

Necessary measures to be taken by the Government of Thailand.

1. To secure land necessary for the execution of the Project and provide enough space for such construction as temporary offices, working area, stockyard and others.

(The construction of the temporary road for the reclamation within the site and bridge across Klong Bang Aow Chak will be started in May and be completed in November 1987. Land reclamation and levelling within the site will be started in August and completed at the end of November 1987.)

2. To ensure that sea area necessary for the construction of the facilities be freely accessible.

3. To construct the roads outside the site to connect Pak Phanang town.

(The construction will be completed until the end of July 1987.)

4. To provide facilities for distribution of electricity, water supply, drainage and sewage, telephone and other incidental facilities up to the Project site. (These facilities will be completed its distribution line until the end of 1988.)

5. To ensure prompt unloading, tax exemption, customs clearance at ports of disembarkation in Thailand and prompt internal transportation therein of the products purchased under the grant.

6. To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in Thailand with respect to the supply of the products and services under the verified contracts.

7. To accord Japanese nationals whose services may be required in connection with the supply of the products and the services.

岸野昭雄

T. Sisenmai

under the verified contract such facilities as may be necessary for their entry into Thailand and stay therein for the performance of their work.

8. To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid.
9. To bear all the expenses including the periodical dredging, which will be carried out by the Department of Harbour, other than those to be borne by the Grant Aid.

岸野 昭雄

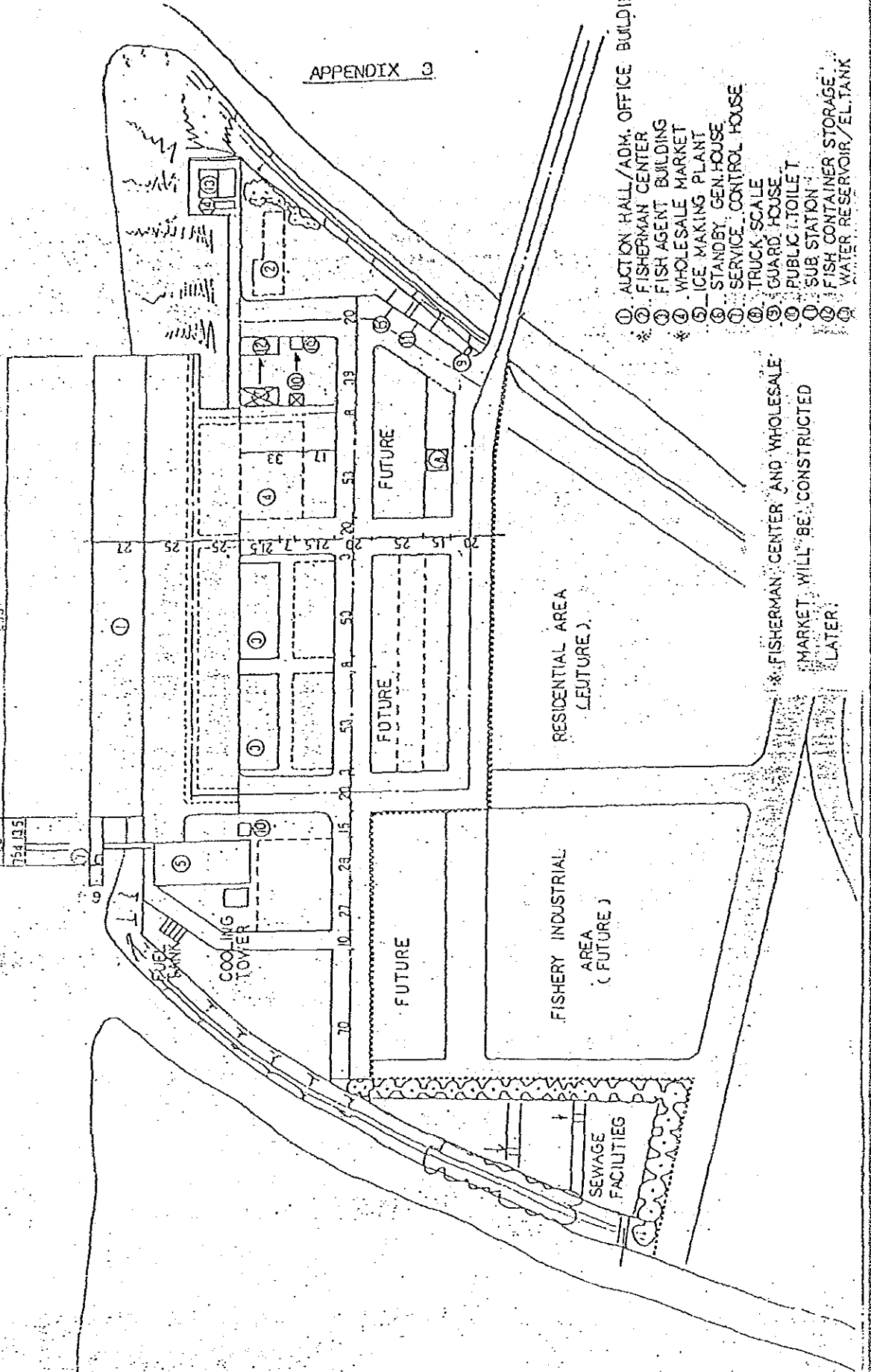
T. Sitemai

GENERAL PLAN OF NAKHON SI THAMMARAT FISHING PORT  
S. 1:1, 2000.



APPENDIX 3

SERVICE JETTY  
LANDING PIER  
253.



- ① AUCTION HALL/ADM. OFFICE BUILDING
- \* ② FISHERMAN CENTER
- \* ③ FISH AGENT BUILDING
- ④ WHOLESale MARKET
- ⑤ ICE MAKING PLANT
- ⑥ STANDBY GEN. HOUSE
- ⑦ SERVICE CONTROL HOUSE
- ⑧ TRUCK SCALE
- ⑨ GUARD HOUSE
- ⑩ PUBLIC TOILET
- ⑪ SUB STATION
- ⑫ FISH CONTAINER STORAGE
- ⑬ WATER RESERVOIR/EL. TANK

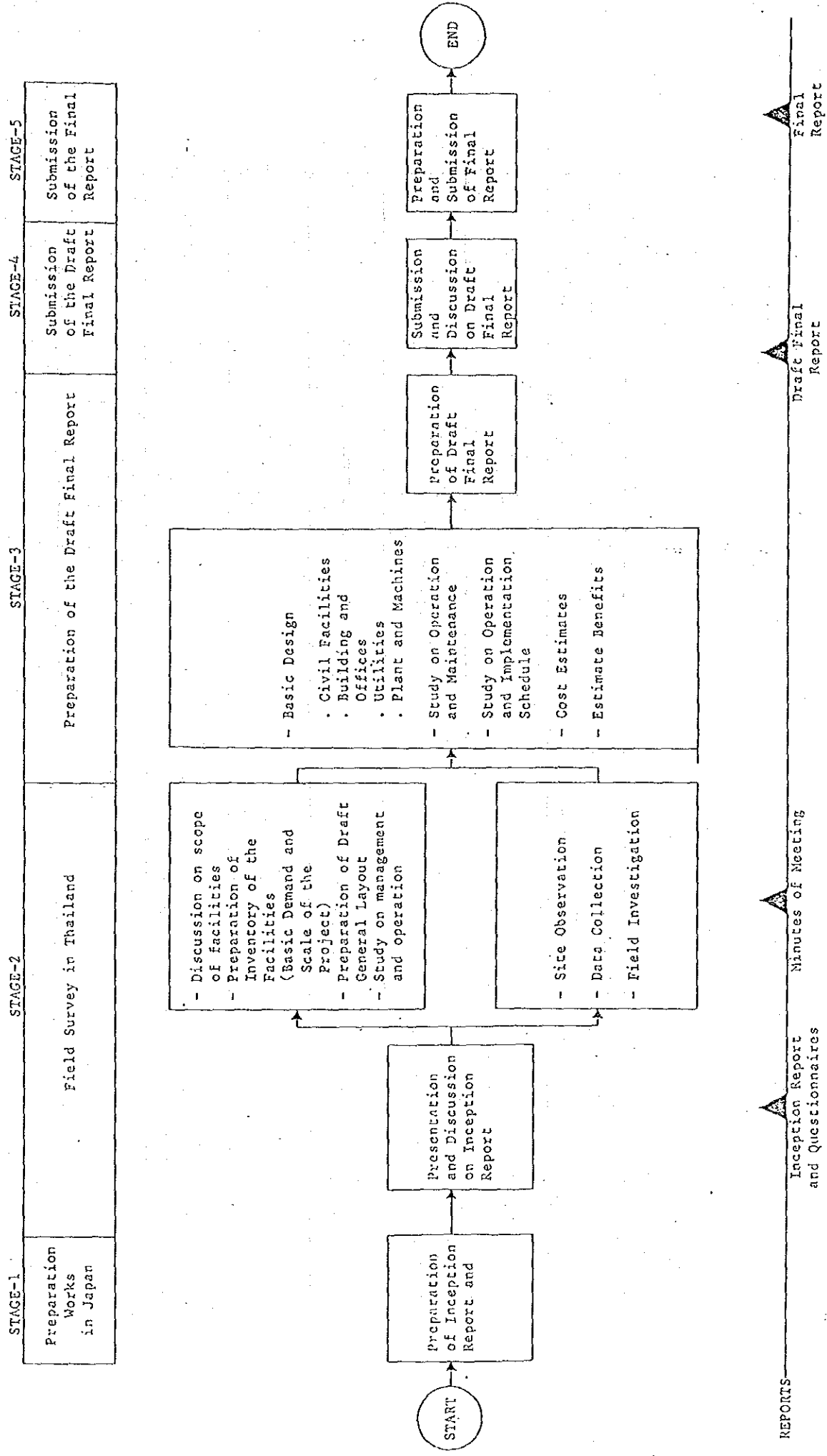
\* FISHERMAN CENTER AND WHOLESale MARKET WILL BE CONSTRUCTED LATER.

岩野昭雄

T. O. ...

# Attachment 1-4 : Flow chart of Basic Design Study

Flow Chart of Basic Design Study: Nakhon Si Thammarat Fishing Port Project



Attachment 1-5 : Study Schedule of Basic Design Study

Work Item in Stage	Year						
	Month	April	May	June	July	August	
Stage - 1 Preparation Works in Japan		—					
Stage - 2 Field Survey in Thailand		■					
Stage - 3 Preparation of the Draft Final Report			—				
Stage - 4 Submission and Explanation on the Draft Final Report					■		
Stage - 5 Preparation and Submission of the Final Report						—	

Remarks:

— Preparation      ■ Study works in Thailand      — Study works in Japan

Attachment 1-6 : Itinerary of Site Investigation

1) First Site Investigation (18 April~12 May 1987;for 25 days)

Date	Work	
	Team	Individuals
Apr. 18th	Arrival at Bangkok.	
19th	Presentation of Inception Report at FMO. Discussion of schedule and assistance. Visit to Samut Prakan.	Preparation for site investigation.
20th	Visit to JICA, EOJ, DTEC. Discussion on scope and Minutes with FMO.	Preparation for site investigation.
21th	Leave for Nakhon Si Thammarat. Visit to Surat Thani, Don Sak Sichon fishing part.	
22th	Visit to public work, governor. Data collection at Pak Phanang. Visit to project site.	Inspection of project site. Discussion of site investigation on soil, tide and current.
23th	Move to Bangkok. Discussion on Minutes.	Preparation of investigation. Start of tide observation.
24th	Discussion on Minutes with FMO Visit to NOA, MOH.	Visit Songkhla fishing port.
25th	Discussion on scale of facilities and work items with FMO.	Start soil and current observation.
26th	Sorting data. Visit ice and freezer factory.	Leave for Bangkok.
27th	Signing of Minutes of Meeting. Visit JICA, EOJ to reporting.	Data collection.
28th	Two officials leave for Japan.  Leave for Hat Yai. Visit ice factory, Songkhla Fishing Port.	Data adjustment.  Current observation finished.

29th	Visit Pattani F.P. Fish mill, cold storage and ice factory.	Collection of data.
30th	Visit Songkhla F.P. (morning auction and trash fish) Leave to Bangkok and Pak Phahang.	Soil investigation finished. Analysis of siltation, labor cost and material.
May 1st	Discussion of layout.	Pak Phanang. Fish agent interview Leave to chumphon.
May 2nd	Discussion of scale and layout of facilities	Visit Chumphon F.P. and move to Bangkok.
3rd	Sorting data. Adjustment of layout.	
4th	Discussion of forecast, layout and mainte. plan with FMO.	Discussion on dredging, mainte plan and data collection at DOH.
5th	Sorting data and reporting.	
6th	Confirmation of allocation and scale of facilities.	Visit auction at evening at Bangkok F.M. Data on material cost.
7th	Visit JICA and report process. Make list of facilities and equipment of FMO.	Data collection at DOF/NESDB/PAO.
8th	Discussion on building and utilities at FMO.	Data collection on siltation and soil. Tide observation finished.
9th	Visit Samut Sakhon F.P. and Samut Prakan.	Discussion on siltation and reclamation plan.
10th	Sorting data.	
11th	Data collection.	
12th	Leave to Japan	

2) Second Site Investigation  
 (27 July ~5 August 1987 ; for 10 days)

Date	Work	
	Team	Individuals
July 27th	Arrival at Bangkok	
28th	Courtesy call (JICA, DTEC, EOJ) and meeting with FMO. Submission and presentation of the Report.	
29th	Discussion with FMO on the Report.	
30th	Discussion with FMO and preparation for the Minutes of Discussion.	
31th	Signing of the Minutes of Discussion with FMO. Report to JICA and EOJ.	One official left for Japan.
Aug. 1th	Meeting among team.	One staff visited to the Project site to know the site condition till 2nd Aug.
2th	Same as above	One official left for Japan.
3th	Discussion with FMO on additional technical matters.	
4th	Same as above.	
5th	Leave to Japan.	





Attachment 2-1 : The Basic Sociologic Date

1) Provincial Date

	Population (million )	Area ( km )	Population Density (person/km)	GDP 1982 (million Bath)	Per capita GDP (Bath)
Country	48.5 (100.0)	513,115 (100.0)	94	858,371 (100.0)	17,702
North-Eastern	17.2 ( 35.4)	168,854 ( 32.9)	102	109,604 ( 12.8)	6,390
Northern	10.0 ( 20.6)	169,644 ( 33.1)	59	114,366 ( 13.3)	11,434
Southern	6.0 ( 12.4)	70,715 ( 13.8)	85	86,275 ( 10.1)	14,376
Western	3.3 ( 6.7)	46,088 ( 9.0)	71	84,392 ( 9.8)	25,847
Central	2.9 ( 6.0)	18,742 ( 3.7)	155	61,046 ( 7.1)	20,999
Bangkok,Thonburi	5.5 ( 11.4)	1,565 ( 0.3)	3,539	281,317 ( 32.8)	50,779

Source : NESDB, Gross Regional and Provincial Product 1981 - 82.

Actual Growth Rate (1971/72/-78/79)

(unit : %)

	Production	Agriculture
Contry	7.8	7.2
North-Eastern	6.7	5.5
Northern	6.0	5.4
Central	8.1	8.6
Southern	9.7	9.4

Source : NESDB

No. vtp. 0504/777

Office of the National Environmental Board

February 11, 1980

Subject : Nakhon Si Thammarat Fishing Port Construction Project

To : Director  
Fish Marketing Organization

Reference : Fish Marketing Organization's letter  
No. ks. 1703/8018, dated August 29, 1979

Enclosure : 1. Copy of National Environmental Board's letter  
No. vtp. 0504/610, dated February 6, 1980

2. Evaluation Report of the primary effect from  
Nakhon Si Thammarat Fishing Port Construction Project

Referring to FMO's letter No. ks. 1803/8018, dated August 24, 1979 requesting the National Environmental Board to study the feasibility of Nakhon Si Thammarat Fishing Port Project in the national forest reserves in Klongnoi Sub-District, Pak Pahnang District, Nakhon Si Thammarat Province and to present the supporting opinion to the Forest Department. We would like to advise you that we have already sent our officers to study the surrounding environment. Evaluation report of the primary effect from Nakhon Si Thammarat Fishing Port Construction Project is herewith, enclosed.

The National Environmental Board deems that this Project is suitable and should be supported and FMO should cooperate with the Harbour Department and the Provincial Administration Office in seeking proper measures to minimize the direct effect from channel dredging and the growing community development in the nearby area. The culvert laying operation should be carefully planned to suit the natural circulation of the water. Otherwise it will be an obstacle against the water passage, causing death to the mangrove forest as it had happened in the road construction to Satun Fishing Port. Moreover, the polluted water and garbage disposal must be considered in the first stage planning of the operation to prevent the forthcoming effect to the Pak Phanang water resources on the public water consumption and deteriorating the mangrove swamp which is an affluent resources. The mentioned environment problems will be not shown in the earlier stage but in the long run. Therefore, it is necessary to have a careful consideration in order to provide sufficient protection and control for the national resources to its best for the public benefits.

The National Environmental Board will be glad to cooperate with FMO for mutual planning to protect any deterioration which may be happened. For the mentioned national forest reserves appropriation, our office has already proceeded our supporting opinion to the Forest Department as shown in the enclosed copy.

Yours sincerely

Mr. Kasem Sanitwong  
Secretary of the National  
Environmental Board

อ. คัดสรรหาปลา
วันที่..... 11/42
วันที่..... 13 ก.พ. 93
เวลา..... 14.00

ที่ วทพ.๐๕๐๘/นพ.๗๗

สำนักงานคณะกรรมการสิ่งแวดล้อมแห่งชาติ

*Office of the National Ecological*  
*Policy Development Authority*

๑๑ กุมภาพันธ์ ๒๕๒๓

เรื่อง โครงการสร้างท่าเทียบเรือประมงนครศรีธรรมราช

เรียน ผู้อำนวยการองค์การสะพานปลา

อ้างถึง หนังสือองค์การสะพานปลา ที่ กส.๑๘๐๓/๒๐๑๔ ลงวันที่ ๒๕ สิงหาคม ๒๕๒๒

- สิ่งที่ส่งมาด้วย
๑. สำเนาหนังสือสำนักงานคณะกรรมการสิ่งแวดล้อมแห่งชาติ ที่ วทพ.๐๕๐๘/๖๑๐ ลงวันที่ ๖ กุมภาพันธ์ ๒๕๒๓
  ๒. รายงานการวิเคราะห์ผลกระทบเบื้องต้นโครงการสร้างท่าเทียบเรือประมงนครศรีธรรมราช

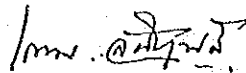
ตามที่องค์การสะพานปลาได้มีหนังสือ ที่ กส.๑๘๐๓/๒๐๑๔ ลงวันที่ ๒๕ สิงหาคม ๒๕๒๒ ขอให้สำนักงานคณะกรรมการสิ่งแวดล้อมแห่งชาติพิจารณาความเหมาะสมและความจำเป็นที่จะก่อสร้างท่าเทียบเรือประมงนครศรีธรรมราช ในพื้นที่ป่าสงวนแห่งชาติ ตำบลคลองน้อย อำเภอปากหนัง จังหวัดนครศรีธรรมราช และให้ส่งความเห็นสนับสนุนการขอใช้ที่ดินป่าสงวนแห่งชาตินี้ไปยังกรมป่าไม้ความคืบหน้าถึงไต่ถามแล้วนั้น สำนักงานได้จัดส่งเจ้าหน้าที่ไปสำรวจและศึกษาข้อมูลสภาพแวดล้อมบริเวณดังกล่าวและได้ประเมินผลกระทบวิเคราะห์สิ่งแวดล้อมเบื้องต้นที่จะเกิดจากโครงการสร้างท่าเทียบเรือประมงนครศรีธรรมราช ดังในรายงานที่แนบมาด้วยนี้

สำนักงานฯ เห็นสมควรสนับสนุนโครงการดังกล่าวขององค์การสะพานปลาและเห็นว่าองค์การสะพานปลาควรขอความร่วมมือจากกรมเจ้าท่าและองค์การบริหารส่วนจังหวัดในอันที่จะหามาตรการลดหรือหลีกเลี่ยงผลกระทบที่จะเกิดจากการขุดลอกร่องน้ำและการพัฒนาชุมชนในบริเวณใกล้เคียง และสำหรับการคัดถนนของโครงการควรพิจารณากำหนดจำนวนและการวางท่อออกให้เหมาะสมกับการขุดลอกของระกุ่มน้ำตามธรรมชาติ เพื่อมิให้ถนนกลายเป็นอุปสรรคกีดขวางทางน้ำ และมีผลให้ไม้ชายเลนตายไต่ถึงกรณีการคัดถนนเข้าสู่ท่าเทียบเรือประมงจังหวัดสตูล อีกทั้งปัญหาการกำจัดขยะและน้ำเสียของโครงการควรใช้มาตรการพิจารณาในชั้นวางแผนและเริ่มดำเนินการ เพื่อป้องกันมิให้เกิดผลกระทบรุนแรงแก่แหล่งน้ำปากหนัง ในแง่การใช้หน้าเพื่ออุปโภคบริโภคของประชาชนและการทำลายระบบนิเวศน์ช่วยเลนชั้นเป็นทรัพยากรที่ให้ผลผลิตอย่างอุดมสมบูรณ์ ปัญหาสิ่งแวดล้อมดังกล่าวนี้แม้มิได้แสดงผลในระยะแรกเริ่มแต่เป็นปัญหาในระยะยาวที่ก่อการพิจารณาพิจารณา มาตรการวางอย่างรอบคอบ ในอันที่จะปกป้องและคุ้มครอง

ทรัพย์สินเพื่อประโยชน์สุขของประชาชน และในกรณีนี้สำนักงานอื่นที่ประสานงานกับองค์การ  
สหภาพปลาในการที่จะช่วยกันวางแนวป้องกันผลกระทบสิ่งแวดล้อมอันอาจจะเกิดขึ้น อันึ่ง สำหรับ  
การใช้ที่ดินในเขตป่าสงวนแห่งชาติบริเวณดังกล่าว สำนักงานฯ ได้มีหนังสือขออนุญาตการใช้ที่ดิน  
ป่าสงวนแห่งชาติแปลงนี้ไปยังกรมป่าไม้แล้ว ทั้งสำเนาที่แนบมาด้วยนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถืออย่างสูง



(นายเกษม สนิทวงศ์)

เลขาธิการคณะกรรมการสิ่งแวดล้อมแห่งชาติ

กองวิเคราะห์ผลกระทบสิ่งแวดล้อม

โทร. ๒๗๘๒๗๕๒

Attachment 2-3 : Letter of The Forest Department

No. ks. 1715(3)/21080

Forest Department

November 22, 1982

Subject : The request for permission of FMO for using the national forest reserves in western Pak Phanang mangrove swamp for constructing of the fishing port and other related facilities

To : Director  
Fish Marketing Organization

Reference : Forest Department's letter No. ks. 1711(3)/3157, dated February 17, 1982

Enclosure : Copy of Forest Department's letter No. ks. 1715 (3)/21078, dated November 22, 1982 of the above subject

We are submitting herewith, a copy of our letter dated November 22, 1982. Please send your officer to contact the Regional Forest Department Office for the testimonial and acknowledgement of the 9 conditions practice.

Yours sincerely,

Mr. Somperm Kittinond  
Deputy Director-General  
(for Director-General)

Ruling conditions to allow FMO to use the national forest reserves in western Pak Phanang mangrove swamp, Klongnoi Sub-District, Pak Phanang District, Nakhon Si Thammarat Province in the area of 115 rai for constructing of the fishing port and other related facilities.

1. The recipient must not do or allow any agent or worker or labourer to commit any action harmful or deteriorate to the natural state of forest, trees or wild life beyond the permitted area.

2. The recipient must strictly operate in compliance with the Forest Law, the National Park Law or the Wild Life Protection Law including the existing Ministry Regulation, Restrictions, Notifications, Rulings as issued under the related laws, either legally effective at present or in the forthcoming promulgation.

3. The permanent signboards of the appropriate size for easy observation must be fixed along the border of the permitted area, with the words " Fish Marketing Organization is legally permitted to appropriate the land use in the national forest reserves."

4. The recipient must allow the Forest Inspector to examine the operation under the permission conditions at any time in the permitted area.

5. Using of the land must be in compliance with the permitted operation only.

6. The recipient must keep constant watch for forest intrusion along the surrounding site or in the permitted passage. Any violation made against the related laws must be immediately reported by the recipient to the Regional Forest Department Office.

7. Demarcation posts or similar signs must be put on every permitted location and must be clearly seen.

8. The recipient must operate by itself. If it is done by its authorized agent, the recipient must be responsible for all damages caused by the said agent.

9. If the ruling conditions have not been exercised as above mentioned by the recipient, the Forest Department as authorized by the Minister, Ministry of Agriculture and Cooperatives is eligible to cancel the existing permit through the effect that the recipient has no legal right to undertake legal action for its claim from the Forest Department.

Mr. Smann Phupae  
Chief, Land Utilization Section

Memorandum

Nakhon Si Thammarat Regional Forest Office

April 22, 1983

The Fish Marketing Organization (by the Director of the Fish Marketing Organization) is permitted to use the land in the national forest reserves in western Pak Phanang, Klongnoi Sub-District, Pak Phanang District, Nakhon Si Thammarat Province in the area of 115 rai for constructing of the fishing port and other related facilities for the interim period until the Forest Abrogation Regulation is fulfilled. It is hereby acknowledged and agreed to practice according to the 9 ruling conditions.

This memorandum is made and signed as a testimonial evidence.

(Signed) Mr. Tongbai Sirimai (The Recipient)  
Director  
Fish Marketing Organization

(Signed) Mr. Prasong Wipulanusart  
Acting Chief,  
Nakhon Si Thammarat Regional Forest Office

(Signed) Mr. Jarun Narkton  
Witness

(Signed) Mr. Niran Puttan  
Witness





วันที่	5/10
วันที่	25/10/56
เวลา	9.00น.

ที่ กส.๑๓๑(๓)/๒๑๐๕๖

กรมป่าไม้

๒๒ พฤศจิกายน ๒๕๕๕

เรื่อง องค์การสหประชาชาติ ขอเจ้าหน้าที่ประโยชน์ในเขตป่าสงวนแห่งชาติ ป่าเต็งยางกึ่งป่าเบญจพรรณ เพื่อสำรวจหาเห็ดเบ็ดประมงและกิจการอื่น ๆ ของที่จังหวัดนครศรีธรรมราช

เรียน ผู้อำนวยการองค์การสหประชาชาติ

อ้างถึง หนังสือกรมป่าไม้ ที่ กส.๑๓๑(๓)/๓๐๕๗ ลงวันที่ ๑๗ กุมภาพันธ์ ๒๕๕๕

สิ่งที่ส่งมาด้วย สำเนาหนังสือกรมป่าไม้ ที่ กส.๑๓๑(๓)/๒๑๐๕๖ ลงวันที่ ๒๒ พฤศจิกายน ๒๕๕๕ เรื่อง องค์การสหประชาชาติ ขอเจ้าหน้าที่ประโยชน์ในเขตป่าสงวนแห่งชาติ ป่าเต็งยางกึ่งป่าเบญจพรรณ เพื่อสำรวจหาเห็ดเบ็ดประมง และกิจการอื่น ๆ ของที่จังหวัดนครศรีธรรมราช (ไม่มีสิ่งที่ส่งมาด้วย)

กรมป่าไม้หรือส่งสำเนานหนังสือกรมป่าไม้ ถึงจังหวัดนครศรีธรรมราช ความสิ่งที่ส่งมาด้วย เว้นแต่เพื่อทราบและโปรดมอบหมายเจ้าหน้าที่ที่เกี่ยวข้องไปติดต่อขออนุญาตจังหวัดนครศรีธรรมราช (สำนักงานป่าไม้จังหวัดนครศรีธรรมราช) เพื่อทำบันทึกพร้อมของที่จะปฏิบัติตามเงื่อนไขในการอนุญาตต่อไป

ขอแสดงความนับถืออย่างสูง

(นายทองแท้) กิตติพันธ์

รองอธิบดี รักษาราชการแทน  
อธิบดีกรมป่าไม้

กองจัดการที่ป่าสงวนแห่งชาติ

โทร.๕๓๕๕๕๕

๒๕/๑๐/๕๖

เงื่อนไขในการอนุญาตให้ สงเคราะห์สงเคราะห์ปลา.....  
 เจ้าท่าประจวบในเขตสงวนแห่งชาติ ป่าเขาปากน้ำปึงทะเลอันดามัน.....  
 กองที่ท่าบล. กอ.อ.น.บ. .... อำเภอ ปากน้ำ ..... จังหวัด นครศรีธรรมราช.....  
 เนื้อที่ ..... ไร่ ..... งาน ..... ตารางวา เพื่อ สงเคราะห์เห็นเรือประมงและกิจการ .....

(๑) ต้องไม่ทำการหรือยินยอมให้ผู้อื่น ค่นงาน หรืออุทธรณ์ กระทำการอย่างหนึ่งอันทำให้เป็นการเสื่อมเสียแก่สงเคราะห์ ปลา ไม้ หรือของป่า นอกเขตพื้นที่ที่ได้รับอนุญาต

(๒) ผู้รับอนุญาตต้องปฏิบัติตามกฎหมายว่าด้วยป่าไม้ กฎหมายว่าด้วยสงวนแห่งชาติ กฎหมายว่าด้วยอุทยานแห่งชาติ หรือกฎหมายว่าด้วยสงวนและคุ้มครองสัตว์ป่า ตลอดจนกฎกระทรวง ข้อบัญญัติ ประกาศพระบรมราชโองการ หรือเงื่อนไข ซึ่งออกตามกฎหมายดังกล่าว ทั้งที่ใช้อยู่ในขณะนั้น และที่จะประกาศใช้บังคับต่อไป

(๓) ต้องจัดทำป่าดงดิบที่มีขนาดโคกหรือจะ เนินโคกหรือเนินดินไว้โดยรอบบริเวณที่ได้รับอนุญาต ในมีระนาบทางลาดชันด้วย โดยระบุชื่อสถานที่ป่าดงดิบ ..... สงเคราะห์สงเคราะห์ปลา ..... ได้รับอนุญาตให้ใช้พื้นที่ป่าสงวนแห่งชาติทุ่งกุลาผืนแรก

(๔) ต้องยินยอมให้เจ้าหน้าที่ป่าไม้เข้าไปตรวจสอบการปฏิบัติตามเงื่อนไขการอนุญาตในพื้นที่ที่ได้รับอนุญาตได้ทุกโอกาส

(๕) ต้องใช้พื้นที่บริเวณที่ได้รับอนุญาตเพื่อกิจการที่ขอลาอนุญาตเท่านั้น จะนำไปใช้ในกิจการอื่นไม่ได้


(๖) ผู้รับอนุญาตต้องคอยสอดส่องตรวจการละเมิดกรณีไม่มีไม้การปลูกทุกแนวตรงน้ำในบริเวณที่ขอลาได้เลี้ยงหรือชาวแนวทาง เจ้าท่าประจวบที่ได้รับอนุญาต ถ้ามีการกระทำผิดกฎหมายเกี่ยวกับป่าไม้ บุคคลในบริเวณดังกล่าว ผู้รับอนุญาตต้องแจ้งให้พนักงานเจ้าหน้าที่ป่าไม้แห่งท้องที่ทราบทันที

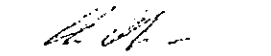
(๗) ผู้รับอนุญาตต้องจัดหาไม้ค้ำยันหรือเครื่องหน่วงแสงแนวเขตที่ได้รับอนุญาตไว้ทุกด้านในเห็นโคกโดยชัดเจน

(๘) ผู้รับอนุญาตต้องทำเนียบการเอง ในกรณีต้นขงมาในพื้นดินเป็นผู้นำเนียบการ หากเกิดความเสียหายใด ๆ ขึ้น ผู้รับอนุญาตต้องรับผิดชอบในการดำเนินกิจการที่ขอลาอนุญาตที่ได้รับอนุญาตทั้งสิ้น

(๙) หากผู้รับอนุญาตไม่ปฏิบัติตามเงื่อนไขดังกล่าวข้างต้น กรมป่าไม้โดยอธิบดีหรือหัวหน้าราชการกระทรวงเกษตรและสหกรณ์ จะสั่งเพิกถอนหนังสืออนุญาตเห็นที่โคก โดยผู้รับอนุญาตจะฟ้องร้องเรียกค่าเสียหายในกรณีใด ๆ จากกรมป่าไม้ไม่ได้

ขอรับรองว่าไม่ฉ้อฉลจากต้นฉบับจริง.

  
 เจ้าท่าประจวบ

  
 (นายเสนา นุสพ)  
 หัวหน้าฝ่ายไร่ประจวบ

มติ

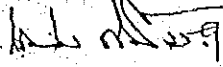
สำนักงานป่าไม้จังหวัดนครราชสีมา

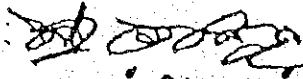
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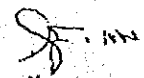
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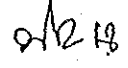
องค์การสหภาพฯ (โดยผู้ดำเนินการขององค์การสหภาพฯ) ผู้ได้รับอนุญาต  
ประโคม ในเขตป่าสงวนแห่งชาติ ป่าเขาพนมรุ้งจังหวัดบุรีรัมย์ มีข้อพิพาทของนาย ชำนาญ  
ปานอง เจ้าหน้าที่กรมการป่าไม้ เป็นเหตุให้ต้องยุติการประโคม และเลิกการอื่น ๆ ภายในพื้นที่  
ที่ ๖๖ ไร่ เป็นการชั่วคราว จนกว่าจะเลิกข้อพิพาทป่าสงวนฯ ได้พิจารณาและดำเนินการที่จะยุติ  
การประโคมในคราวต่อไป รวม 9 ข้อ ขุดและการ

จึงทำบันทึกไว้เป็นหลักฐานและลงนามไว้เป็นสำคัญ.

(ลงชื่อ)  ผู้รับอนุญาต  
( นายชำนัญญู ปานอง )  
ผู้ดำเนินการขององค์การสหภาพฯ

(ลงชื่อ)   
( นายประจักษ์ วิษุวัตยาน )  
ผู้อำนวยการในตำแหน่งป่าไม้จังหวัดนครราชสีมา

(ลงชื่อ)  นาย  
( นายรัฐ นากน )

(ลงชื่อ)  นาย  
( นายนิพนธ์ ทนทา )

Attachment 2-1 : Reference Data of Fisheries in Thailand

Table 1 : Fish Catches in Thailand

Year	(unit: 1,00 ton)							
	1977	1978	1979	1980	1981	1982	1983	1984
Marine fish	2,067 (94%)	1,958 (93%)	1,813 (93%)	1,648 (92%)	1,824 (92%)	1,987 (94%)	2,100 (93%)	1,973 (92%)
Freshwater fish	122 (6%)	141 (7%)	133 (7%)	145 (8%)	165 (8%)	134 (6%)	155 (7%)	162 (8%)
Total	2,189	2,099	1,946	1,793	1,989	2,121	2,255	2,135

Figure in parenthesis shows a proportion to total.

Source : Department of Fisheries, Thailand

Table 2 : Fish Catch and Number of Registered Fishing Boats

Year	(unit: catch (1,000 ton)) ( : boats (units) )					
	1977			1984		
	Catch	No. of boats	Catch /boat	Catch	No. of boats	Catch /boat
Trawl fishing	1,219	5,834	0.21	1,017	9,131	0.11
Purse seine fishing	437	562	0.78	517	961	0.54
Gill net fishing	46	545	0.08	85	510	0.17

Note: Gill net fishing includes only king mackerel gill net and mackerel encircling gill net fishing.

Source : Department of Fisheries, Thailand

Table 3 : CPUE of Trawl Fishery in the Gulf of Thailand

Year	(unit: kg/hour)				
	1961	1969	1975	1980	1984
CPUE	249.88	102.74	46.99	47.92	49.67

Source : Department of Fisheries, Thailand

Table 4 : Fish Landing Variation by Region

		(unit: 1,000 ton)							
Region	Year	1977	1978	1979	1980	1981	1982	1983	1984
Eastern		238 (11.5)	194 (9.9)	144 (7.9)	123 (7.5)	163 (8.9)	222 (11.2)	257 (12.2)	225 (11.4)
Central		884 (42.8)	846 (43.2)	750 (41.4)	628 (38.1)	668 (36.6)	561 (28.2)	600 (28.6)	585 (29.7)
Southern (east coast)		602 (29.1)	593 (30.3)	600 (33.1)	556 (33.7)	634 (34.8)	778 (39.2)	821 (39.1)	821 (41.6)
Southern (west coast)		343 (16.6)	325 (16.6)	319 (17.6)	341 (20.7)	359 (19.7)	426 (21.4)	422 (20.1)	342 (17.3)
Total		2,067	1,958	1,813	1,648	1,824	1,987	2,100	1,973

Figure in parenthesis shows a proportion to total.

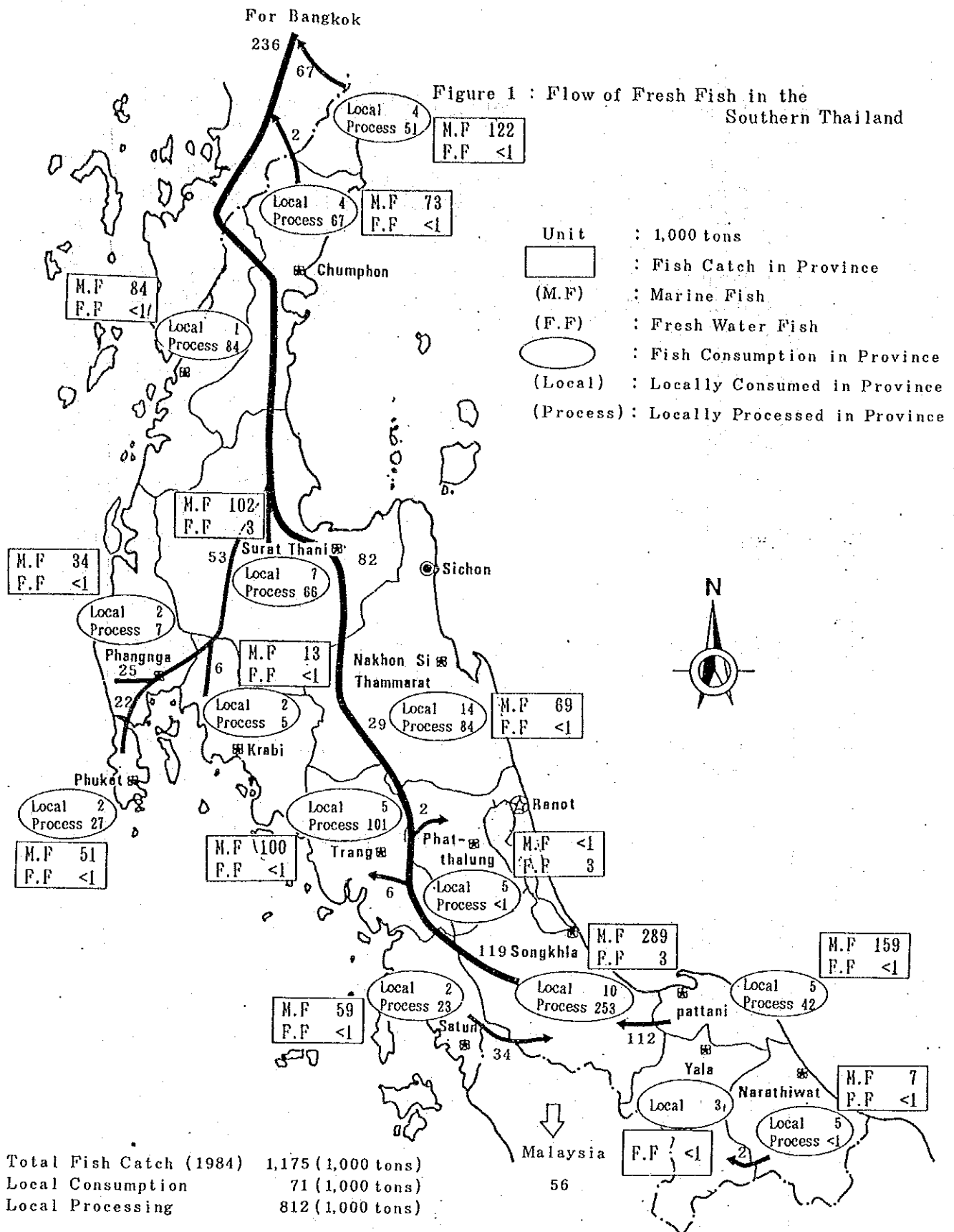
Source : Department of Fisheries, Thailand

Table 5 : Number of Registered Fishing Boats by Region

Region	Year	1981	1982	1983	1984	1985	Average
Eastern		1,942	2,553	2,076	1,939	3,608	2,424 (14.3)
Central		3,538	4,603	4,032	4,000	4,437	4,122 (24.3)
Southern (east coast)		6,946	9,600	8,951	7,862	6,350	7,942 (46.9)
Southern (west coast)		2,207	2,942	2,241	2,200	2,406	2,399 (14.2)
Others		90	58	86	5	19	52 (0.3)
Total		14,723	19,756	17,386	16,006	16,820	16,939

Figure in parenthesis shows a proportion to total.

Source : Department of Fisheries, Thailand



Note) Local consumption volume is estimated based on 10 kg/year of per capita fresh fish consumption and population in 1986 (not including consumption of processed products)

Source : Department of Fisheries, Thailand

Table 6 : Current Status of FMO's Fishing Port and Fish Market

Name of Fish Market/ Fishing Port	Opening year	1985's Fish landing (ton/year)	Length of landing pier(m)	No. of calling boats per day	Moorings of calling boats (boats /time)	Degree of congestion (%)	Area for sorting & auction (m <sup>2</sup> )	Fish vol. handled per m <sup>2</sup> parking lot(m <sup>2</sup> )	Area of roads & trucks per calling trucks per day (m <sup>2</sup> /unit)	No. of calling trucks per day	Area per truck
Bangkok Fish Market	1953	128,751	245	-	-	-	5,681	63	12,530	826	15
Samut Sakhon Fish Market	1969	107,469	143	17	18	94	1,272	235	5,200	293	18
Samut Prakan Fish Market	1982	84,409	177	14	14	100	4,578	51	5,840	158	37
Trat Fishing Port	1968	(NA)	104	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
Hua Hin Fishing Port	1965	24,881	250	66	35	189	546	127	1,800	15	120
Pranburi Fishing Port	1967	(NA)	26	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
Ranong Fishing Port	1964	29,727	98	12	16	75	950	87	(NA)	10	(NA)
Surat Thani Fishing Port	1969	19,786	99	5	16	31	600	92	1,717	11	156
Songkhla Fishing Port	1954	164,919	227	30	24	125	3,718	123	3,898	32	122
Pattani Fishing Port	1982	110,189	200	17	16	106	762	402	1,180	155	8
Phuket Fishing Port	1974	12,970	181	6	7	86	3,077	12	3,150	10	315
Satun Fishing Port	1975	9,942	93	8	12	67	(NA)	(NA)	1,441	5	288
Chumporn Fishing Port	1982	18,025	99	6	16	38	84	84	(NA)	4	(NA)

Source : Fish Marketing Organization (FMO)

**Attachment 3-1 : Estimate of Number of Pak Phanang's Fishing Boats**

The number of fishing boats in Pak Phanang was calculated by using statistical data available, the results of a questionnaire survey and on-site questions to fishermen. This procedure was necessary because of the large number of unregistered fishing boats not included in DOP's statistical data.

- (1) The total number of fishing boats, including both registered and unregistered boats in Pak Phanang (Survey Report 1986 made by the Pak Phanang Chamber of Commerce):

Type of boat	No. of boats	Power
Otter board trawler	907	In-board
Pair trawler	54 (27 pairs)	"
King mackerel gill netter	5	"
Shrimp gill netter	286	Out-board (partly out-board)
Push netter	306	Out-board

- (2) Estimated number of fishing boats by length, equipped with Inboard engines:

The number of fishing boats to be estimated is presented by the factors "a" to "i" as follows.

Type of boat	<14m	14-18m	18-25m
Otter board trawler	a	b	c
Pair trawler	d	e	f
King mackerel gill netter	g	h	i

Note : The maximum length of Pak Phanang's boats is 25 meters according to the on-site survey.

The following formulas are brought out from the above two tables.

$$a + b + c = 907 \dots\dots(1)$$

$$d + e + f = 54 \dots\dots(2)$$

$$g + h + i = 5 \dots\dots(3)$$



From the on-site survey the total number of fishing boats of a length of over 14 meters is about 600.

$$b + c + e + f + h + i = 600 \dots\dots(4)$$

According to the results of the questionnaire survey, the breakdowns of the sampled 294 boats are as follows:

Type of boat	<14m	14-18m	18-25m	Total
Otter board trawler	-	88	187	275
Pair trawler	-	2	14	16
King mackerel gill netter	-	1	2	3
Total	-	91	203	294

The number of registered fishing boats in 1983 was as follows:

Type of boat	<14m	14-18m	18-25m	Total
Otter board trawler	15	136	291	442
Pair trawler	-	20	-	20
King mackerel gill netter	-	1	4	5
Total	15	157	295	467

Note : Other types of boats are not included in the above, since they are mostly equipped with outboard engines.)

From the above two tables,

$$b : c = 88 : 187 \dots\dots(5)$$

$$e : f = 20 : 14 \dots\dots(6)$$

$$h : i = 1 : 4 \dots\dots(7)$$

$$d = 0 \dots\dots(8)$$

$$g = 0 \dots\dots(9)$$

By inserting formulas (8) and (9) into formulas (2) and (3),

$$e + f = 54 \dots\dots(10)$$

$$h + i = 5 \dots\dots(11)$$

By inserting formulas (10) and (11) into formula (4),

$$b + c = 541 \dots\dots(12)$$

From formulas (5) and (12),  $b = 173$ ,  $c = 368$

From formulas (6) and (10),  $e = 32$ ,  $f = 22$

From formulas (7) and (11),  $h = 1$ ,  $i = 4$

By inserting the above into formula (1),  $a = 366$

Thus, the current number of fishing boats in Pak Phanang is as follows:

Type of boat	<14m	14-18m	18-25m	Total
Otter board trawler	366	173	368	907
Pair trawler	-	32	22	54
King mackerel gill netter	-	1	4	5
Shrimp gill netter	286	-	-	286
Push netter	306	-	-	306
Total	958	206	394	1,558

**Attachment 3-2 : Reference Data of Fisheries and Fish Marketing  
in the Project Region**

**Table 1 : Registered Fishing Boats (Over 14 Meter Long) in Pak Phanang**

Type of boat	No. of registered boats					Actual Percentage	
	1982	1983	1984	1985	1986	No. of registered boat (1986)	boat (%)
Otter board trawler	353	427	416	414	305	541	56%
Pair trawler	15	20	20	18	15	54	28%
Beam trawler	-	-	-	-	-	-	-
Push netter	-	-	-	-	-	-	-
King mackerel gill netter	5	5	-	2	1	5	20%
Shrimp gill netter	-	-	-	-	-	-	-
<b>Total</b>	<b>373</b>	<b>452</b>		<b>434</b>	<b>321</b>	<b>600</b>	<b>54%</b>

Source : Pak Phanang Fisheries Office

**Table 2 : Percentage of Pak Phanang Fishing Boats to Total Number of Fishing Boats in Nakhon Si Thammarat Province**

Type of boat	Total Number of Fishing Boats in Nakhon Si Thammarat				Proportion of Pak Phanang Boats			
	Length of boat	<14m	14-18m	18m<	Total	<14m	14-18m	18m<
Otter board trawler	476	380	145	1,001	2%	51%	76%	31%
Pair trawler	-	14	3	17	-	93%	67%	80%
Beam trawler	45	-	-	45	-	-	-	0%
Push netter	27	3	-	30	19%	33%	-	20%
Gill netter	569	3	3	575	1%	-	33%	1%
Long liner	1	-	-	1	-	-	-	0%
<b>Total</b>	<b>1,118</b>	<b>400</b>	<b>151</b>	<b>1,669</b>	<b>2%</b>	<b>52%</b>	<b>75%</b>	<b>20%</b>

Source : Pak Phanang Fisheries Office

**Table 3 : Shipbuilding Status of Nakhon Si Thammarat's Boats**

Legth of boat	Year	No. of new boats built					Average No. of boats	
		1982	1983	1984	1985	1986	1987 (planned)	(built) built/year
<14m		4	8	7	(NA)	5	21	11
14-18m		2	17	13	(NA)	6	57	29
18m<		3	18	2	(NA)	15	60	30
<b>Total</b>		<b>9</b>	<b>43</b>	<b>22</b>	<b>(NA)</b>	<b>26</b>	<b>138</b>	<b>70</b>

Remarks : (planned) - boats under building and already ordered  
(built) - boats to be building within 1987

Source : Department of Fisheries, Thailand

Table 4 : Ownership of Fishing Boats in Pak Phanang

No. of boats owned/person	1	2	3	4-10	Over 10	Total
No. of owners	146	58	56	14	6	280(psns)
Proportion of owners to total	52%	21%	20%	5%	2%	100(%)
Total No. of boats owned	146	116	168	77	93	600(boats)
Proportion of boats to total	24%	19%	28%	13%	16%	100(%)

Source : Fish Marketing Organization  
(Prepared based on the result of fishermen sampling survey 1987)

Table 5 : Fish Landing Site Used by Pak Phanang Boats  
(Result of Sampling Survey)

Landing site	No. of Fishing Boats						Total
	Otter trawler		Pair trawler		Gill netter		
	14-18m	18-25m	14-18m	18-25m	14-18m	18-25m	
Pak Phanang	49	92	1	14	-	-	156 (53%)
Songkhla	37	91	1	-	1	2	132 (45%)
Others	2	4	-	-	-	-	6 (2%)
Total	88	187	2	14	1	2	294

Note : Other landing sites are mainly at Pattani.

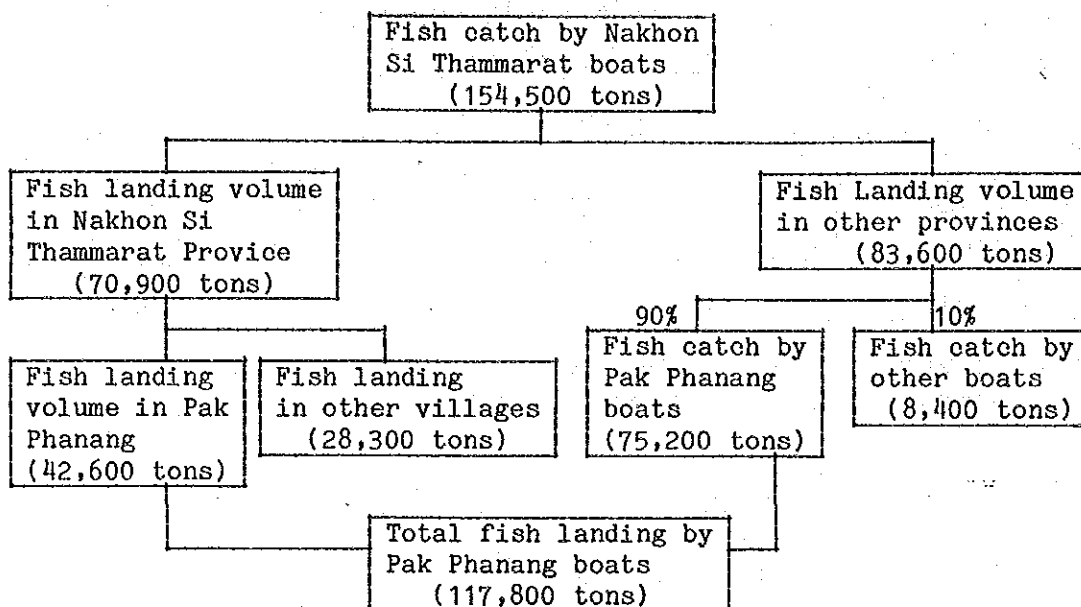
Source : Fish Marketing Organization  
(the result of fishermen's sampling survey 1987)

Table 6 : Size Variation of Pak Phanang's Boats by Landing Site  
(Result of Sampling Survey)

Landing site	Length of boat		Proportion of large boats to total
	14-18m	18-25m	
Pak Phanang	50	106	68%
Songkhla	39	93	70%
Others	2	4	67%
Total	91	203	69%

Source : Fish Marketing Organization  
(the result of fishermen sampling survey 1987)

Table 7 : Fish Landing Volume by Pak Phanang Boats in 1983



Note : Fish catch by small boats (less than 14 meters long) are not included in the above figure.

Source : Nakhon Si Thammarat Provincial Fisheries Office

Table 8 : Estimate of Possible Fish Catch by Pak Phanang Boats at Present

Type of fishing boat	No. of boats	Annual operation efficiency	No. of trip /month (time)	Fish catch /trip (ton)	Monthly fish landing (ton/month)	Annual fish landing (ton/year)
Otter board trawler						
14-18m	173	0.75	2.0	9	2,336	28,032
18-25m	368	0.75	1.5	19	7,866	94,392
Pair trawler						
14-18m	32	0.75	1.6	9	346	4,147
18-25m	22	0.75	1.6	13	343	4,118
King mackerel gill netter						
14-18m	1	0.75	2.3	7	60	720
18-25m	4	0.75				
<b>Total</b>	<b>600</b>				<b>16,951</b>	<b>131,409</b>

Table 9 : Estimate of Fish Landing by Pak Phanang Boats  
at Different Landing Site

Landing site	No. of calls Pak Phanang boats	Percentage of calls	Possible annual fish catch (ton/year)	Actual fish landing (ton/year)
Pak Phanang	318	53%	69,700	69,700
Songkhla	270	45%	59,100	56,300/*
Others	12	2%	2,600	2,600
<b>Total</b>	<b>600</b>	<b>100%</b>	<b>131,400</b>	<b>128,600</b>

/\* Remarks : It is estimated that approximately 2,800 tons of fish have been lost due to the long waiting time for unloading at Songkhla Port.

Figure 1 : Fish Marketing Channel at Pak Phanang

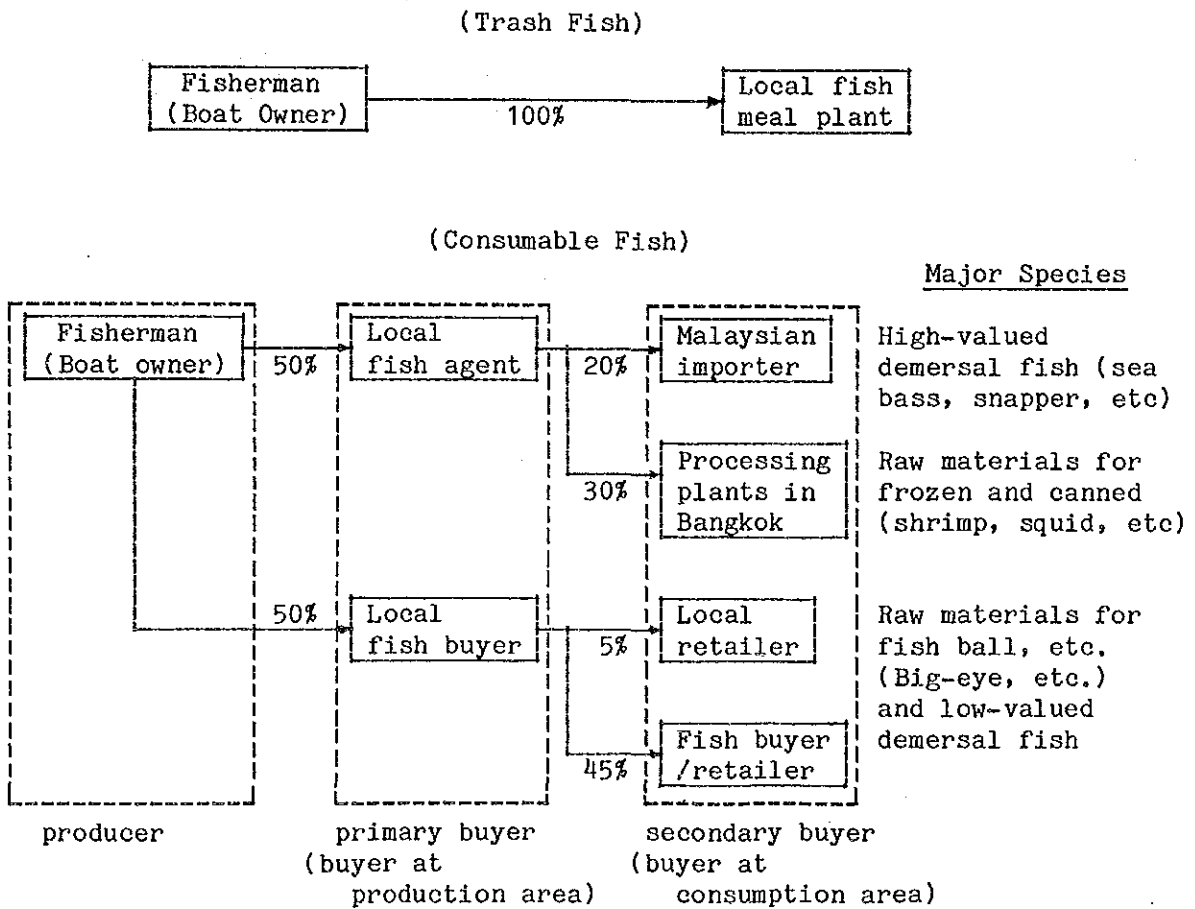


Table 10 : Fish Facilities in Pak Phanang

Facilities	Number	Capacity (Max)		Required Material	Number of labour
		Daily	Yearly		
Ice making	5	4,850 block	1,230,000 block	—	112
Fishmeal	7	140 ton	41,160 ton	198,000 ton	224
Shipbuilding/ repairing	6	building repair	12 ship 230 ship		136
Freezing/Cold Storage	2	freezer	60 t/d		386
		Cold Storage	2,150 ton		
		shrimp	7,500 ton	9,600 ton	
		squid	6,850 ton	7,700 ton	
		fish	5,020 ton	6,000 ton	
		shell	50 ton	500 ton	

Source : Nakhon Si Thammarat Provincial Industrial Office (1986) and  
interview at the site.

Figure 2 : Fish Marketing Channel at Songkhla Fishing Port

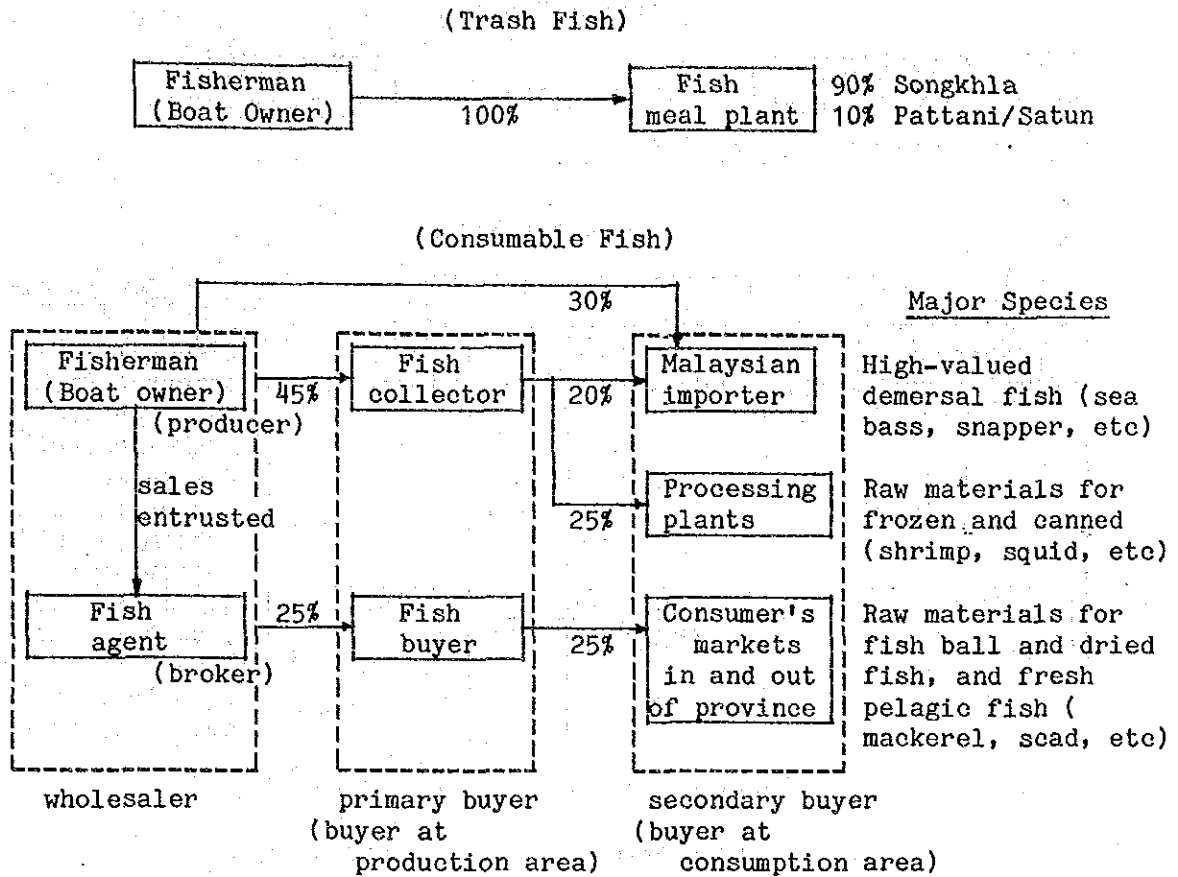
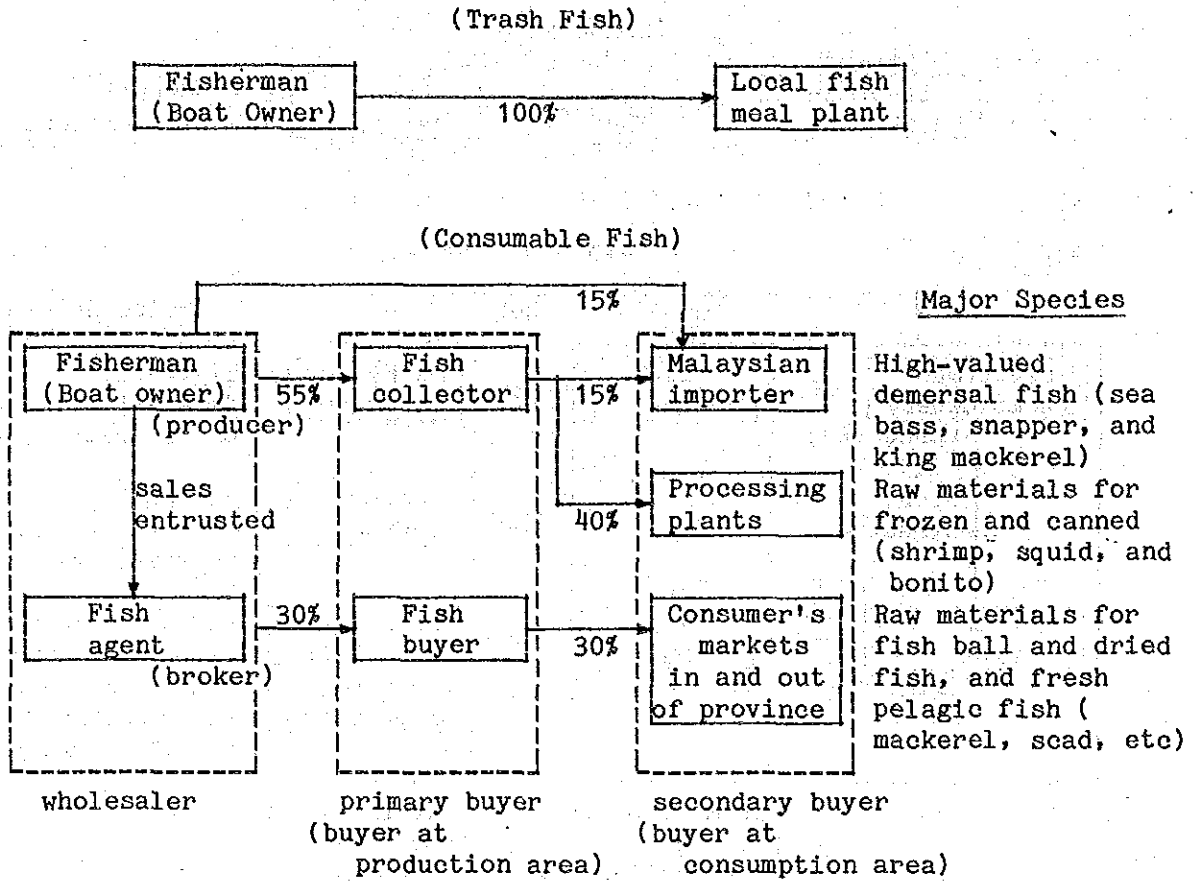




Figure 3 : Fish Marketing Channel at Pattani Fishing Port



Attachment 3-3 : Fish Price by Major Species (Producer's Price)

1. Fish Price of Major Species (1984)

(unit : Baht/kg)

Fish Species	Price at landing site		
	Pak Phanang	Songkhla	Thailand
A) Fish			
Indo-pacific mackerel	-	6.48	7.30
Indian mackerel	-	12.42	7.36
King mackerel	16.53	32.46	25.95
Wolf herrings	5.69	9.59	11.73
Spotted tuna	-	12.69	11.19
Bonito	-	9.07	9.42
Scads	-	4.91	4.20
Hairtail scad	-	8.88	6.57
Travallies	-	6.25	7.76
Threadfins	15.52	-	21.72
Sardinellas	4.74	3.30	3.30
Anchovies	-	-	2.80
Mulletts	-	-	14.13
Black pomfret	17.35	32.23	30.04
Silver pomfret	87.21	176.40	73.29
Barracuda	-	4.21	9.21
King fish	22.75	17.94	23.76
Croakers	10.15	6.80	6.78
Threadfin breams	6.29	5.88	6.02
Monocle breams	10.22	3.17	5.95
Big eye scads	3.30	6.89	5.40
Lizard fish	-	3.08	3.98
Hair tails	-	3.37	6.11
Snappers	19.88	20.36	26.00
Big eyes	6.50	3.30	4.44
Sand whittings	-	22.42	16.85
Barble eel	14.79	-	17.39
Marine catfish	14.50	8.15	9.77
Rays	5.12	4.57	4.94
Sharks	5.45	4.26	5.53
Flat fish	6.47	2.96	6.05
Indian halibut	19.72	16.60	16.24
Conger eel	6.97	5.19	6.88
Other foodfish	16.34	8.64	6.97
Trash fish	1.89	1.48	1.94
B) Crustaceans			
Banana shrimp	93.43	135.24	113.44
Jumbo tiger shrimp	-	-	167.21
Tiger shrimp	145.14	157.31	154.89
King prawn	-	67.02	93.67
School prawn	92.62	44.24	64.32
Other shrimps	11.17	7.86	9.81
Flathead lobster	37.80	56.41	54.17
Mantis shrimp	6.75	10.01	11.53

(unit : Baht/kg)

Fish Species	Price at landing site		
	Pak Phanang	Songkhla	Thailand
Swimming crab	6.10	23.56	19.19
Mud crab	-	23.25	46.41
Other crabs	-	-	5.33
C) Molluscs			
Squid	18.24	15.69	19.10
Cuttlefish	11.05	17.88	16.75
Octopus	13.67	5.57	5.43
Shellfishes	-	5.41	1.76
Others	11.68	-	12.37

Source : Department of Fisheries, Thailand

2. Monthly fluctuation of fish price

(1) Songkhla Fishing Port

(unit: Baht/kg)

Month	1983		1984		1985	
	Trash	Consumable	Trash	Consumable	Trash	Consumable
Jan.	2.00	11.39	2.10	11.01	1.50	10.73
Feb.	2.00	10.78	2.40	11.29	1.60	9.49
Mar.	1.80	10.39	2.40	10.67	1.30	9.60
Apr.	1.60	10.68	1.80	10.82	1.10	9.53
May	1.50	10.11	1.60	9.60	1.20	10.04
Jun.	1.50	10.03	1.70	9.99	1.20	10.41
Jul.	1.50	10.16	1.70	9.16	1.50	9.81
Aug.	1.80	10.56	1.70	8.79	1.50	9.89
Sep.	2.00	10.61	1.50	9.54	1.60	10.98
Oct.	2.00	9.95	1.32	9.33	1.40	9.90
Nov.	2.00	10.40	1.50	10.30	1.50	10.42
Dec.	2.00	11.78	1.50	10.06	1.70	11.17
Average	1.79	10.46	1.71	9.98	1.42	10.14

Source : Fish Marketing Organization

(2) Pak Phanang Landing Site

(unit: Baht/kg)

Date of Landing	Trash	Consumable
Aug. 7, 1986	1.85	11.45
Sep. 21, 1986	1.90	7.40
Oct. 14, 1986	1.90	8.68
Oct. 25, 1986	1.95	12.42
Nov. 21, 1986	1.95	8.41
Nov. 27, 1986	1.95	15.25
Jan. 8, 1987	2.00	12.64
Jan. 31, 1987	2.00	10.44
Feb. 20, 1987	2.00	10.89
Mar. 11, 1987	2.00	10.35
Mar. 28, 1987	2.00	8.03
Average	1.94	9.89

Source: Prepared based on sales slips of fish by otter-board trawler in Pak Phanang.



2) Calculation of consolidation settlement:

The final settlement can be calculated from the following formula:

$$S = H \frac{C_c}{1 + e_o} \log_{10} \frac{P_o + \Delta P}{P_o}$$

where;

S : Final consolidation settlement (cm)

H : Thickness of consolidating layer (cm)

C<sub>c</sub> : Compression index

e<sub>o</sub> : Initial void ratio

P<sub>o</sub> : Initial pressure (kg/cm<sup>2</sup>)

ΔP : Pressure increment (kg/cm<sup>2</sup>)

Case 1 Crown height of reclamation work by FMO : + 5.00

(Thickness of reclaimed material 2.40m)

$$P_o = 1.50 \times (2.60 - 2.22) + 0.50 \times (2.22 + 5.40)$$

$$= 4.63 \text{ t/m}^2 = 0.46 \text{ kg/cm}^2$$

$$\Delta P = 1.80 \times (5.00 - 2.60)$$

$$= 4.32 \text{ t/m}^2 = 0.43 \text{ kg/cm}^2$$

$$S = 16.00 \frac{1.15}{1 + 2.55} \log_{10} \frac{0.89}{0.46}$$

$$= 1.48 \text{ m}$$

Case 2: Crown height of reclamation work by FMO : + 4.30

(Thickness of reclaimed material 1.70m: FMO's originally planned crown height)

$$P_o = 0.46 \text{ kg/cm}^2$$

$$\Delta P = 1.80 \times (4.30 - 2.60)$$

$$= 3.06 \text{ t/m}^2 = 0.31 \text{ kg/cm}^2$$

$$S = 16.00 \frac{1.15}{1 + 2.55} \log_{10} \frac{0.77}{0.46}$$

$$= 1.14 \text{ m}$$

(3) Estimation of settlement speed

The consolidation test is aimed to obtain the consolidation characteristic values (Cc,Cv) required for forecasting the final settlement and speed of settlement.

However, as to the settlement phenomenon, even when final settlement and settlement speed are calculated according to the one-dimensional consolidation theory (Terzaghi's theory), using the consolidation characteristic value, it is hard to say from the past experiences that the results conform well to actual values, that is, the calculated values and the measured value, do not coincide with each other in high accuracy.

According to the literatures and special papers of Japanese Society of Soil Mechanics and Foundation Engineering, the final settlement can be presumed with accuracy of approx. 20%, while the settlement speed (that is, estimation of Cv) is rather hard to forecast, and a case such that the actually measured settlement speed is approx. 10 times as the settlement speed obtained from test Cv is often found. Consequently, it is very important from a viewpoint of soil engineering to check Cv obtained from the consolidation test with the settlement characteristics near or around the construction site and other similar cases.

In this attachment, Cv = 0.09 cm<sup>2</sup>/min obtained from the consolidation test was checked with similar executed construction examples, and finally Cv employed for this calculation of settlement speed is determined as Cv = 0.5cm/min.

The settlement speed will be carefully observed by the settlement measuring plate, which is to be used as a basic data for study of construction timing of road and parking area.

1) Settlement speed calculated from consolidation coefficient(test) Cv

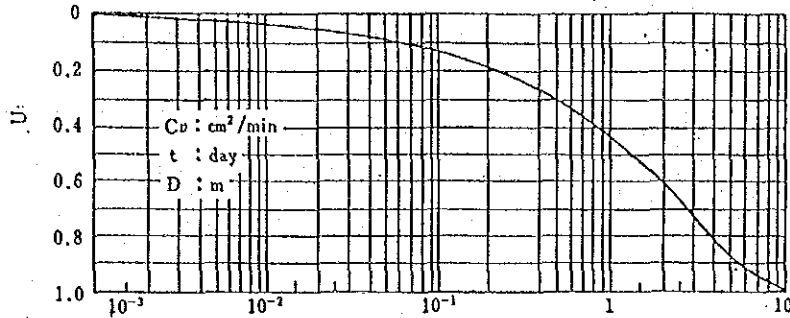
The time of the degree of consolidation reaches U can be calculated by the equation below.

$$t = \frac{T_v \cdot D^2}{C_v}$$

where;

- t : Time required for the degree of consolidation to reach U (day)
- D : Pore water drainage path distance (m)
- Cv : Coefficient of consolidation (cm<sup>2</sup>/min)
- U : Degree of consolidation  $U = St/s$
- S : Final settlement (cm)
- St : Settlement at time of t (cm)
- Tv : Time coefficient as shown in Figure 1.

Figure 1 Relationship between Average Consolidation Degree and Time Coefficient

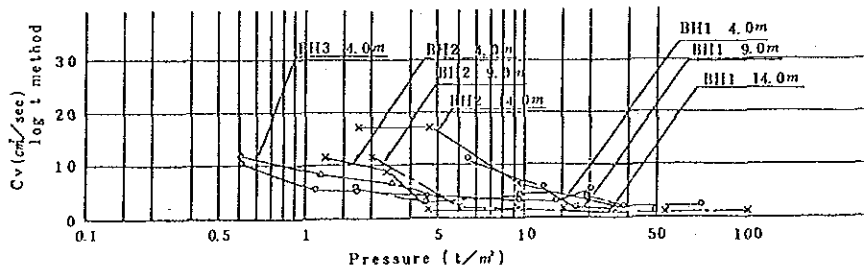


$$\text{Time coefficient } T_v = \frac{C_v \cdot t}{D^2}$$

a) Determination of consolidation coefficient

According to the consolidation test results of the JICA geotechnical investigation,  $C_v$  -  $\log P$  curve is summarized below.  $C_v$  corresponding to  $\Delta P = 4.63 \text{ t/m}^2$  (increased pressure by land reclamation) is in average  $15 \times 10^{-4} \text{ cm}^2/\text{sec} = 9 \times 10^{-2} \text{ cm}^2/\text{min}$ .

$C_v$  -  $\log P$  Curve



Note: The cases of BH3 9m and 14m are omitted in the above figure since the same curves are obtained.

b) Calculation of settlement speed  
 When 10% consolidation degree  
 (15cm settlement)

$$t = \frac{6 \times 10^{-2} \times (16)^2}{9 \times 10^{-2}} = 171 \text{ days} = 0.46 \text{ years}$$



When 20% consolidation degree  
(30cm settlement)

$$t = \frac{0.2 \times (16)^2}{9 \times 10^{-2}}$$

$$= 569 \text{ days} = 1.6 \text{ years}$$

When 50% consolidation degree  
(75cm settlement)

$$t = \frac{1.7 \times (16)^2}{9 \times 10^{-2}}$$

$$= 4.836 \text{ days} = 13.2 \text{ years}$$

When 90% consolidation degree  
(135 cm settlement)

$$t = \frac{5.5 \times (16)^2}{9 \times 10^{-2}}$$

$$= 15.644 \text{ days} = 42.9 \text{ years}$$

- 2) Estimation of field consolidation coefficient according to similar executed work examples
- a) Sample of executed work of "Road Bank in Nakhon Si Thammarat Province". The provincial road, which is an existing access road to this planned fishing port, was constructed with 1.5 to 2m of embankment thickness 1.5 years ago. But at present (April, 1987), there causes settlement of approx. 0.5m. From this case, "Field Cv" is calculated as follows.

- Calculation of final consolidation settlement

$$P_0 = 0.46 \text{ kg/cm}^2$$

$$\Delta P = 1.8 \times 1.5 = 2.7 \text{ t/m}^2 = 0.27 \text{ kg/cm}^2$$

$$S = 16.00 \frac{1.15}{1 + 2.50} \log_{10} \frac{0.73}{0.46} = 1.05 \text{ m}$$

- Calculation of field Cv

$$\text{Consolidation degree } U = \frac{\text{Present settlement}}{\text{Final settlement}}$$

$$= \frac{0.5 \text{ m}}{1.05 \text{ m}} = 48\% \rightarrow T_v = 1.3$$

$$C_v = \frac{T_v D^2}{t} = \frac{1.3 \times (16)^2}{365 \times 1.5} = 0.60 \text{ cm}^2/\text{min}$$

The ratio of this field Cv to the JICA consolidation test Cv (May, 1987) ;

$$\frac{\text{Field Cv}}{\text{Test Cv}} = \frac{0.60}{9 \times 10^{-2}} = 6.67 \text{ times}$$

The ratio of this field Cv to PMO consolidation test Cv (March, 1987) ;

$$\frac{\text{Field Cv}}{\text{Test Cv}} = \frac{0.60}{6 \times 10^{-2}} = 100 \text{ times}$$

b) Sample of executed work of "Royal Thai Navy Dockyard"

It has been said that there are many cases of approx. 1.5 m thickness road bank settles down to the original ground level within approx. 10 years near or around Bangkok. To know the characteristics of ground settlement in this planned fishing port. It is intended to obtain inversely calculated of field  $C_v$  from example of the test banking in Samutprakarn (locating at the mouth of Chao Phraya River 20km south from Bangkok) dockyard as a similar example (thickness of soft clay layer  $H = 17m$ ). In this test banking, the consolidation settlement after banking is observed, using the settlement measuring plate the consolidation settlement vs time is recorded.

- Calculation of final consolidation settlement

$$P_o = 1.5 \times 1.25 + 0.5 \times 7.25$$

$$= 5.5 \text{ t/m}^2 = 0.55 \text{ kg/cm}^2$$

$$\Delta P = 1.8 \times 2.35$$

$$= 4.23 \text{ t/m}^2 = 0.42 \text{ kg/cm}^2$$

$$S = 17.00 \frac{1.20}{1 + 2.8} \log_{10} \frac{0.97}{0.42}$$

$$= 1.93 \text{ m}$$

- Calculation of field  $C_v$

When the settlement is 30 cm:

$$U = \frac{0.3}{1.93} = 16\% \rightarrow T_v = 0.15, \quad C_v = \frac{0.15(17)^2}{100 *1} = 0.43 \text{ cm}^2/\text{min}$$

When the settlement is 50 cm:

$$U = \frac{0.5}{1.93} = 26\% \rightarrow T_v = 0.3, \quad C_v = \frac{0.3(17)^2}{155 *1} = 0.56 \text{ cm}^2/\text{min}$$

NOTE \*1: Required time to reach  $U$  is estimated from Fig. 3 Settlement vs Time Curve.

Therefore, the actual settlement speed corresponds to 16.5 times as the settlement speed calculated below from the consolidation test  $C_v$  indicated on Figure 2.

$$\frac{\text{Field } C_v}{\text{Test } C_v} = \frac{1/2 (0.43 + 0.56)}{5 \times 10^{-4} \times 60} = 16.5 \text{ times}$$

Figure 2 Consolidation Coefficient  $C_v$  (Obtained from Consolidation Test)

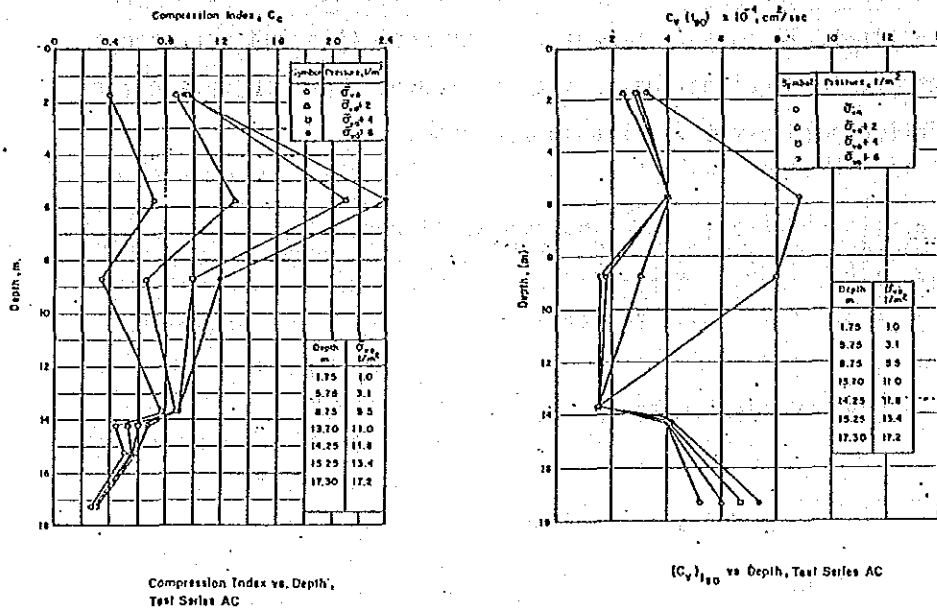
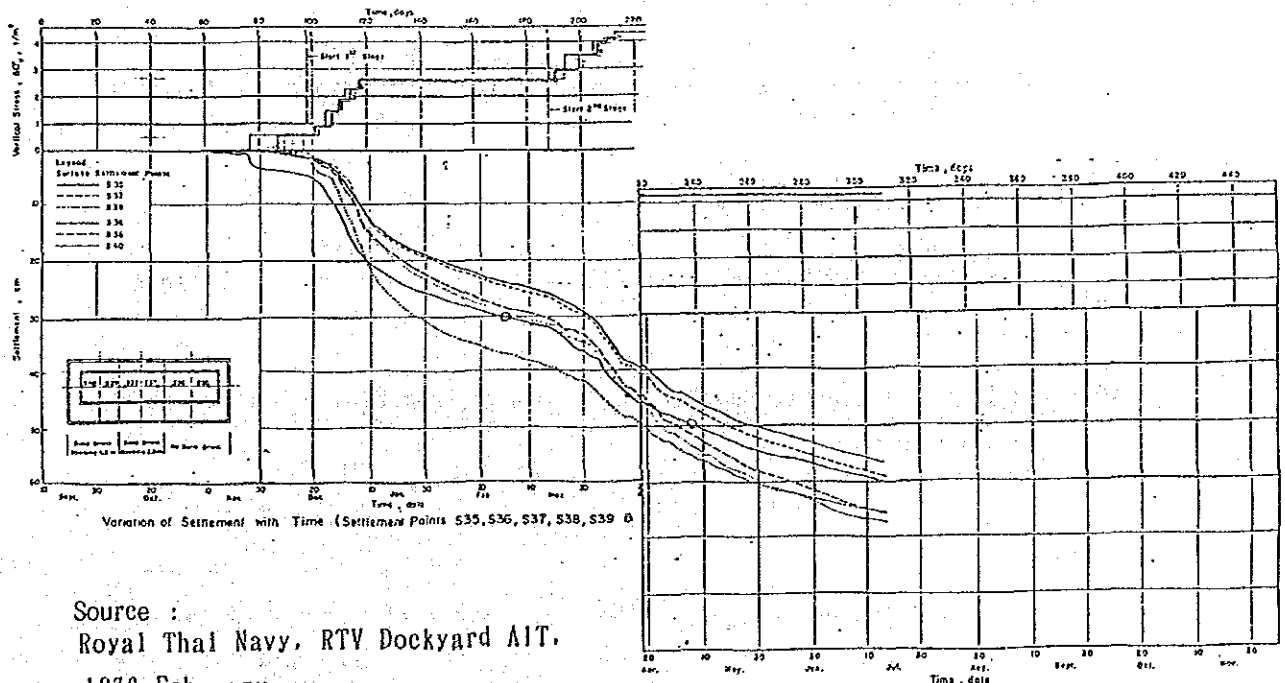


Figure 3 Settlement vs Time Curve



Source :  
Royal Thai Navy, RTV Dockyard AIT,  
1976 February

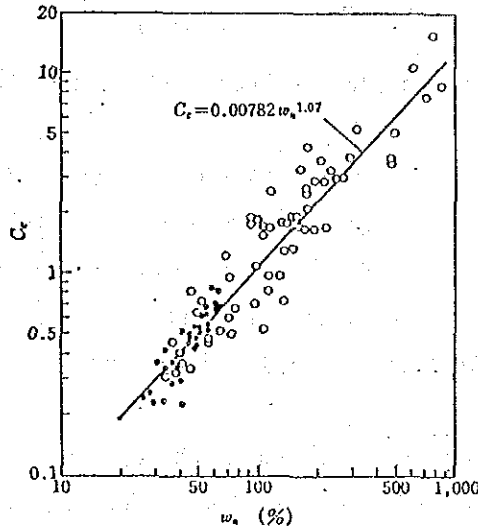
3) Checking consolidation characteristic values ( $C_c$ ,  $C_v$ ) with reference data

As to consolidation characteristics obtained from the consolidation test, it is important to check these values on the basis of correlation with the physical constant of soil because of disturbance at the time of sampling and limited sampling species.

a) Compression index ( $C_c$ )

Ohira and Iwami presented the correlation chart shown below from many existing consolidation test results. The natural water content ratio in this planned fishing port is around 80 to 100%, and the compression index  $C_v$  is 1.0 from the illustration, which conform well to average value  $C_v = 1.15$  obtained from the JICA consolidation test results.

Relationship between Compression Index  $C_c$  and Natural Water Content  $w_n$  (Ohira and Iwami)



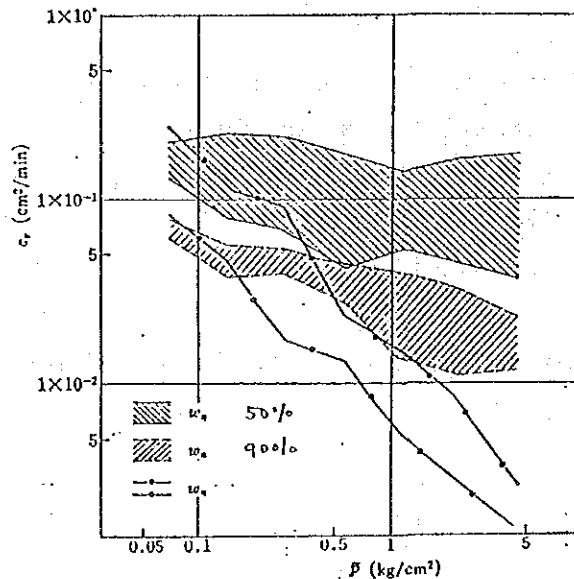
Source : Interpretation of Soil Investigation Test Results and Sample Applications (Japanese Society of Soil Mechanics and Foundation Engineering)

○ : Peat  
● : Clay

b) Consolidation coefficient (Cv)

Cv values are obtained for each load applied in the test, but no particular value is given as shown, figure below. The following figure indicates many collected data and the correlation with natural water content  $w_n$  thus found.

General Trend between  $\log C_v - \log P$



Average Consolidation Pressure P (kg/cm²)

When the value  $P = 0.5 \text{ kg/cm}^2$  (In case of reclaimed crown height +5.00), and  $w_n$  approx. 90%,  $C_v$  is given as  $0.5 \text{ cm}^2/\text{min}$ , which is an intermediate value of field  $C_v$   $0.43$  to  $0.60 \text{ cm}^2/\text{min}$  as mentioned before, and it is considered that the correlativity is high.

Therefore,  $C_v = 0.50 \text{ cm}^2/\text{min}$  is employed for the sequent analysis.

(4) Determination of reclamation crown height by FMO

On the basis of the study results of the aforementioned consolidation characteristic values, the required crown height at the time of land reclamation works by FMO is studied as follows.

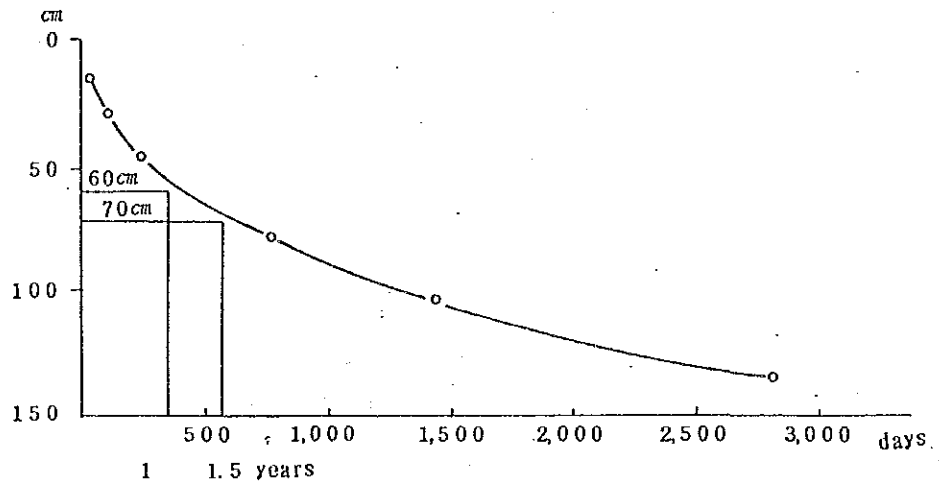
Final consolidation settlement :  $S = 1.5 \text{ m}$  ( $C_c = 1.15$ )

Consolidation coefficient :  $C_v = 0.5 \text{ cm}^2/\text{min}$ .

Relationship between settlement and time is calculated as below.

### Settlement vs Time

Degree of consolidation (%)	Settlement (cm)	Tv	Consolidation period (day)
10	15	0.07	35
20	30	0.22	112
30	45	0.45	230
50	75	1.5	768
70	105	2.8	1,434
90	135	5.5	2,816



Settlement vs Time Curve

From the above figure, the settlement after 1.5 years of consolidation period can be estimated as  $S = 0.7m$ .

- (5) Residual settlement after pavement work  
 Final settlement, due to additional load of pavement work expected to start after 1.5 years from the completion of the reclamation work done by FMO, is calculated as follows.

Increased pressure:

$$\begin{aligned} \Delta P &= \text{Increased pressure at the time of reclamation work by FMO} \\ &+ \text{Concrete pavement weight} + \text{Subgrade material weight (crushed stone and sand)} + \text{Surcharge} \\ &= 4.32 + 2.3 \times 0.25 + 1.8 \times 0.5 + 1.0 = 7.32 \text{ t/m}^2 \end{aligned}$$

Final settlement

$$\begin{aligned} S &= 16.00 \times \frac{1.15}{1 + 2.55} \times \log_{10} \frac{4.63 + 7.32}{4.63} \\ &= 2.14 \text{ m} \end{aligned}$$

Accordingly, the value of residual settlement after pavement work executed is found by the following equation as 1.44 m.

$$\begin{aligned} \text{Residual settlement} &= \text{Final settlement (Due to pavement work loaded)} - \text{Settlement at commencement of pavement work} \\ &= 2.14 - 0.70 \\ &= 1.44 \text{ m} \end{aligned}$$

This residual settlement is anticipated to continue for a considerable long period of time (more than 10 years).

If the crown height at the commencement of pavement work is set to + 5.00, the ground elevation will be + 3.50 after final settlement. However, it is considered that there is no problem for such crown height of road and parking area because of relatively easy maintenance and repairing works.

## Attachment 5-2 : Determination of Landing Time

Project port landing time are determined with regards to the following factors:

### 1) Trash fish:

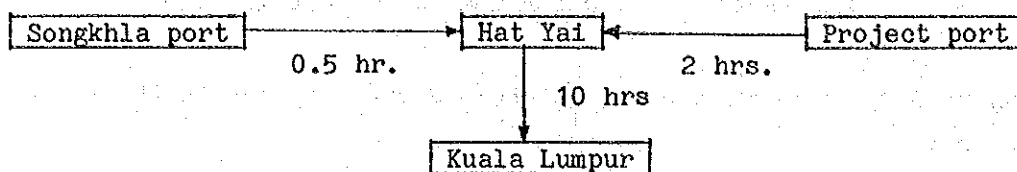
- a) All trash fish is expected to be processed on land. Collecting raw materials is usually performed by fish meal plants in the morning.
- b) Boats port calls usually occur in the morning.
- c) The landing of trash fish in Songkhla Port normally starts at 7:00 a.m. and ends at 2:00 p.m. Songkhla Port does not allow trash fish landing to start after 11:00 a.m., since the process takes two or three hours to complete.

### 2) Consumable fish:

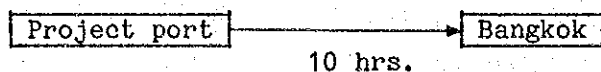
- a) Two third of consumable fish landed at the Project port is expected to be sent to Bangkok or Malaysia. The opening times of these markets are the following.

- Bangkok Central Fish Market	3:30 a.m. - 9:30 a.m.
- Samut Sakhon Fish Market	7:00 a.m. - 10:00 a.m.
- Raw materials collecting time for Bangkok processing plants	Usually in the morning
- Kuala Lumpur markets	Early morning
- b) At Songkhla port, where 50% of consumable fish is destined to Malaysia, landing of fish starts at 3:30 p.m.
- c) The time required for the transportation of fish to Bangkok and Malaysia are as follows:





Note : Time required to change trucks at Hay Yai is approximately 1 hour.



d) The time required for packing consumable fish is assumed as follows:

Destination	Packing condition	Required time
Fresh fish to Malaysia	Wooden boxes (fish:ice = 1:1)	1 hour
Fresh fish to Bangkok - to processing plants	Washing, primary processing, packing in fish containers	3 hours
- to consumers' markets	Packing in fish containers (fish:ice = 1:1)	1 hour

Landing time is therefore determined as follows:

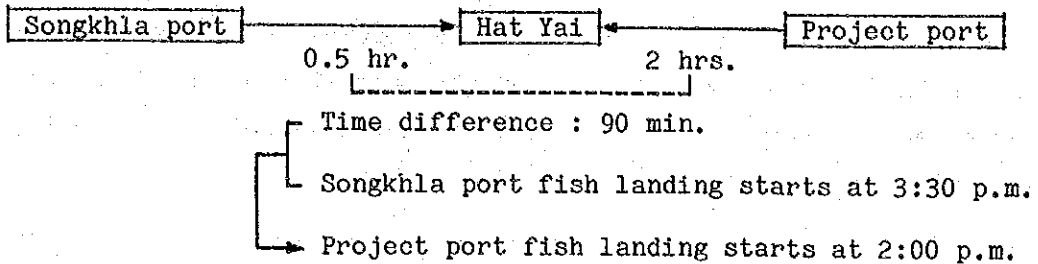
1) Trash fish:

- a) Landing begins begun at the same time as in Songkhla port (7:00 a.m.).
- b) Termination of trash fish landings should occur 30 minutes prior to the start of consumable fish landings (1:30 p.m.). The washing of the floor, the distribution of the FMO's fish containers, the entrance of fish agents into the auction hall and other preparations must be completed within that time span.

2) Consumable fish:

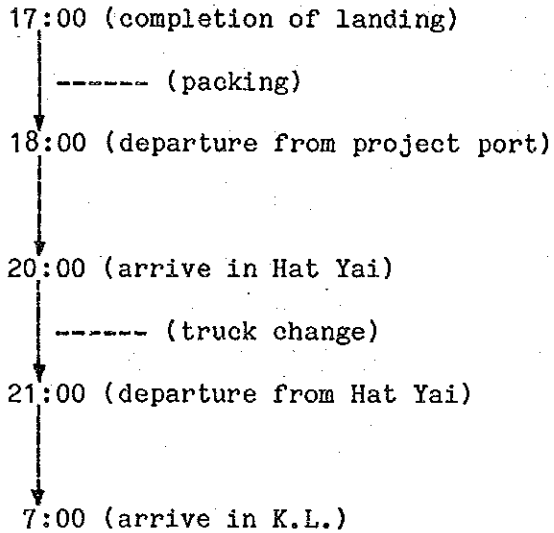
- a) Fish landing at the Project port should commence at 2:00 p.m. in

order to make up for the longer time taken to reach Hat Yai, from where the fish will be sent to Malaysia.

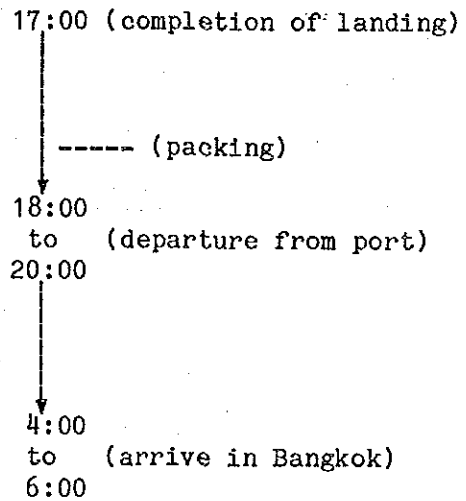


b) Fish landing must be over by 5:00 p.m. in order to meet the opening times of markets in Malaysia and Bangkok's vicinity.

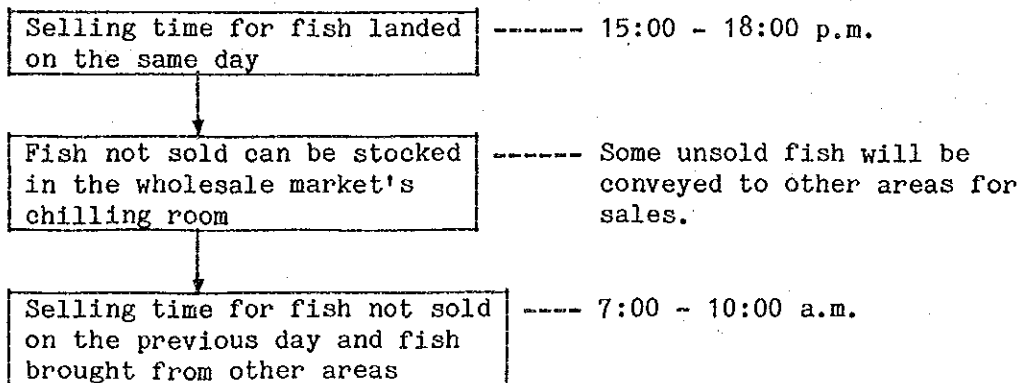
For Malaysia



For Bangkok's vicinity



c) Wholesale market opening time at the Project port is determined as follows:



The Japanese ports selected for this comparison are those Category 3 ports (nation-wide ports) in which the largest fish landings are effected by trawlers and the volume of landings range between 10,000 to 100,000 tons.

Prefecture	Port	Annual vol. of landing at peak (ton)	Daily	Sorting	Sorting area(m <sup>2</sup> ) (B)	Landing volume/ sq. m. (kg/m <sup>2</sup> /day)
			average and landing area (m <sup>2</sup> ) (A)	area (m <sup>2</sup> ) (A)		
1. Hokkaido	Oinaoshi	12,267	278	2,142	1,392	200
2. Miyagi	Shiogama	74,204	523	32,065	20,842	25
3. Fukushima	Matsukawaura	25,564	349	5,035	3,273	107
4. Hyogo	Kasumi	17,945	161	10,021	6,514	25
5. Yamaguchi	Shimonoseki	82,867	633	20,850	13,552	47
6. Ehime	Yahatahama	25,590	180	8,026	5,217	35
Average		39,740	354	13,023	8,465	42

Note : As there are no record available, sorting area (B) is estimated by multiplying sorting and loading area (A) by 65%.

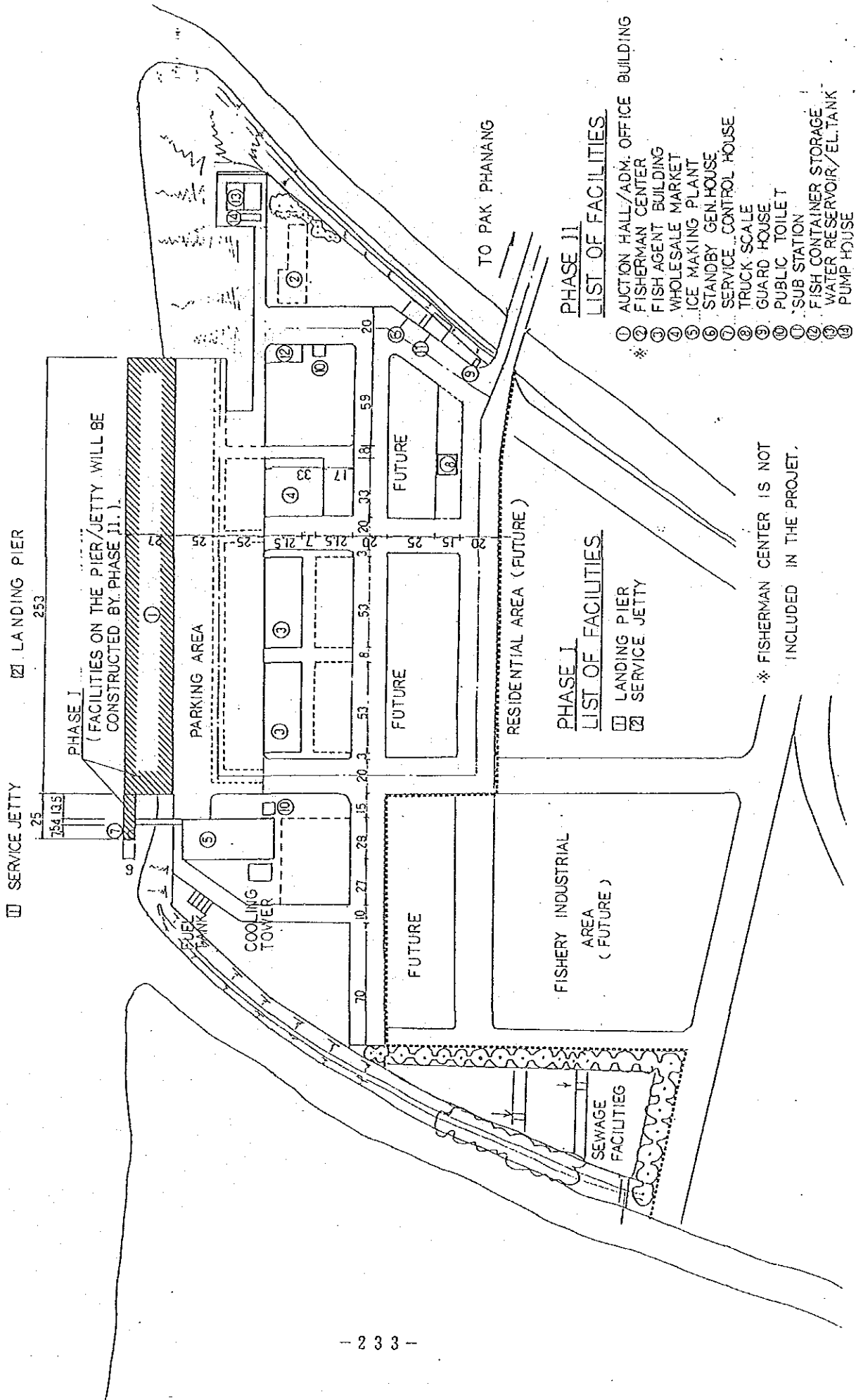
Source : Japan Fisheries Agency, Fishing Port Dept., 1984

Thailand	Project port	50,000	196	-	5,324	37
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Auction hall area at the Project port can be judged to be suitable considering the difference in working efficiency between Japan and Thailand.



Attachment 5-4 : GENERAL PLAN OF NAKHON\_SITTHAMMARAT FISHING PORT



Attachment 5-5 : General Plan of Building Facilities



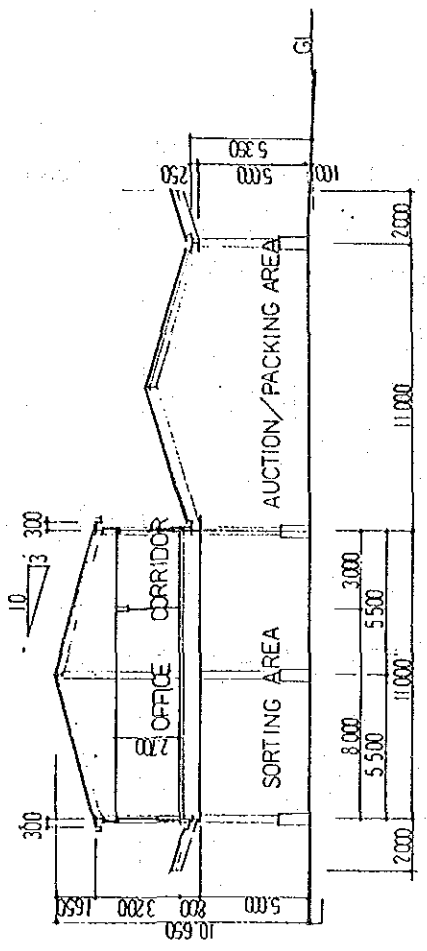




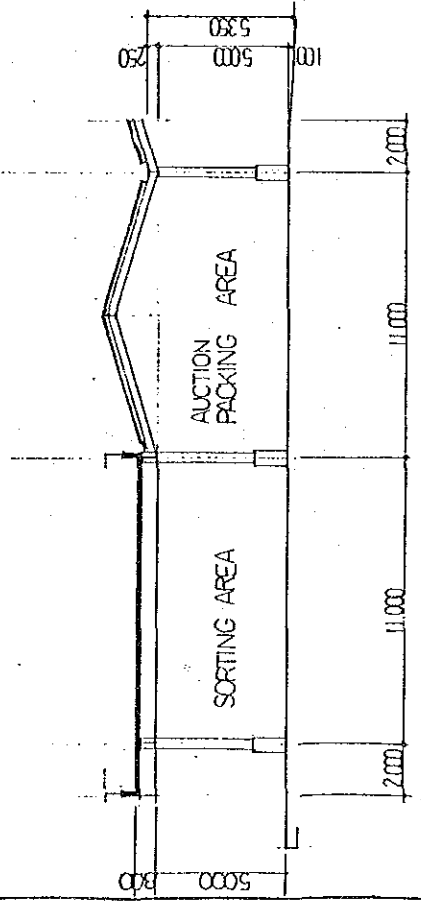




ELEVATION 1/1000

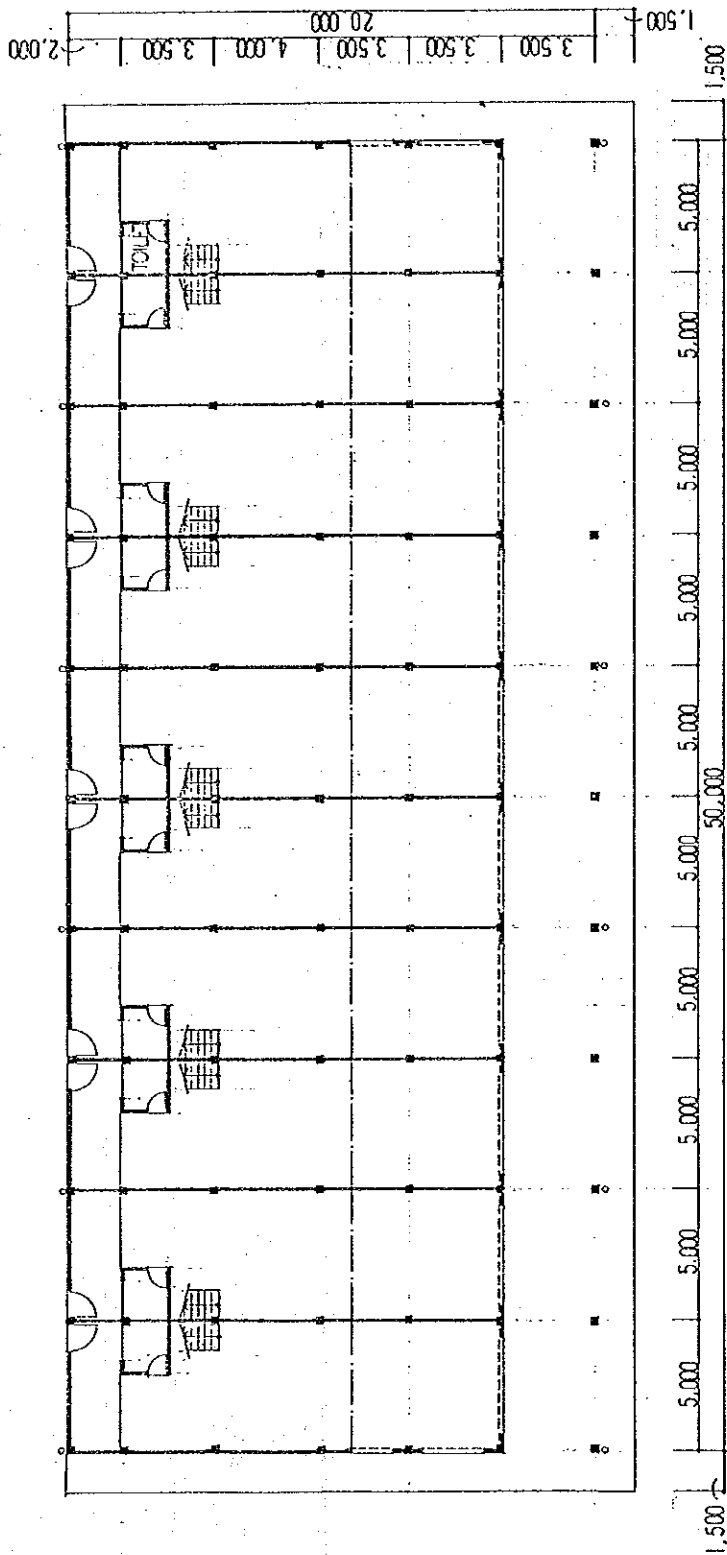


SECTION A A 1/200

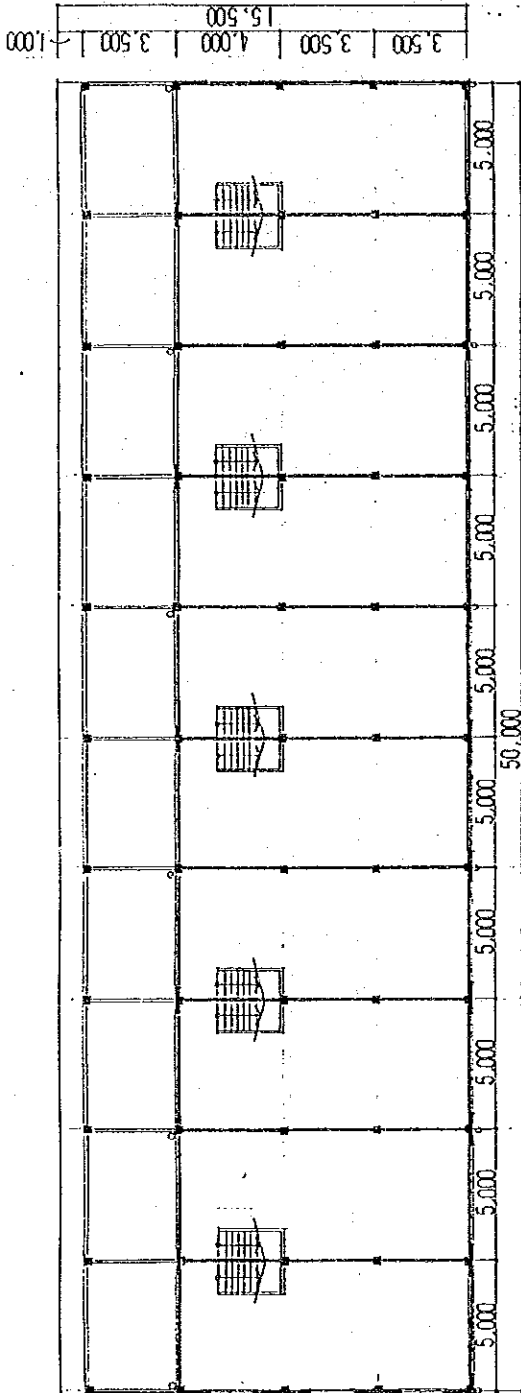


SECTION B-B 1/200

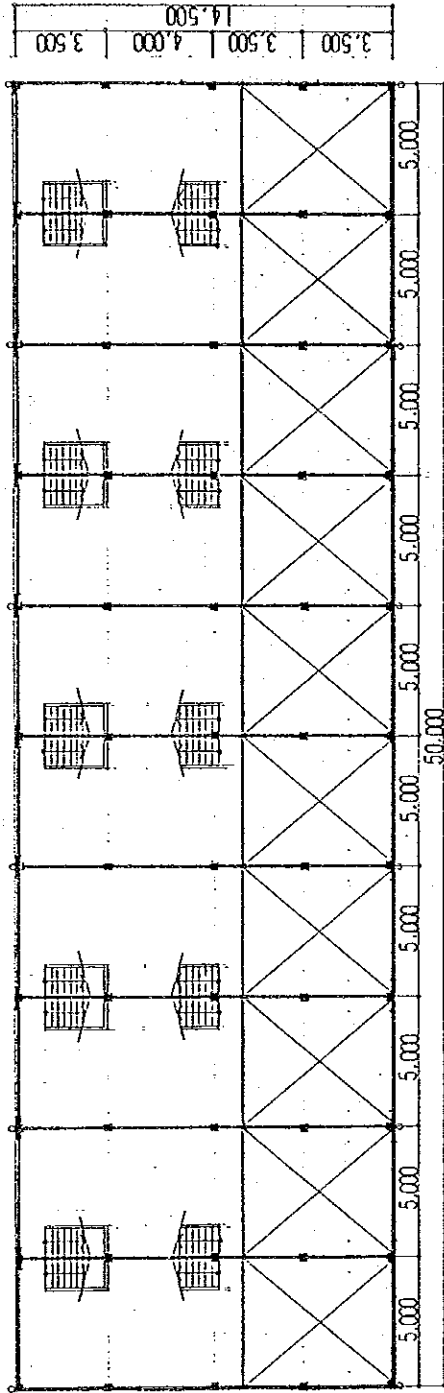
① AUCTION HALL ADM OFFICE BUILDING 3



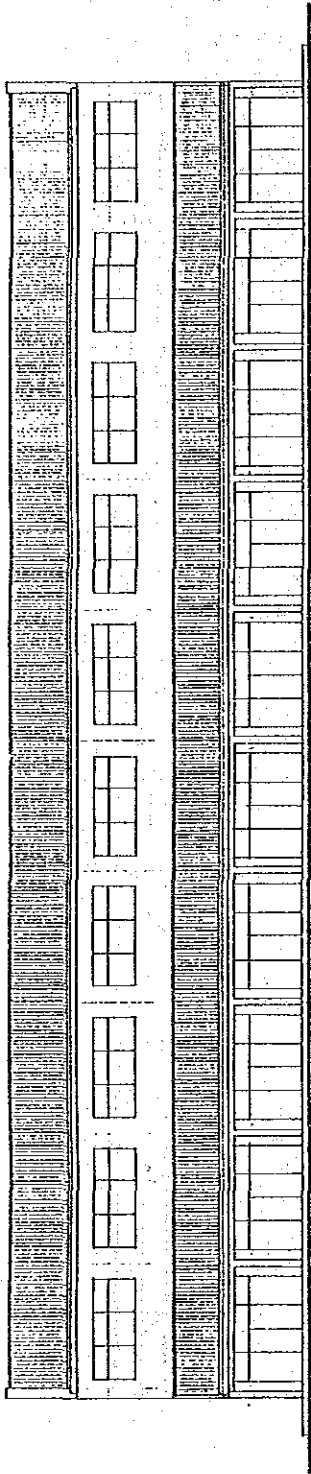
1ST. STORY PLAN 1/200



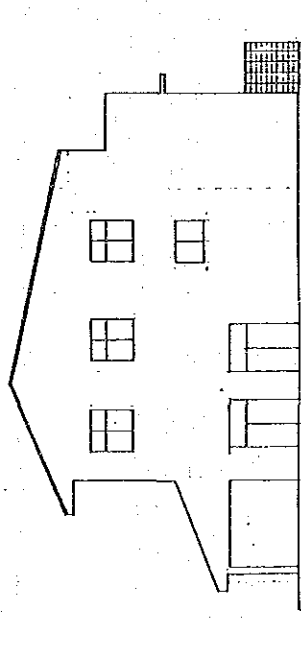
2ND STORY PLAN 1/200



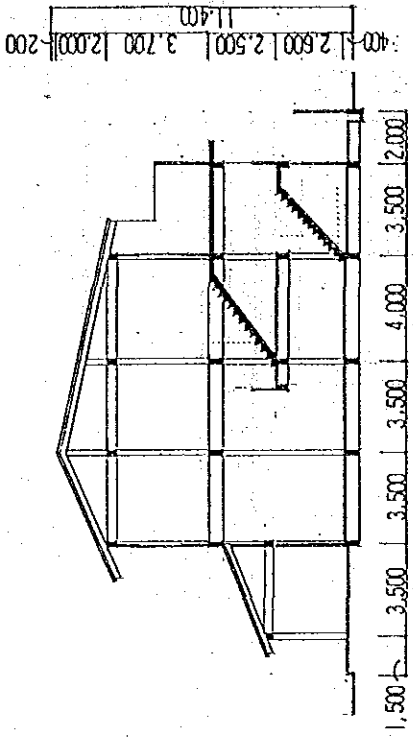
MEZZANINE PLAN 1/200



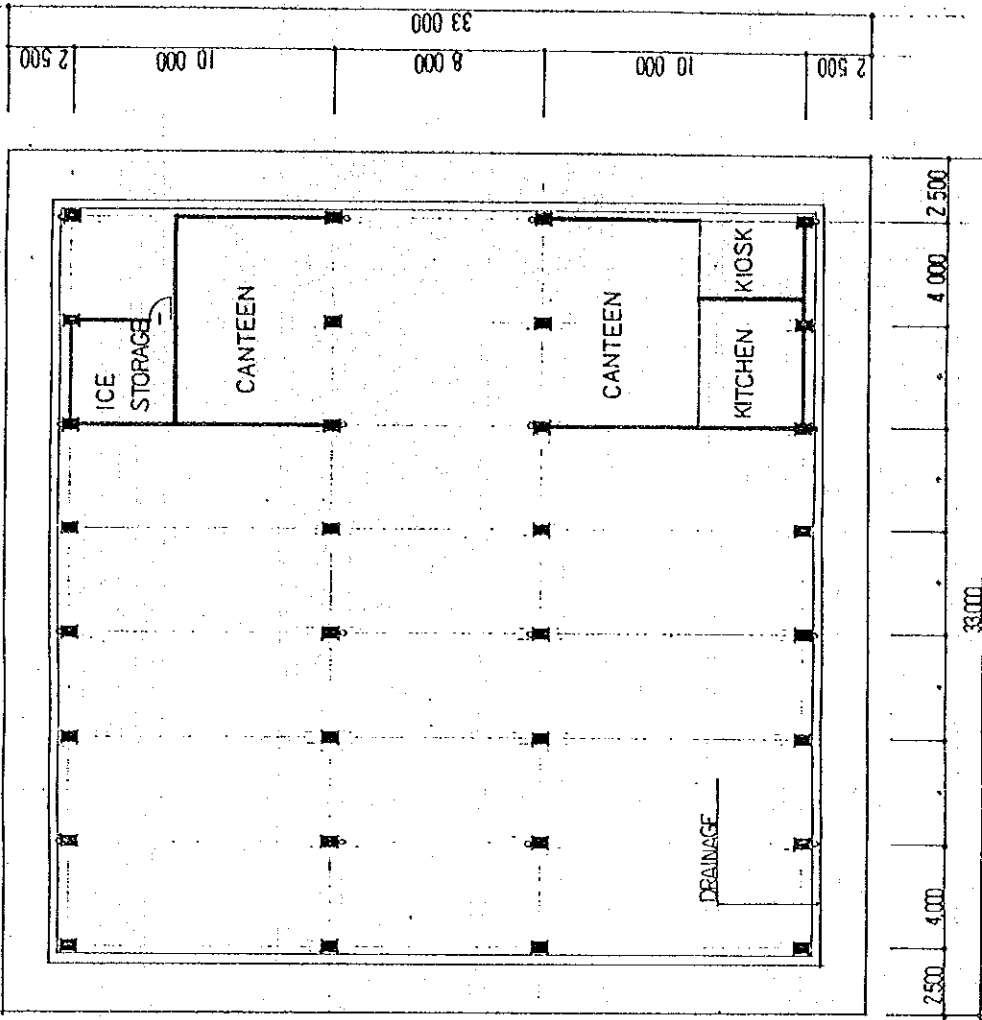
FRONT ELEVATION 1/200



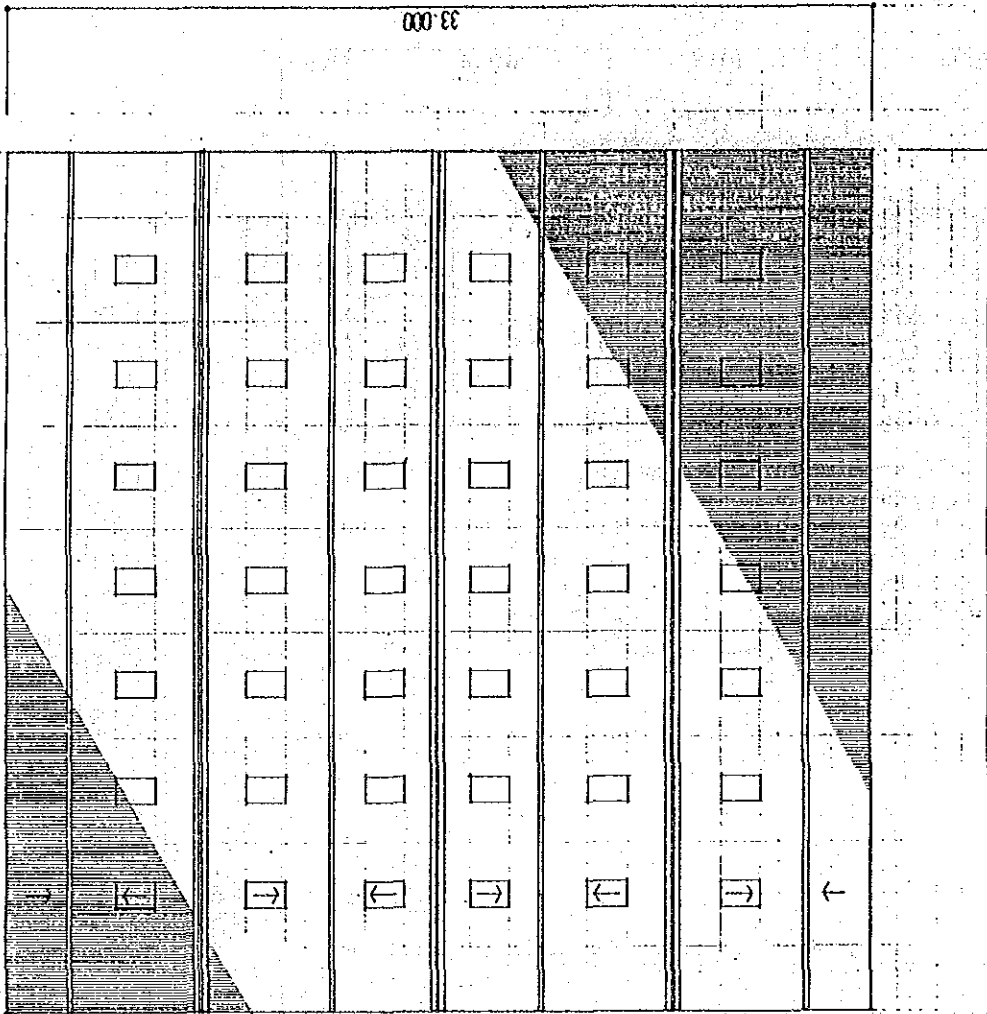
SIDE ELEVATION 1/200



SECTION 1/200



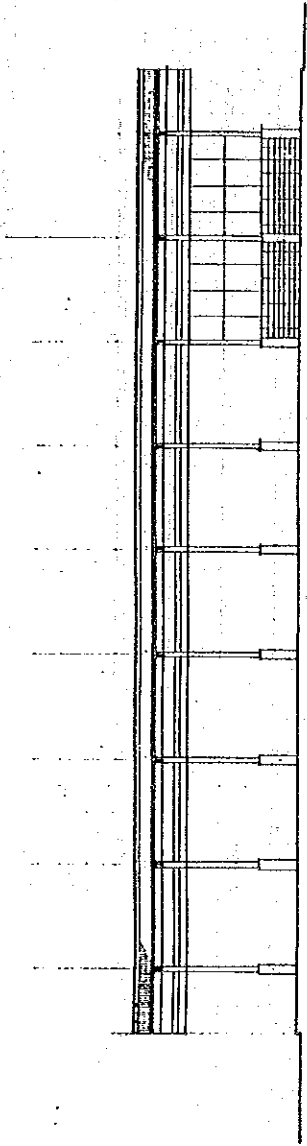
④ WHOLESALE MARKET BUILDING I



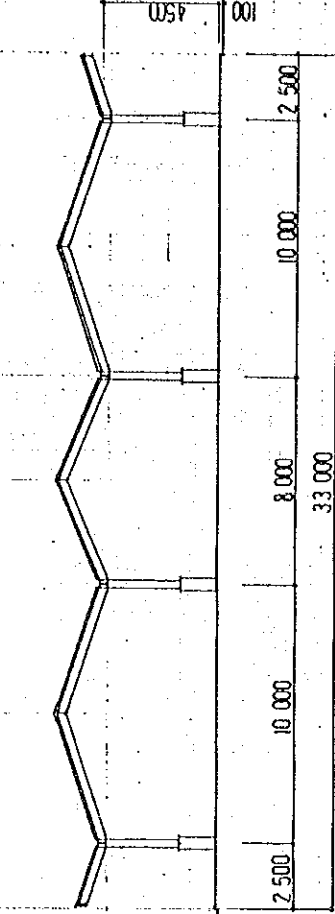
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ROOF PLAN 1 / 200

④ WHOLESALE MARKET BUILDING 2



FRONT ELEVATION 1/200

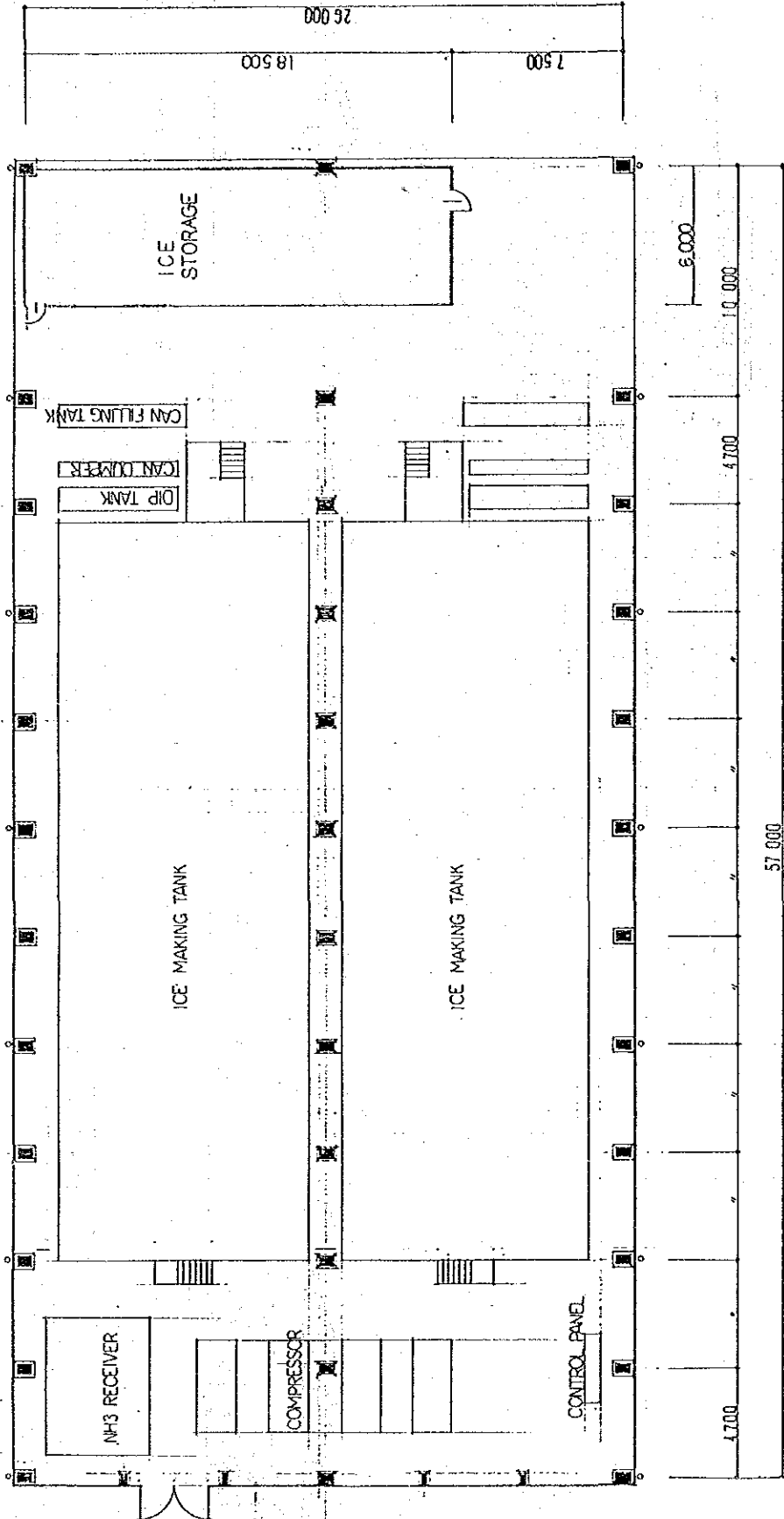


SIDE ELEVATION 1/200

SECTION 1/200

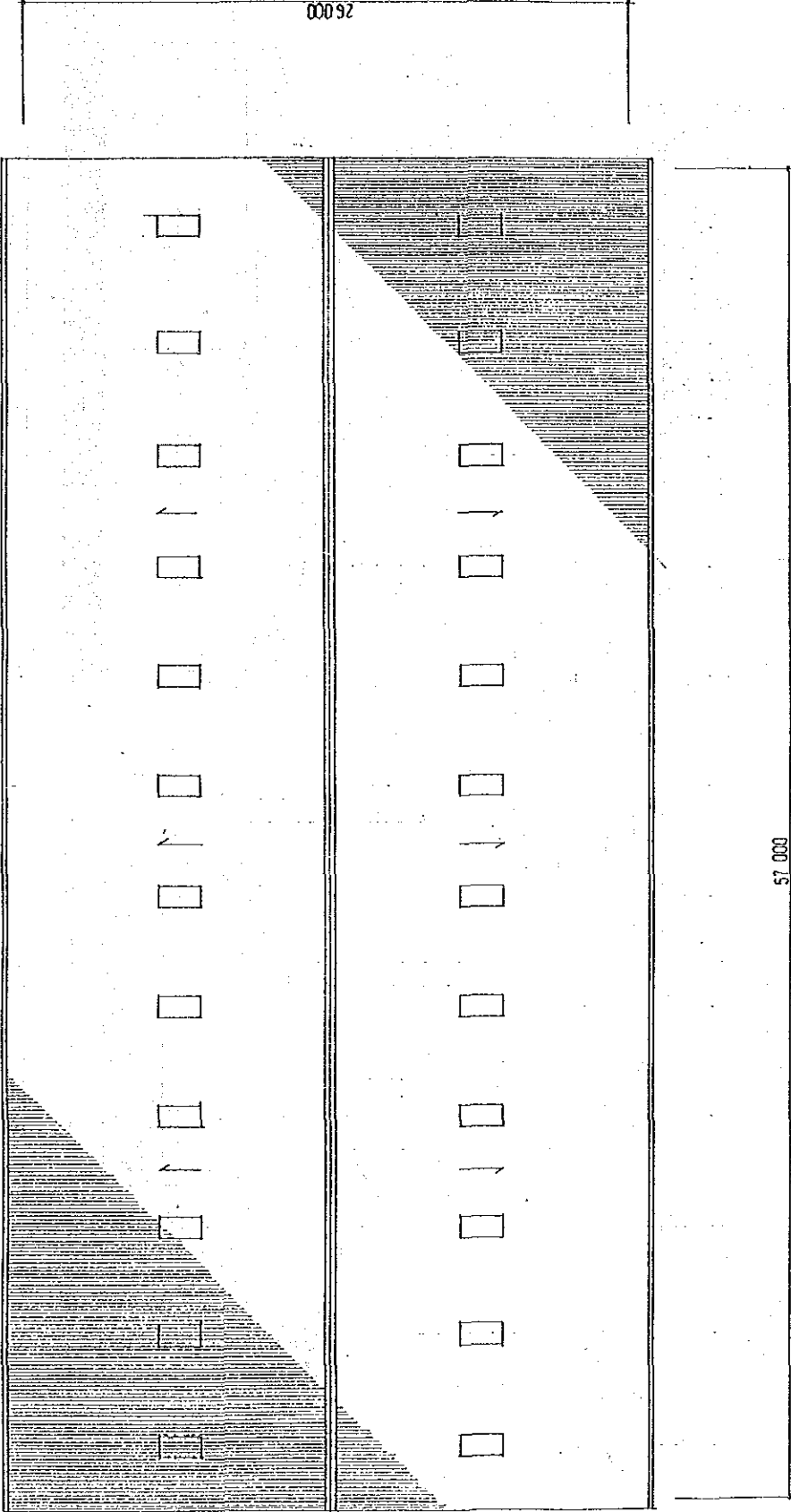
④ WHOLESALE MARKET BUILDING 3





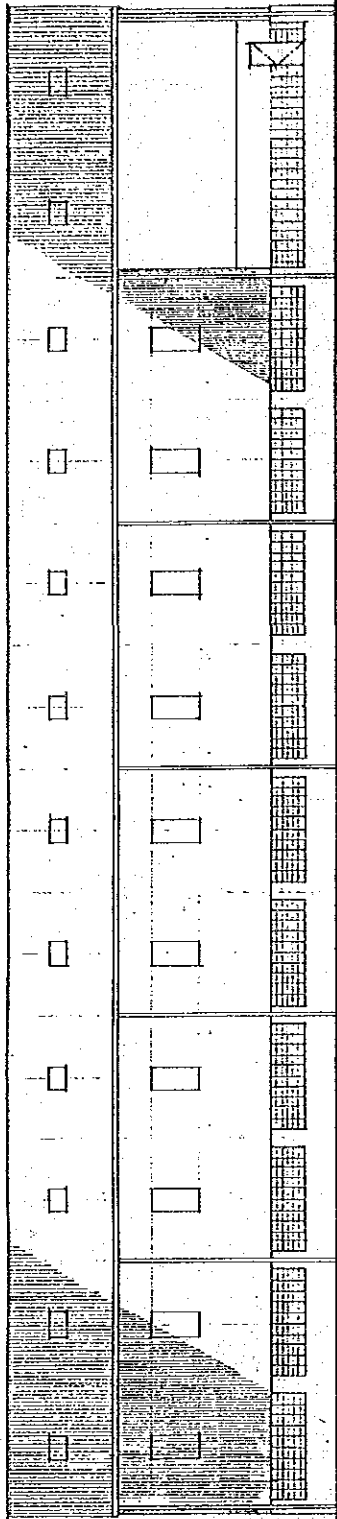
1ST STORY PLAN 1/200

⑤ ICE MAKING BUILDING I

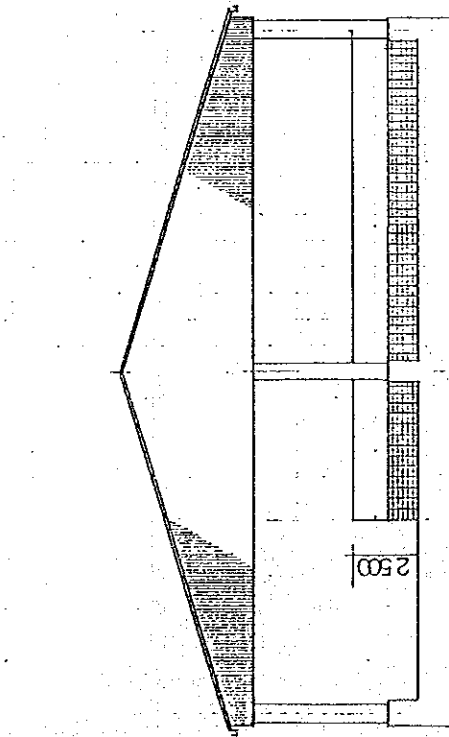


ROOF PLAN 1/200

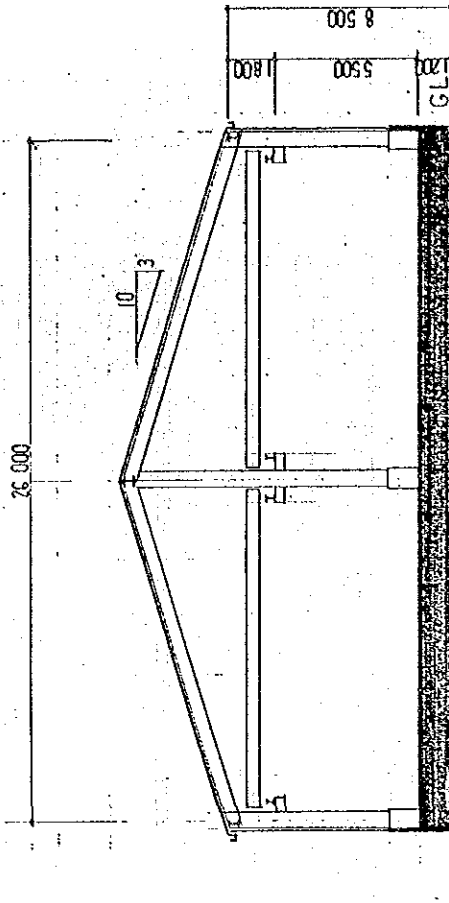
© ICE MAKING BUILDIG 2



ELEVATION 1/200

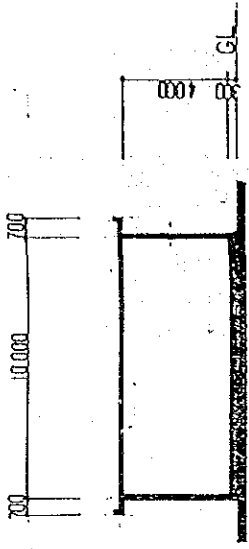


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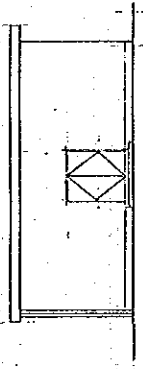


SECTION 1/200

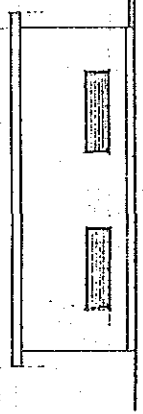
⑤ ICE MAKING BUILDING 3



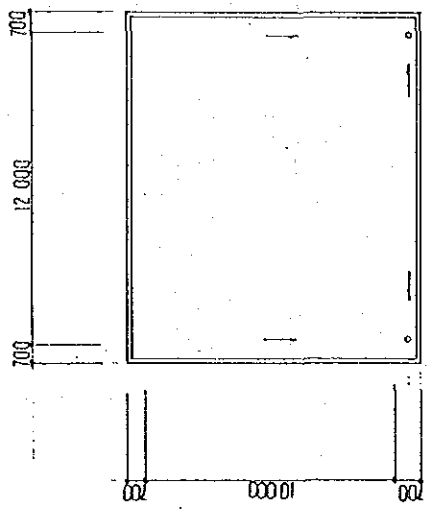
SECTION 1/200



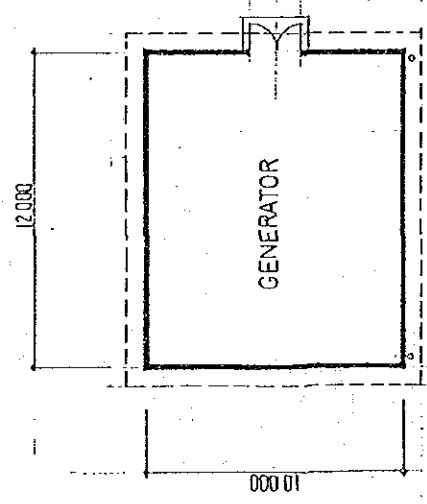
ELEVATION 1/200



ELEVATION 1/200

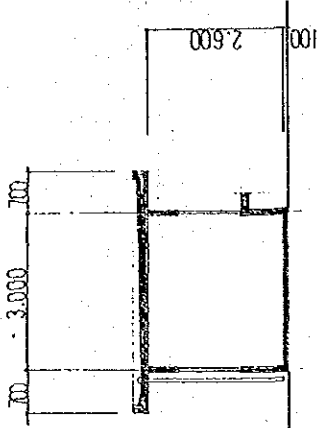


ROOF PLAN 1/200

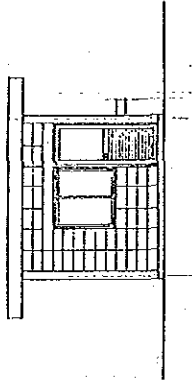


1ST STORY PLAN 1/200

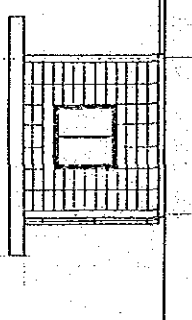
© STAND BY GENERATOR HOUSE I



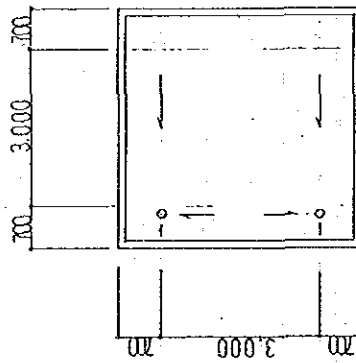
SECTION 1/100



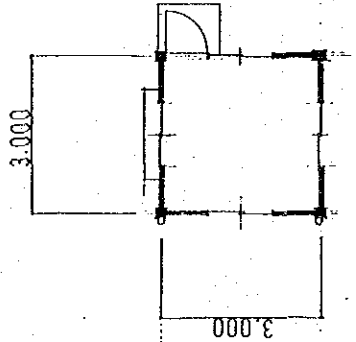
ELEVATION 1/100



ELEVATION 1/100

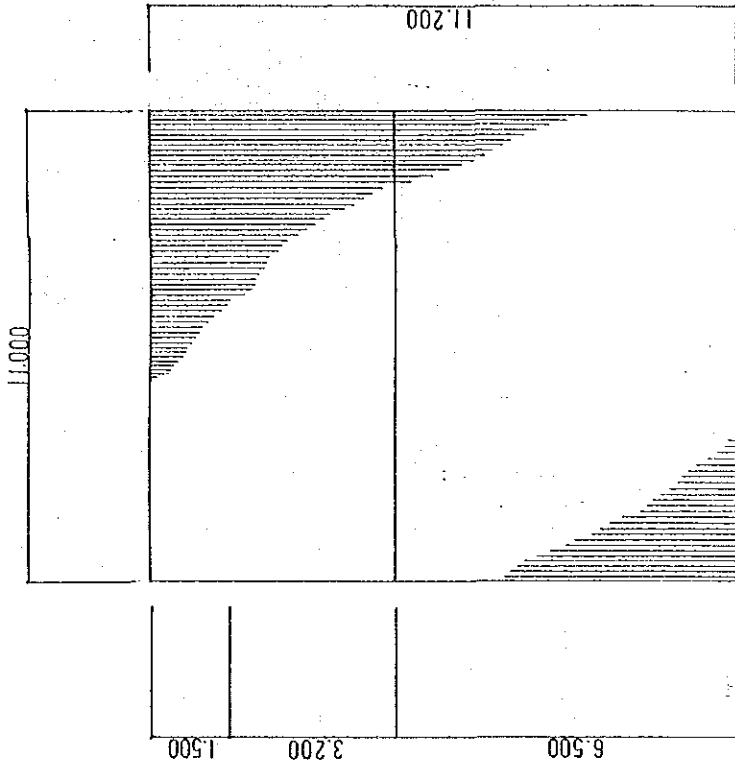


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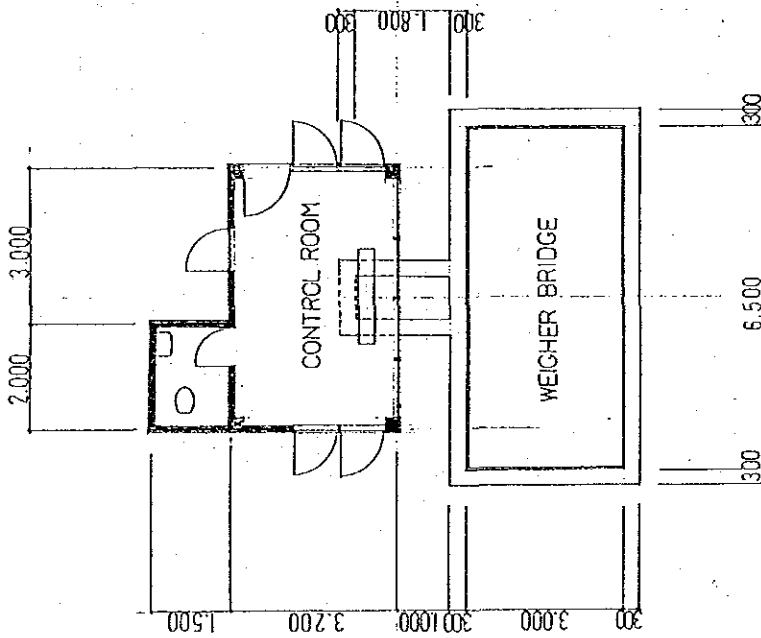


1ST STORY PLAN 1/100

⑦ SERVICE CONTRAL HOUSE I

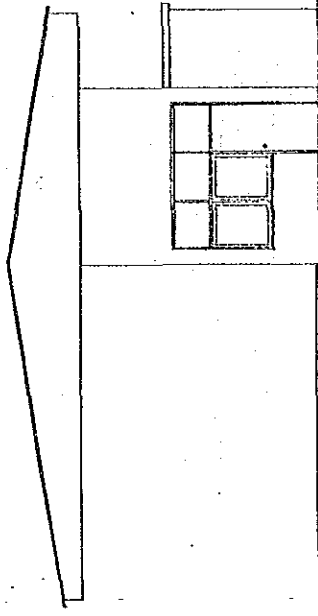


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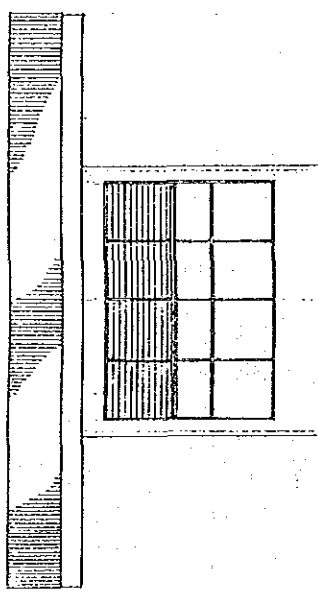


1ST STORY PLAN 1/100

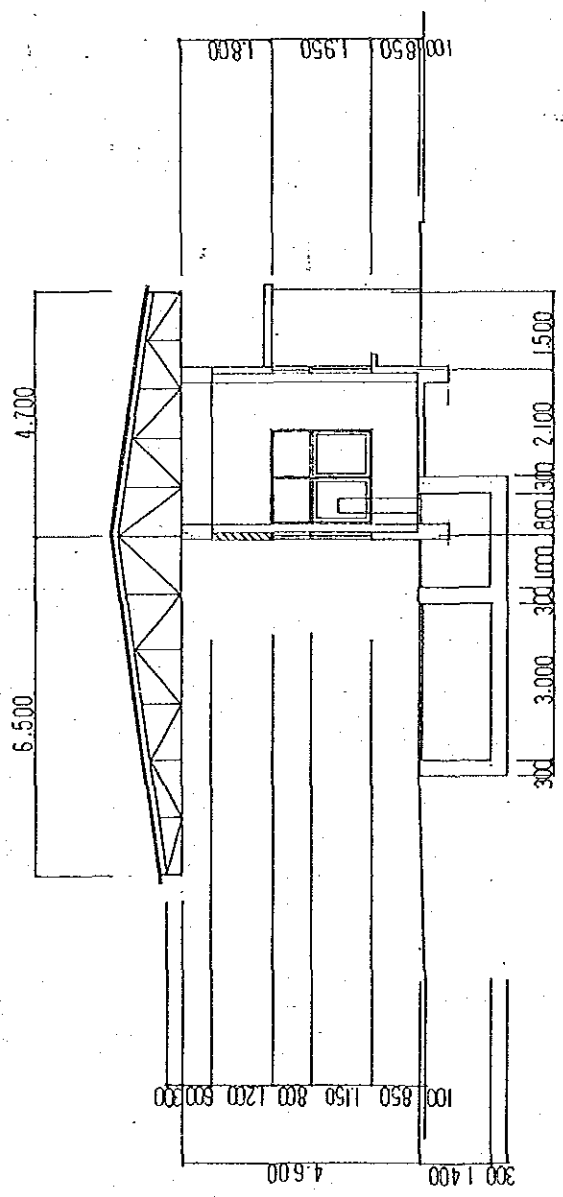
⑧ TRUCK SCALE HOUSE I



ELEVATION 1/100

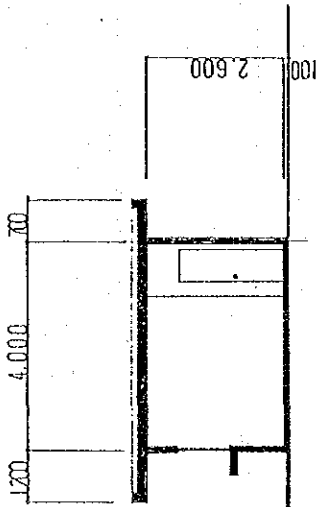


ELEVATION 1/100

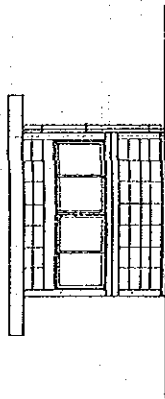


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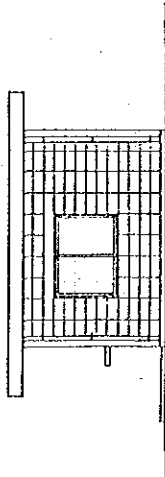
⑧ TRUCK SCALE HOUSE 2



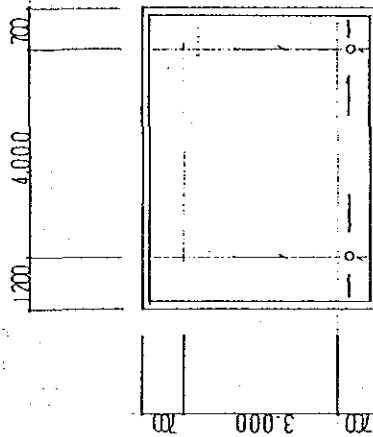
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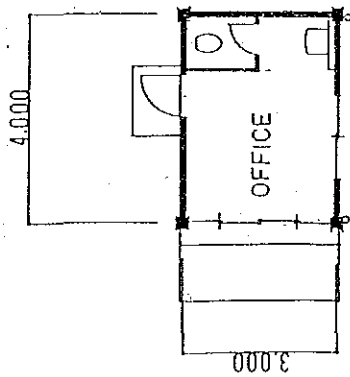
ELEVATION 1/100



ELEVATION 1/100



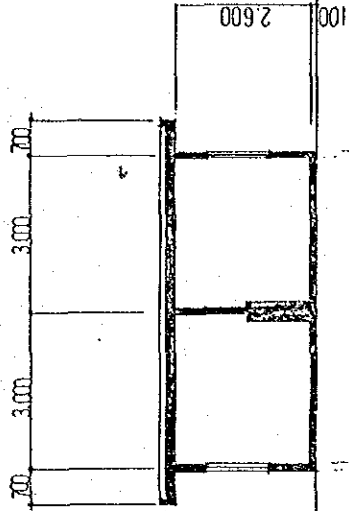
ROOF PLAN 1/100



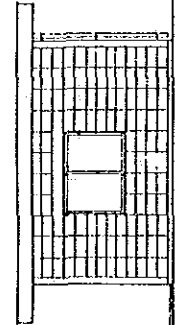
1ST STORY PLAN 1/100

9 GUARD HOUSE I

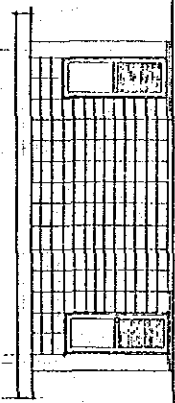




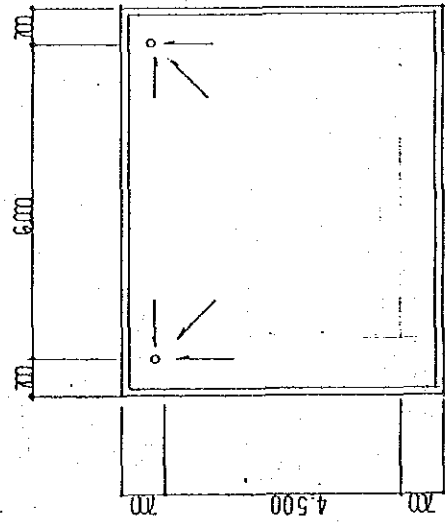
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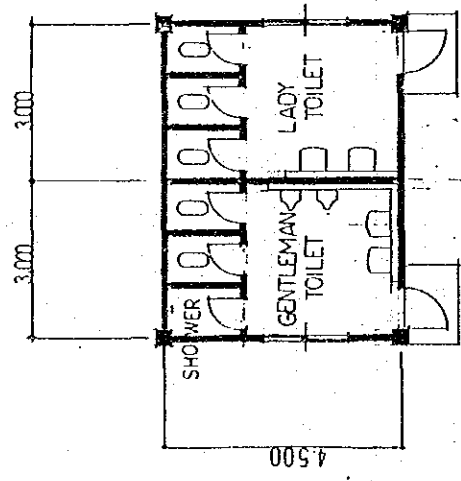
ELEVATION 1/100



ELEVATION 1/100

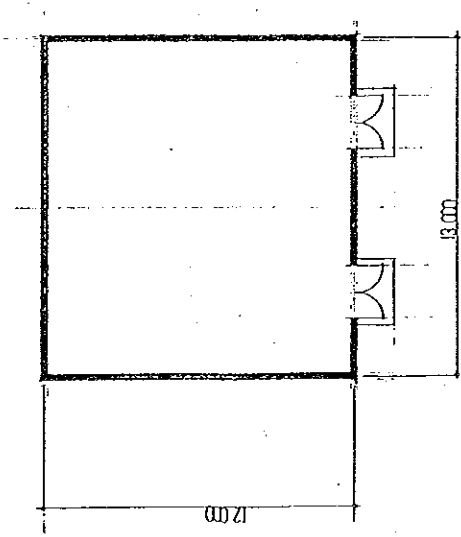
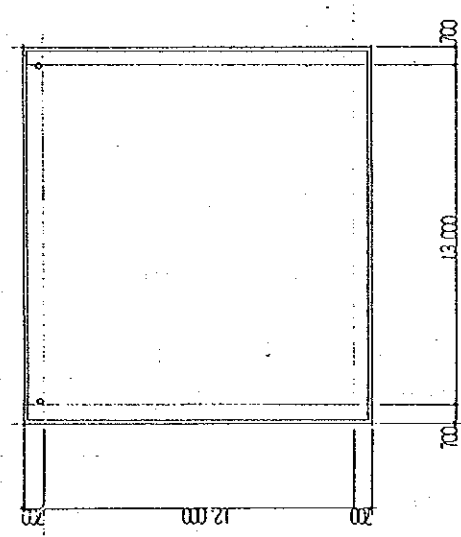
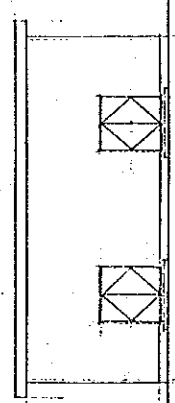
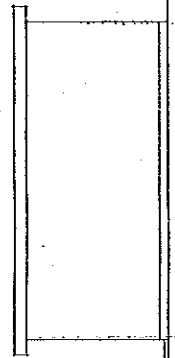
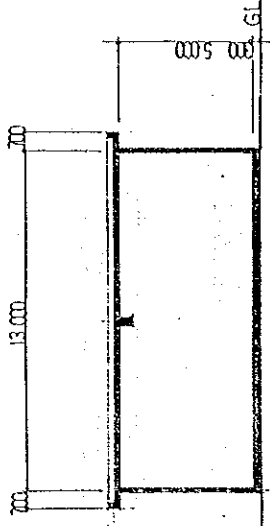


ROOF PLAN 1/100

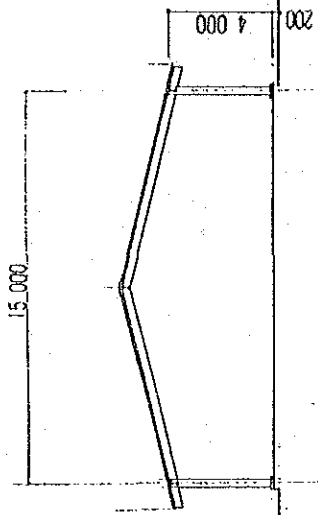


1ST STORY PLAN 1/100

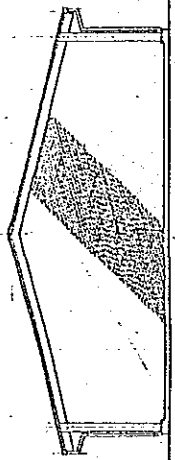
© PUBLIC TOILET I



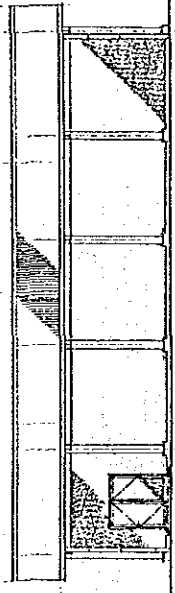
Ⓜ SUB-STATION I



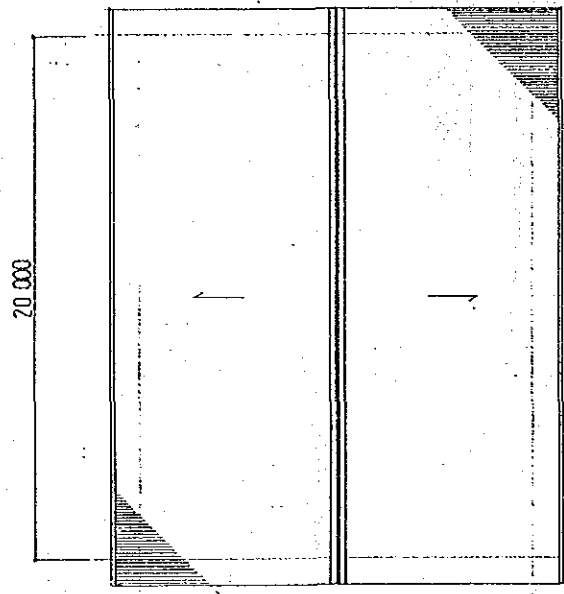
SECTION 1/200



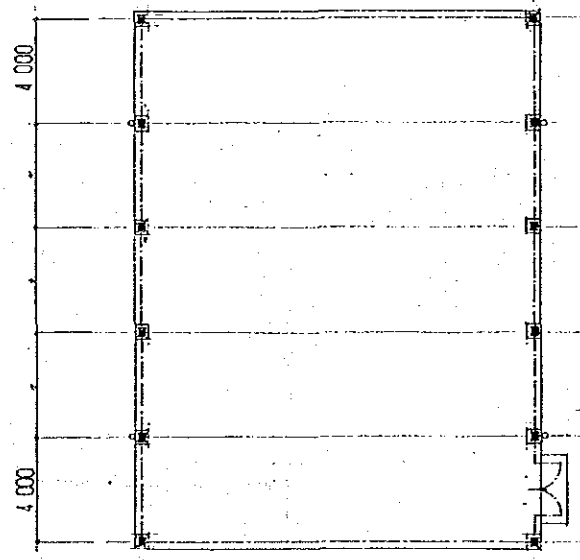
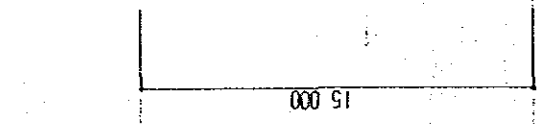
ELEVATION 1/200



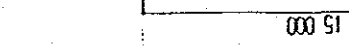
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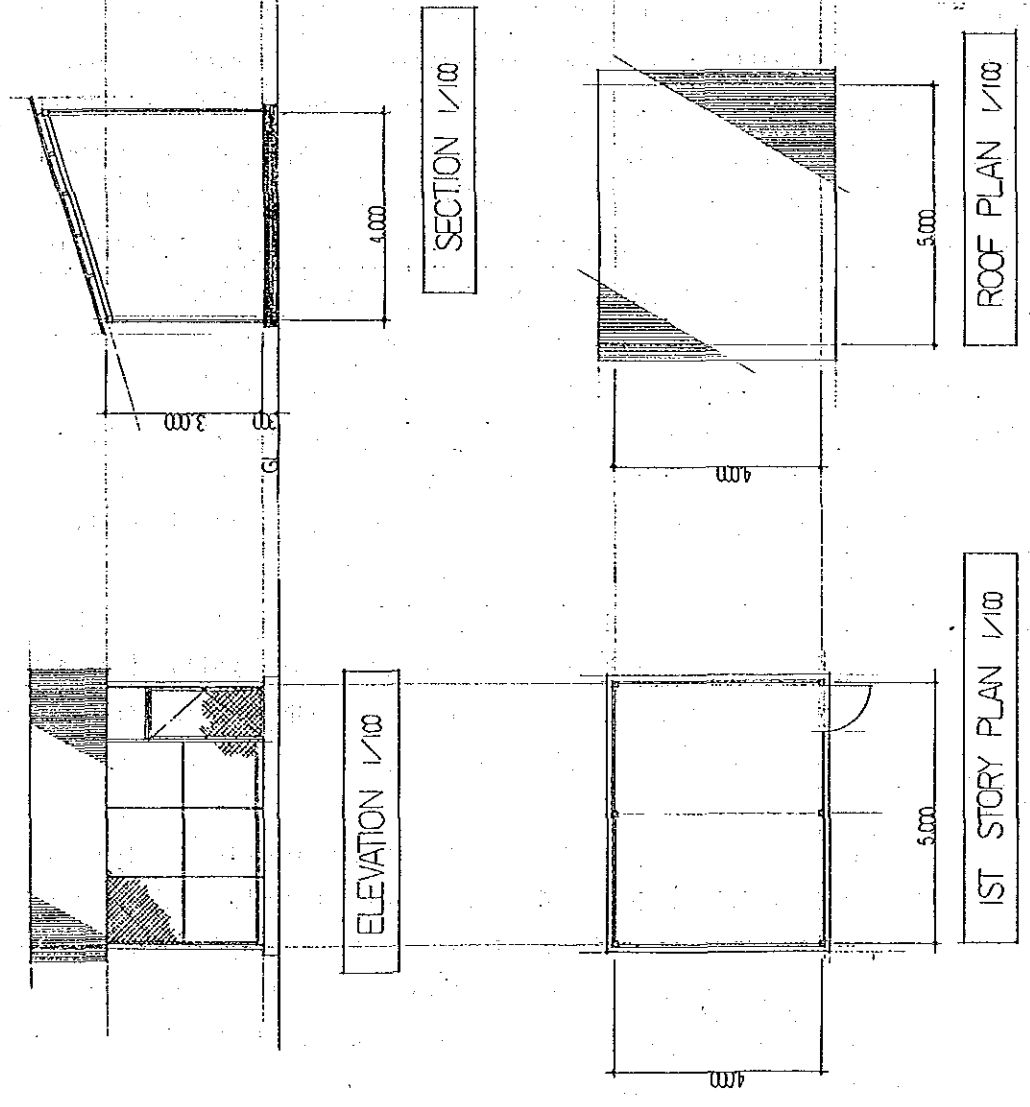
ROOF PLAN 1/200



1ST STORY PLAN 1/200



② FISH CONTAINER STRAGE I



④ PUMP HOUSE

Attachment : 6-1 Construction Circumstances in Thailand

(1) Construction equipment

It is needed to mobilize the on-land construction equipment from mainly Bangkok, when considered the volume of the construction works required for the project. Such equipment, of course, can be also employed in Nakhon Si Thammarat, but quantity and kinds of machines will be limited.

Also it might be needed to mobilize exclusively the following heavy marine construction equipment from Singapore.

- Dredger
- Pile driving barge

(2) Labour

Supply of local labour in the surrounding area of the project site is sufficient in quantity, and their skills are relatively high.

However, it is needed to employ skilled labours from Bangkok because of less such labours in vicinity of the project site. Some foreign labours are expected to be engaged for a part of the waterfront structure works such as pile driving and dredging. Minimum wage stipulated by the Ministry of Labour is taken into account in cost estimation.

(3) Construction materials

Major locally produced construction materials are summarized below.

1) Reinforcing bar

SR24, SD30 conforming to Thailand industrial standard (TIS), diameters are following to inch size system.

2) Cement

Thailand product are available in quantity and quality including sulphate-resistant portland cement to be required exclusively for waterfront structure.

3) Concrete pile

Prestressed concrete pile (PC pile) and reinforcing concrete pile (RC pile) are manufactured in Pak Phanang City.

However, such pile's dimensions are limited in small size to be used for mainly foundation of buildings. It is scheduled to transport from Bangkok big diameter PC piles of  $\phi$  600 for landing/service piers.

Other construction materials produced in Thailand are also available. Limited items of plant and project equipment are to be imported from Japan.

(4) Local contractor

The construction industry in Thailand has occupied a share of 5.3% in GDP in 1984, and 2.1% in employment population rate in 1982, indicating relatively low shares. According to the latest data of

Thailand Contractor Association (TCA), there are 4,000 contractors which are registered to the Ministry of Commerce.

There are only few big contractors in Thailand equivalent to so-called general contractor in Japan. Thailand contractors are generally small in size, still in family partnership owned, not well-developed in management. It is known that the Thai's big leading contractors who have been in joint managed with European, American or Japanese contractors are relatively in high engineering level.

When considered the scale and the particular works of the project, which need the heavy marine construction equipment, it is very hard to carry out the whole construction work by a local contractor as a main contractor. Therefore, it is recommended to employ the Thai's contractors as sub-letting and specialist contractors under control of the Japanese main contractor.

(5) Japanese contractor in Thailand

It is reported that Japanese contractors have made their activities in Thailand since 1963. Fourteen local contractors of joint-management with Japanese contractors have been registered in 1986.

A contract amount of construction works in Thailand by both of Japanese contractors and local contractors of joint-management with Japanese contractors have been estimated from 20 to 40 Billion Yen during 1979 to 1985.

Such amount in Thailand follows Malaysia, Singapore and Hong Kong in south east Asia. Such contract amount shares about 10% of whole construction industrial market in Thailand. However, there is no conflict between local contractors and Japanese contractors, because construction works done by Japanese contractors are almost international tender's ones financed by foreign countries including OECF of Japan.

The structures in Thailand which have been constructed by Japanese contractors are mainly civil engineering ones in big sized scale to be required high level in quality and time control. They are, fortunately, completed to the satisfaction of Thai's client.

Therefore Japanese contractors are highly succeeded to establish firm liability in Thailand from the employer. Also, it is said that local contractors have appreciated Japanese contractor because of engineering transfer and liability to contract performance through sub-letting of construction work.

(6) Regulations relating to construction

1) Design standard and technical specification

There is no unified local design standard and technical specification to be adopted for designing and constructing structures in Thailand. So, American (USA), European and Japanese standards are substituted in practice of designing.

In this project, the following design standards, which are most advanced and highly appreciated in the world, are used. In addition to this, local circumstances regarding materials, equipment and labours are also taken into consideration in designing.

Design standard

- Standard design method of fishing port structures  
(Editorial supervised by Ministry of Agriculture in Japan)
- Technical Standards for port and harbour facilities  
(Editorial supervised by Ministry of Transportation in Japan)
- Standard design method of building works  
(Published by Japanese Architect's Association)

- Japanese industrial standard (JIS)
- Concrete standard specification  
(Published by Japanese Civil Engineer's Association)

2) Regulation on construction activities

a) Construction profession control act (May, 1979)

The act was planned to keep the employer's profit and to develop the construction industry in Thailand through promoting smooth construction activities.

The act intended to introduce registration system according to the categorarized contractors from their engineering level and experiences. It was expected that the act will make a progress of the construction industry being in still undeveloped situation, and to push up social liability of contractors. However, upon strong disagreement from some contractors of small and middle sized, the act is not put into effect at present.

b) Regulations to control foreign company/worker

The activities against both the foreign company and foreign worker in Thailand are respectively restricted in accordance with two regulations which are established in 1972.

It is not allowed for foreign companies whose capital of 50% and more are owned by foreigners to participate in some business field of item A stipulated in this regulation

Business field of the construction industry and consulting services exclusive of works financed by foreign governments are listed in item A, therefore it is limited for Japanese contractors to participate in only works financed by foreign countries.

c) Environmental quality sandards (July, 1985)

The standards are indicating the allowable volumes in detail and completely. In designing and constructing the structures of this project, this standard is to be followed accordingly.







