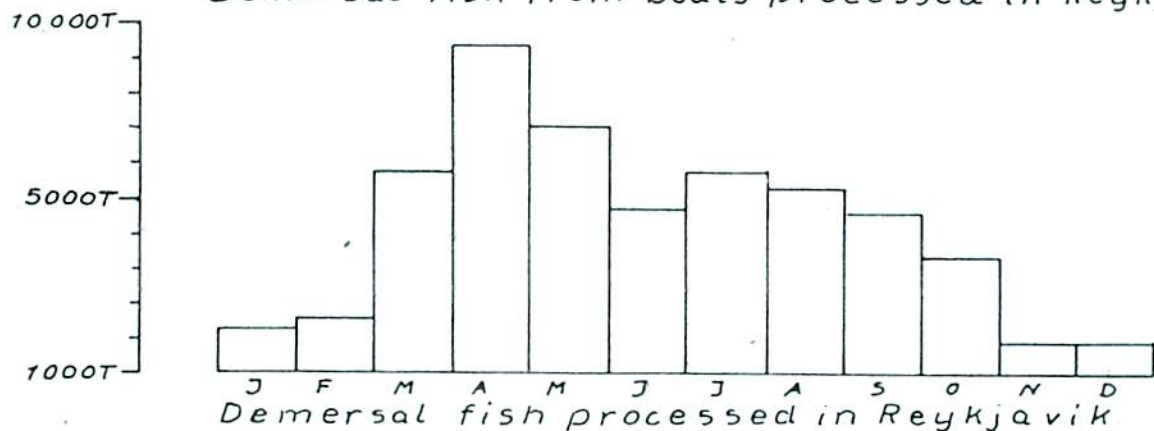
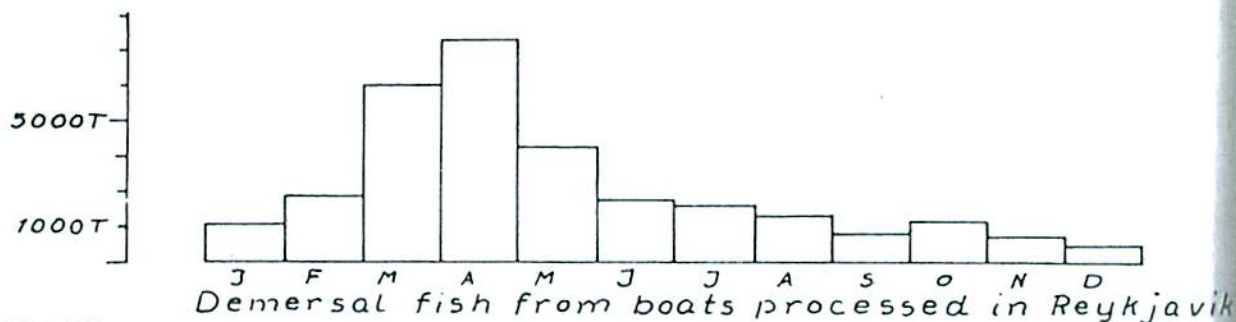
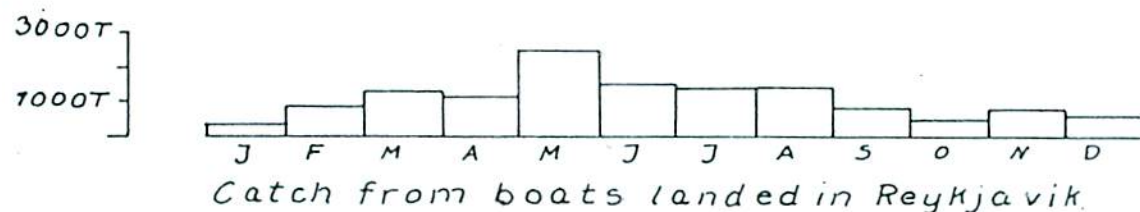
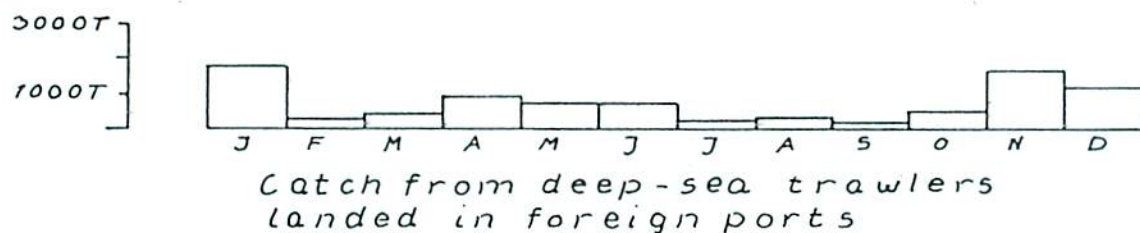
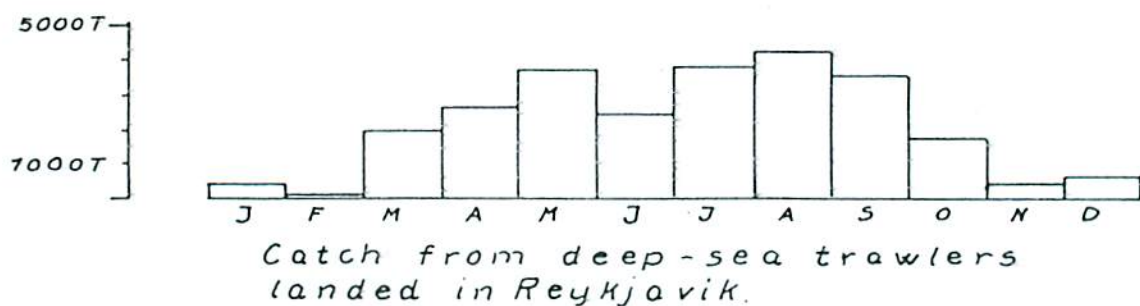


Figure 2

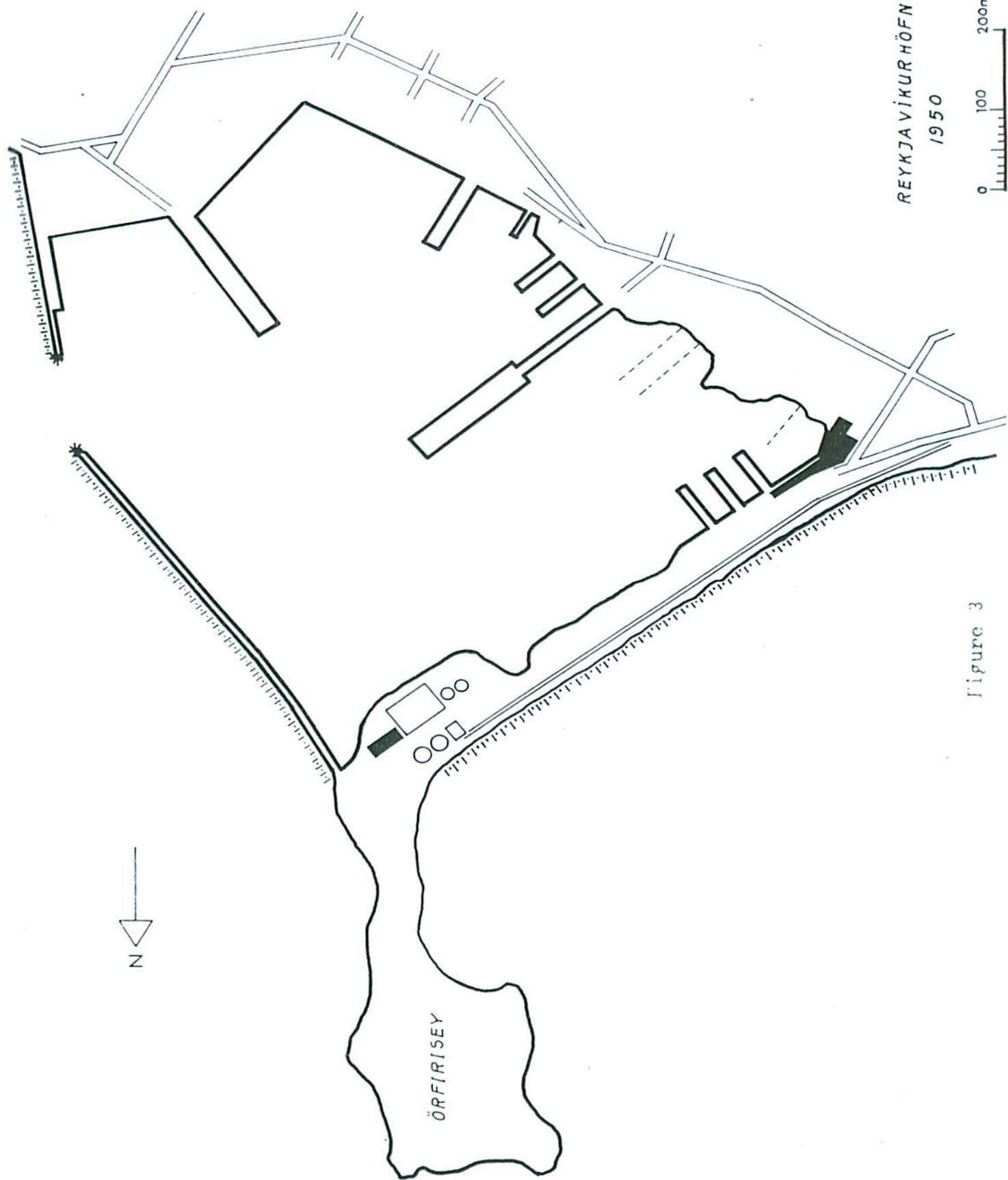


Figure 3

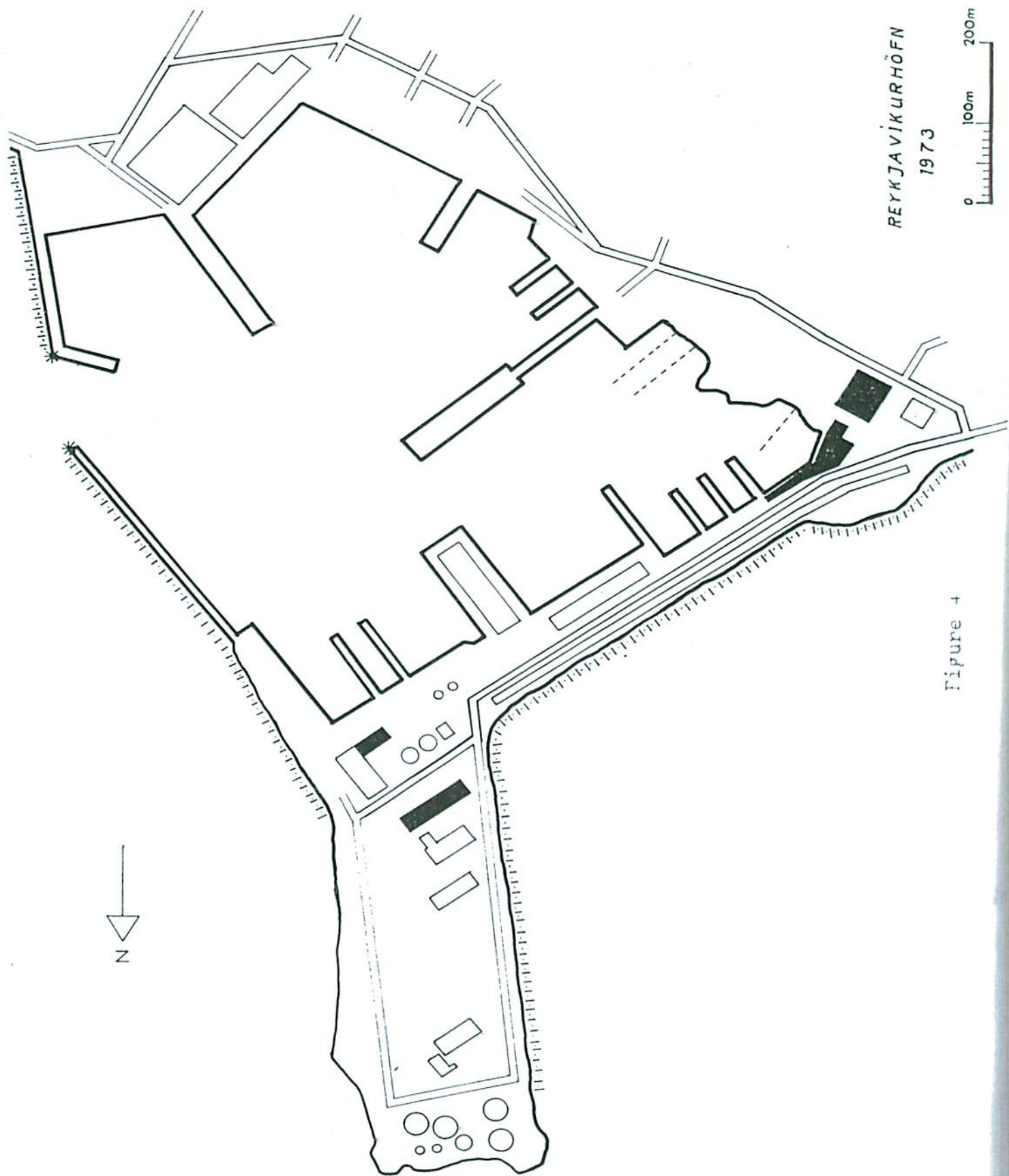


Figure 4

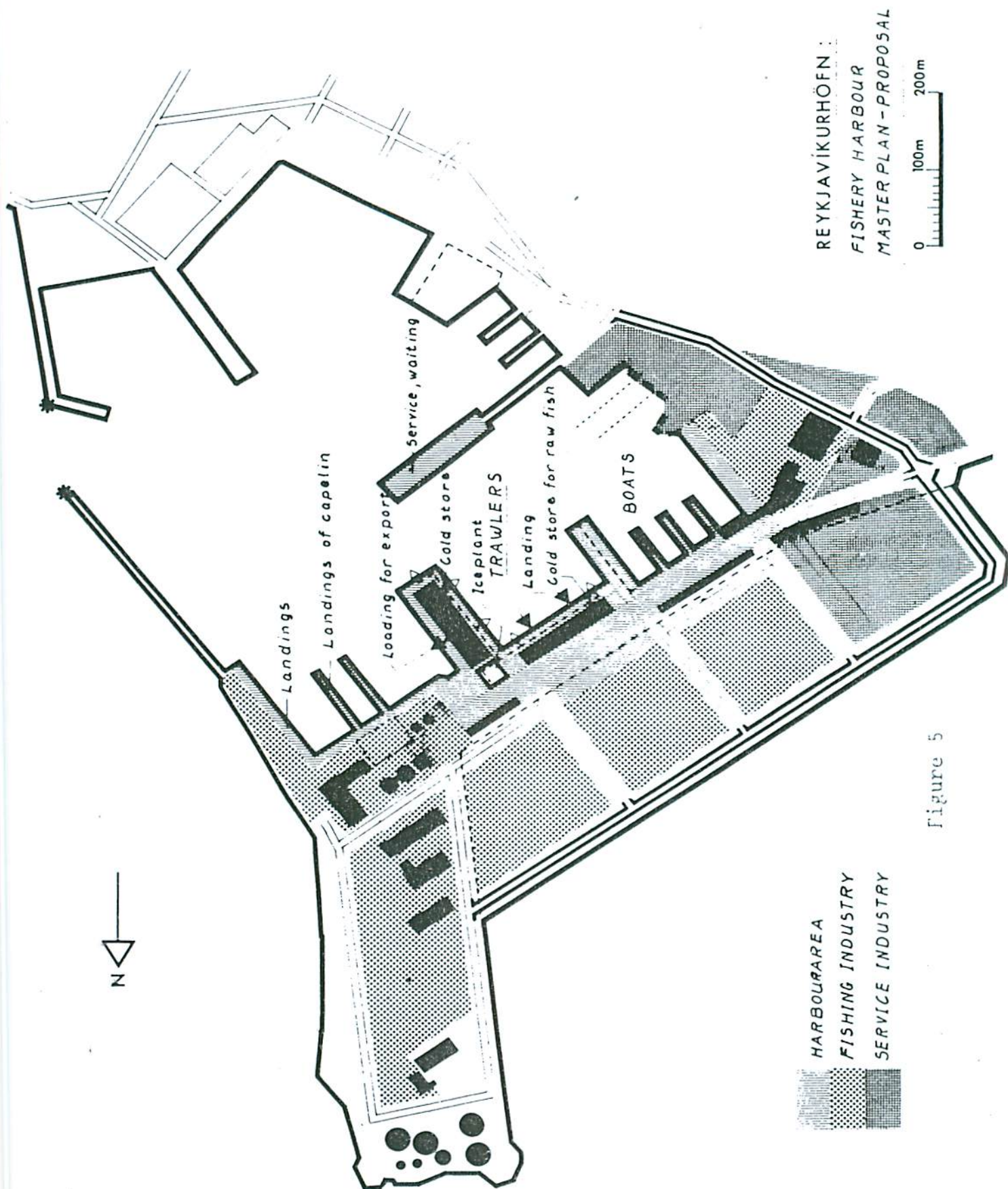


Figure 5

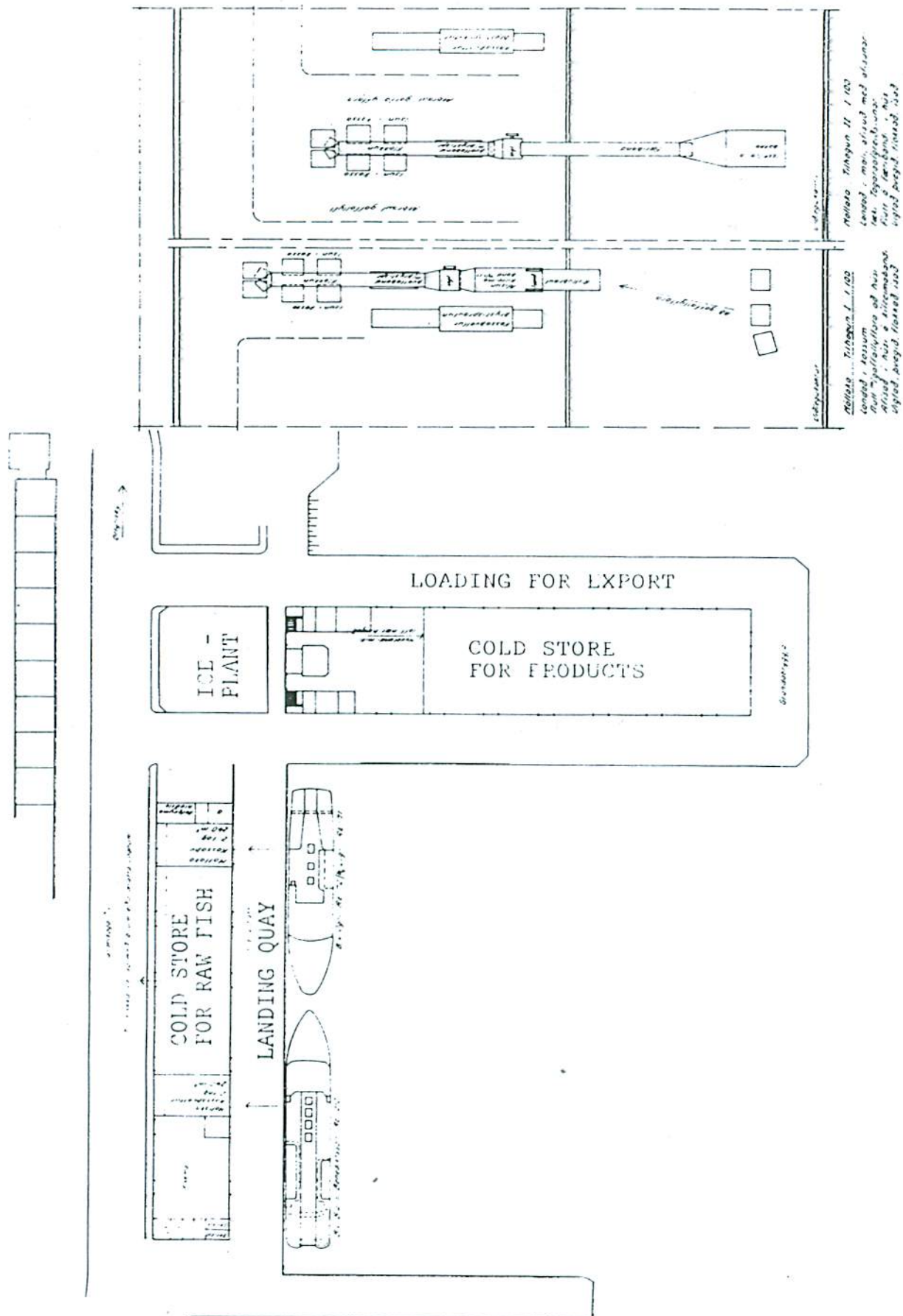


Figure 6

RECEIVING HALLS - DETAIL